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2007 Canadian Vehicle Survey

Summary Report

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Canada

Natural Resources Canada's Office of Energy Efficiency
Leading Canadians to Energy Efficiency at Home, at Work and on the Road

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Contents

List of figures and tables

Figures

Tables

Introduction

The Canadian Vehicle Survey (CVS) is a quarterly survey of vehicle transportation activities in Canada. Prior to the CVS, which began in 1999, there were few accurate estimates based on traffic data for the number of vehicle-kilometres and passenger-kilometres travelled on Canada's roads.

Since 2004, Natural Resources Canada (NRCan) has co-sponsored the CVS in collaboration with Statistics Canada and Transport Canada. Through the analysis of this data, NRCan sheds light on Canadian fuel consumption behaviour, modes of transportation and consumer trends. The objective of this survey is to encourage Canadians to make energy-efficient choices regarding their driving habits.

This report examines the composition of Canada's vehicle fleet, the main characteristics of this fleet and the patterns in vehicle use. Certain behavioural characteristics of Canadian drivers are also presented.

This summary report was prepared by Amandeep Garcha of the Demand Policy and Analysis Division of the Office of Energy Efficiency. Shane Norup supervised the project and Andrew Kormylo provided project leadership.

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Highlights

The following highlights are based on data from the 2007 CVS:

- There were almost 20 million vehicles on Canadian roads in 2007, up nearly 2.5 million since 2000. Light vehicles represented 96.4 percent, or 19.7 million vehicles. Medium trucks (2.0 percent) and heavy trucks (1.7 percent) made up the rest of the Canadian fleet.
- These vehicles travelled 332 billion vehicle-kilometres and 524 billion passenger-kilometres in 2007, representing an increase of 5 percent in vehicle-kilometres and a 0.2 percent decrease in passenger-kilometres since 2005.
- Vehicles in Canada consumed 31 billion litres of gasoline and 11 billion litres of diesel.
- Average gasoline consumption rates for light vehicles were 10.8 litres per 100 kilometres (L/100 km) and 21.7 L/100 km for medium trucks. Diesel consumption rates for medium and heavy trucks were 23.5 L/100 km and 34.5 L/100 km, respectively.
- The rate of diesel consumption among medium trucks more than 10 years old increased (8 percent) in comparison with the rate in 2005. The greatest increase in fuel consumption among heavy trucks appeared in vehicles more than 14 years old (10.6 percent).
- The driver's age and gender did not notably affect the fuel efficiency of gas-powered vehicles.
- There was a slight drop of 2 percent (from 493 725.9 km to 486 931.7 km) in passenger-kilometres travelled by light vehicles in 2007, compared with the distance travelled in 2005.
- The configuration of heavy trucks in regard to distance travelled changed significantly since 2005. The most significant changes occurred with straight trucks (an increase of 17 percent) and tractor and one trailer configurations (a decrease of 19 percent). These changes suggest that shorter distances are being travelled and that straight trucks are being used instead of larger trucks for fuel efficiency.
- Fuel efficiency for heavy trucks increased 21 percent between 2000 and 2007.

Chapter 1. Canada's on-road vehicle fleet

Canada's transportation sector includes activities related to the movement of passengers and freight by road, rail, water and air. In 2006, the sector's energy consumption accounted for almost 30 percent of total secondary energy use in Canada. The focus of the Canadian Vehicle Survey (CVS) is Canada's on-road vehicle fleet and its characteristics.

The following section describes Canada's on-road vehicle fleet, its use and its fuel consumption according to CVS data.

1.1 Number of vehicles

In 2007, there were 19 710 912 vehicles in Canada.[1] As shown in Table 1.1, vehicles can be divided into three categories: light vehicles, medium trucks and heavy trucks. In this report and for analysis purposes, the three categories are defined as follows:

- light vehicles: gross vehicle weight less than 4.5 tonnes (t)
- medium trucks: gross vehicle weight between 4.5 and 15 t
- heavy trucks: gross vehicle weight of 15 t or more

Table 1.1 Number of vehicles in Canada by vehicle type, 2000–2007

Year	Light vehicles	Medium trucks	Heavy trucks	Total
	Number of vehicles			
2000	16 642 140 A	319 500 A	255 503 A	17 217 143 A
2001	16 790 536 A	330 043 A	253 648 A	17 374 227 A
2002	17 299 423 A	315 424 A	268 411 A	17 883 258 A
2003	17 561 499 A	321 878 A	278 848 A	18 148 225 A
2004	17 782 719 A	322 555 B	279 078 B	18 162 924 A
2005	18 134 739 A	325 939 B	295 463 B	18 756 141 A
2006	18 536 955 A	331 667 B	305 947 B	19 174 569 A
2007	19 003 427 A	392 608 B	314 877 B	19 710 912 A

The letter to the right of each estimate indicates its quality: A – Excellent, B – Very good, C – Good, D – Acceptable, E – Use with caution and F – Too unreliable to be published.

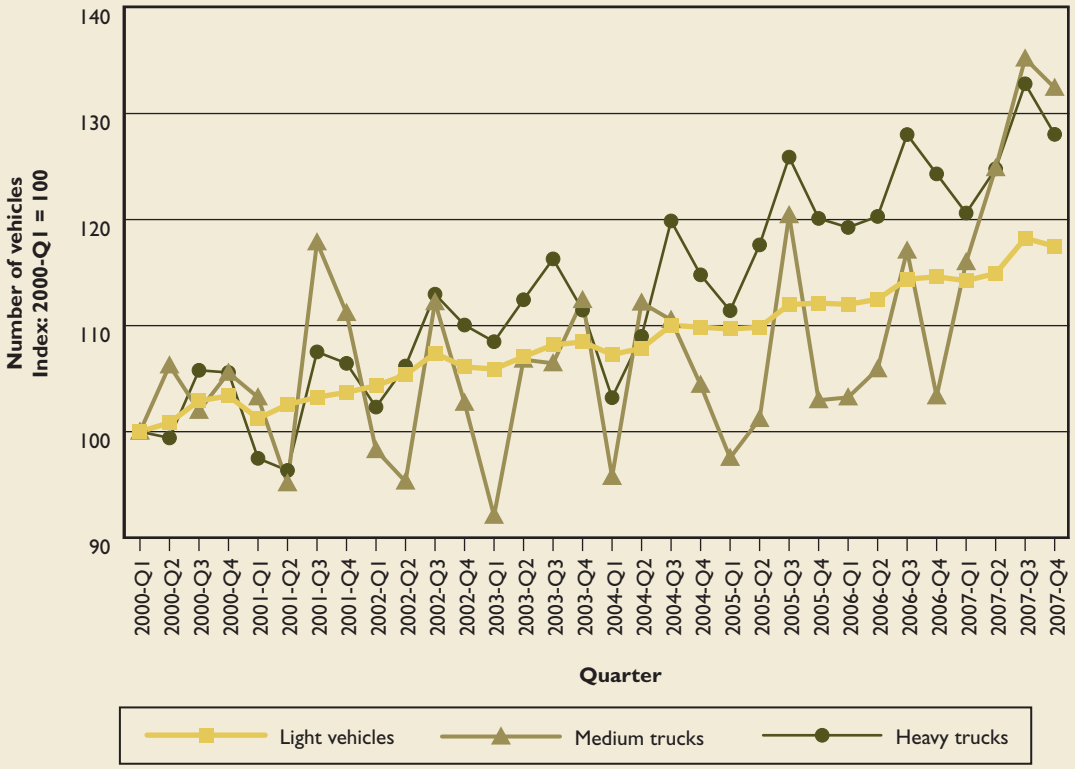
Due to rounding, the numbers in the tables may not add up, and some data may differ slightly from one table to the next.

[1] This figure represents the number of in-scope vehicles. The number of in-scope vehicles is an estimate of the average number of vehicles registered during the quarter based on the registration lists from jurisdictions and survey responses. This estimate may differ from the number of vehicles on the registration lists because it includes all survey findings. The number of in-scope vehicles includes vehicles used and those not used on the roads during the reference period.

The light vehicle category is the largest, representing 96 percent of Canada's on-road vehicle fleet in 2007.

The quarterly data highlight significant seasonal variations in the number of vehicles travelling on Canadian roads and in the use of these vehicles. The number of vehicles tends to be slightly lower during the coldest months, from January to March (first quarter, or Q1). During the summer months (Q2 and Q3), the number of vehicles driven was slightly higher than the numbers for the other two quarters of 2007. This could be explained by the fact that some vehicles are put away for part of the year, usually in the colder months. Figure 1.1 shows the quarterly estimated number of vehicles by vehicle type from 2000 to 2007.

Figure 1.1 Quarterly trends in the number of vehicles, 2000–2007



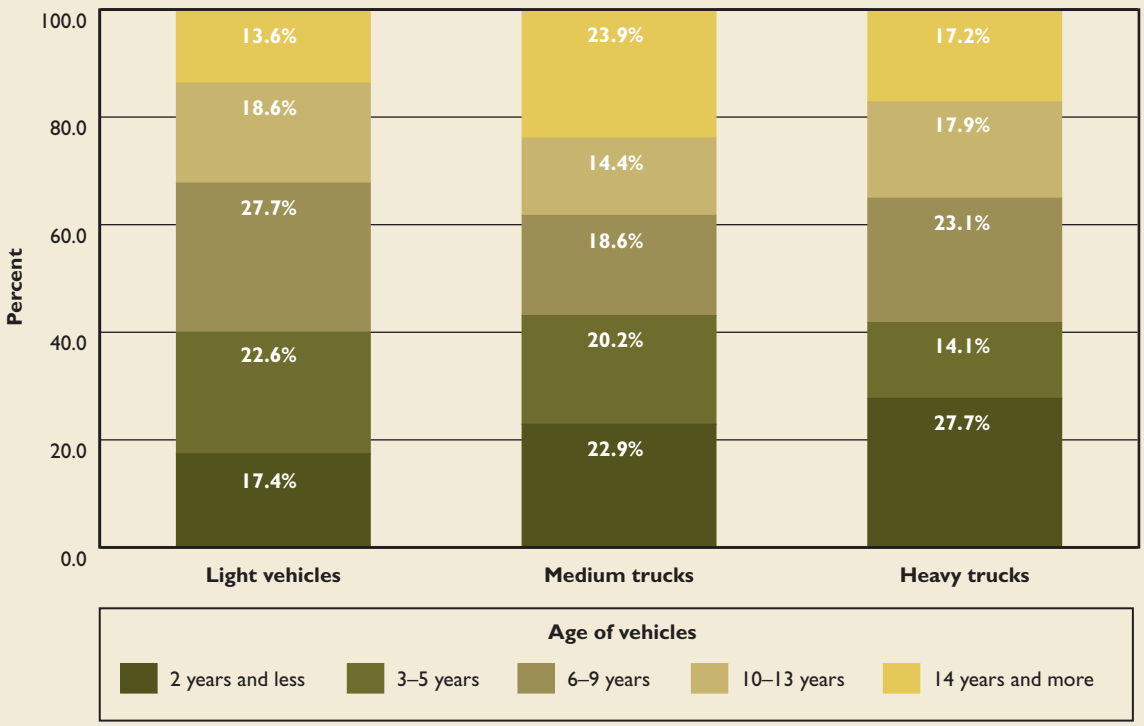
1.2 Principal characteristics of vehicles: Age and fuel type

The age of Canada's on-road vehicle fleet sheds light on various issues. For example, a vehicle's age is an important variable in analysing its use and can play a significant role in determining its fuel efficiency.

Figure 1.2 shows the distribution of vehicles in the CVS based on age. Medium trucks were the oldest vehicles, with almost 40 percent of the fleet being over 10 years old. The heavy truck segment was the youngest, with almost 30 percent of the fleet being less than two years old.

In 2007, gasoline and diesel remained the most frequently used fuels in the country. More than 99 percent of vehicles used one of these fuels. In the CVS, the gasoline category includes three grades of this fuel and gasoline-ethanol blends. Low-level ethanol blends are suitable for most vehicles and are available at more than 1100 service stations across Canada. Other types of fuel used by Canadians included propane and natural gas.[2] These alternative fuels offer several environmental benefits. For example, they can burn more cleanly and completely than gasoline and diesel, producing fewer greenhouse gases.

Figure 1.2 Age of vehicle fleet, 2007



[2] For more information on alternative fuels, visit oee.nrcan-rncan.gc.ca.

Table 1.2 shows the number of vehicles in Canada in 2007 according to fuel type. Gasoline dominated the light vehicle category, with 97 percent of vehicles using this fuel. Diesel remained the primary fuel for heavy trucks. As well, 72 percent of medium trucks used diesel, while the rest of the fleet used gasoline.

1.3 Vehicle use

In 2007, Canadian vehicles travelled more than 332 billion kilometres. Based on the information provided in Table 1.3, 90 percent of the total distance travelled was by light vehicles, 2.5 percent was by medium trucks and 7.2 percent was by heavy trucks in 2007.

Table 1.2 Number of vehicles in Canada by vehicle type and fuel type, 2007

Fuel type	Light vehicles	Medium trucks	Heavy trucks	Total
	Number of vehicles			
Gasoline	18 362 635 A	104 332 E	_ F	18 469 344 A
Diesel	576 204 B	283 974 C	311 939 B	1 172 118 C
Other*	64 587 E	– F	– F	69 450 D
Total	**19 003 427 A**	**392 608 B**	**314 877 B**	**19 710 912 A**

**Other includes electric, propane, natural gas and ethanol fuel types.*

The letter to the right of each estimate indicates its quality: A – Excellent, B – Very good, C – Good, D – Acceptable, E – Use with caution and F – Too unreliable to be published.

Due to rounding, the numbers in the tables may not add up, and some data may differ slightly from one table to the next.

Table 1.3 Vehicle-kilometres travelled in Canada by vehicle type, 2000–2007

Year	Light vehicles	Medium trucks	Heavy trucks	Total
	Vehicle-kilometres (millions)			
2000	281 985 A	5 930 A	20 716 A	308 631 A
2001	283 380 A	6 476 A	18 577 A	308 434 A
2002	290 320 A	5 440 A	18 167 A	313 927 A
2003	286 803 A	6 184 A	18 613 A	311 599 A
2004	285 164 A	7 001 B	20 829 A	312 994 A
2005	289 717 A	6 195 B	21 601 A	317 512 A
2006	296 871 A	7 438 B	21 837 A	326 145 A
2007	300 203 A	8 150 B	23 922 A	332 275 A

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From 2000 to 2007, light vehicles' share of total vehicle-kilometres travelled decreased by slightly more than one percentage point. Although the total distance travelled by light vehicles increased by 6 percent over the same period, the distance travelled by medium trucks and heavy trucks increased more (37 percent and 15 percent respectively).

The number of passenger-kilometres reveals a lot about Canadians' driving habits, e.g. the occupancy rates. In 2007, over 524 billion passenger-kilometres were travelled, representing a slight decrease from the previous two years. This information is presented in Table 1.4, with figures dating back to 2000.

Table 1.4 Passenger-kilometres travelled in Canada by vehicle type, 2000–2007

Year	Light vehicles	Medium trucks	Heavy trucks	Total
	Passenger-kilometres (millions)			
2000	475 074 A	n/a	n/a	475 074 A
2001	460 624 A	9 296 C	19 761 B	489 681 B
2002	470 580 A	7 552 B	20 414 B	498 545 B
2003	463 466 A	8 911 D	20 033 B	492 409 B
2004	471 164 A	9 275 B	22 687 A	503 125 A
2005	496 961 A	7 822 B	24 407 A	529 189 A
2006	491 756 A	9 661 B	23 899 A	525 316 A
2007	486 932 A	11 151 B	26 367 A	524 450 A

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Due to rounding, the numbers in the tables may not add up, and some data may differ slightly from one table to the next.

A comparison of passenger-kilometres with vehicle-kilometres is found in Figure 1.3.

Another area of interest is the intensity with which Canadians use their vehicles, as demonstrated by two indicators:

- the per capita number of vehicle- and passenger-kilometres travelled
- the average number of vehicle-kilometres travelled per vehicle

In 2007, there were 15 797 vehicle-kilometres and 25 623 passenger-kilometres travelled per light vehicle in Canada. In addition to these data, the survey shows that in 2007, each medium truck and heavy truck travelled an average annual distance of 20 758 kilometres (km) and 75 971 km respectively. From 2000 to 2007, the average distance travelled per light vehicle steadily decreased (by 7 percent), as shown in Figure 1.4.

Figure 1.3 Quarterly passenger- and vehicle-kilometres travelled by light vehicles, 2000–2007

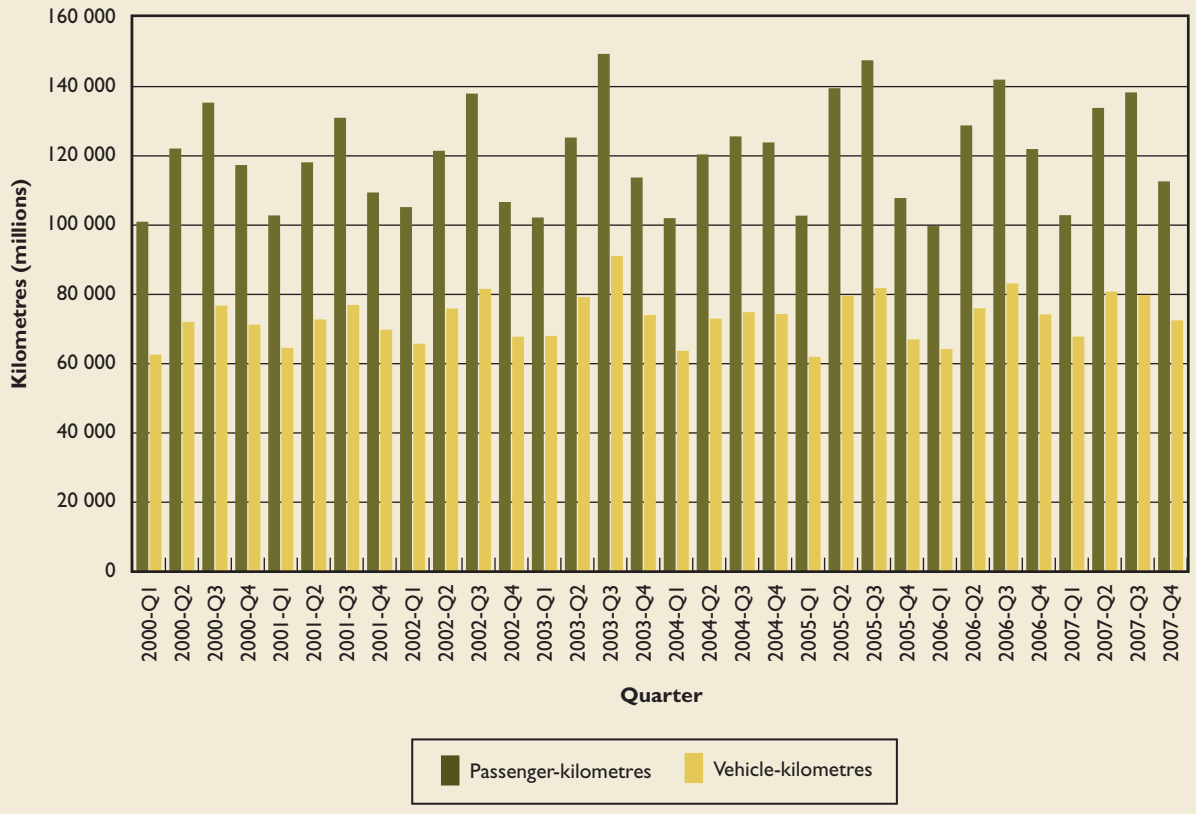
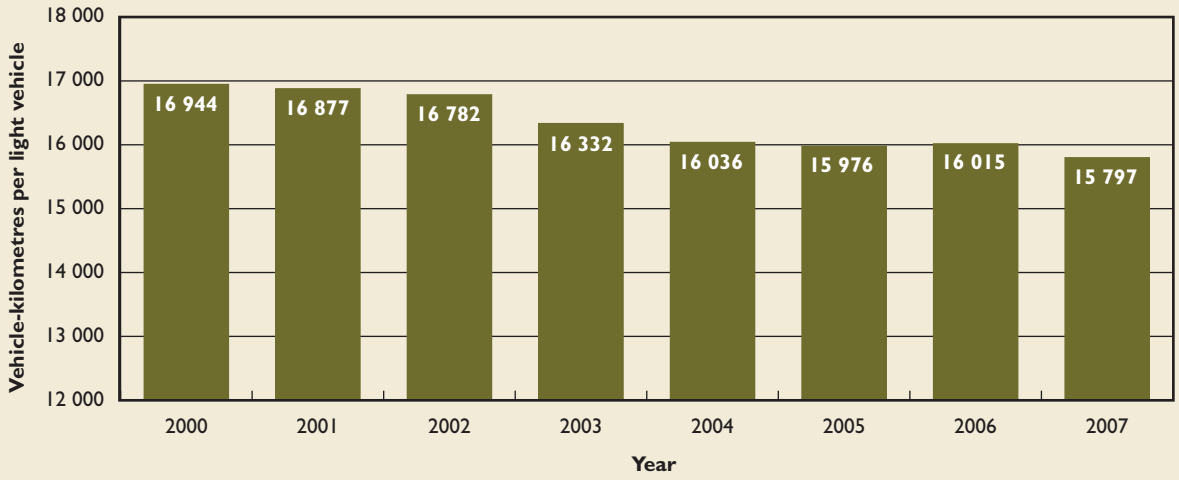


Figure 1.4 Vehicle-kilometres travelled per light vehicle, 2000–2007



1.4 Vehicle fuel consumption

Table 1.5 shows gasoline and diesel consumption in 2007 by vehicle type. The total consumption in 2007 was 32 billion litres of gasoline and 11 billion litres of diesel.

Table 1.5 Fuel consumption, 2007

Fuel type	Light vehicles	Medium trucks	Heavy trucks	Total
	Fuel consumed (millions of litres)			
Gasoline	31 305.0 B	319.2 D	– F	31 647.3 C
Diesel	1 292.1 E	1 554.5 B	8 218.8 A	11 065.5 B

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In conjunction with fuel consumption data, fuel efficiency by vehicle type can be calculated. Table 1.6 shows fuel consumption rates based on vehicle type and fuel type for 2007. Light vehicles averaged 10.8 litres per 100 km (L/100 km) (gasoline). Medium trucks averaged 21.7 L/100 km (gasoline) and 23.5 L/100 km (diesel). Heavy trucks averaged 34.5 L/100 km (diesel). The analysis following in chapters 3 and 4 shows that various factors affect the fuel consumption rates of light vehicles and medium and heavy trucks.

Table 1.6 also shows the increase in fuel efficiency since 2000. Light vehicles, already the most fuel-efficient class of vehicle, were 4 percent more fuel efficient in 2007. Medium trucks also made improvements in fuel efficiency in the gasoline and diesel categories, by 9 percent and 7 percent respectively. Heavy trucks witnessed a substantial 21 percent increase in fuel efficiency from 2000 to 2007. This increase can be attributed to such factors as electronic engines, improved vehicle specifications, advanced vehicle aerodynamics and on-board monitoring.[3] Furthermore, lighter loads can have an impact on fuel efficiency. However, the 2007 CVS does not have load data information at this time.

The CVS findings in Figure 1.5 illustrate the relationship between light-vehicle travel and gas prices. During the coldest months (Q1), gas prices and vehicle-kilometres dropped as people drove less during the colder months. During the warmer months (Q3), there was a rise in gas prices and vehicle-kilometres driven. As a result, there was some correlation between vehicle-kilometres driven and gas prices.

Table 1.6 Fuel consumption rates by vehicle type and fuel type, 2000 and 2007

Year	2000	2007	2000	2007
Type of vehicle	**Gasoline** (L/100 km)		**Diesel** (L/100 km)	
Light vehicles	11.2 A	10.8 A	n/a	12.3 C
Medium trucks	23.8 B	21.7 A	25.4 A	23.5 A
Heavy trucks	n/a	31.5 B	43.5 A	34.5 A

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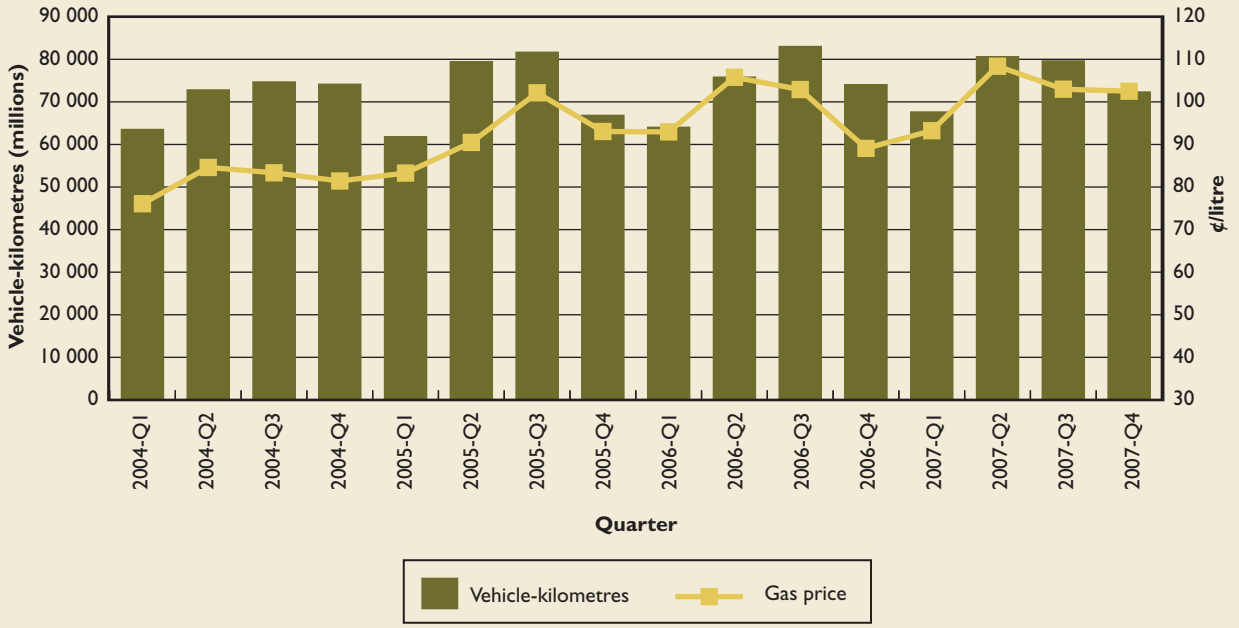
Due to rounding, the numbers in the tables may not add up, and some data may differ slightly from one table to the next.

[3] oee.nrcan-rncan.gc.ca/transportation/business/documents/case-studies/fuel-effic-benchm.cfm

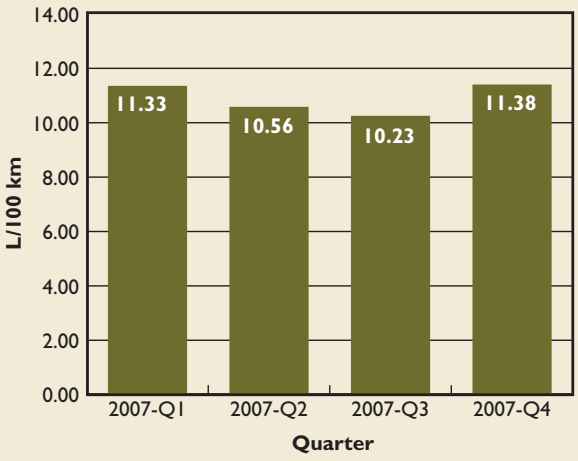
Figure 1.5 Quarterly trends in kilometres travelled by light vehicles in relation to gas prices, 2004–2007



On-road vehicle fuel efficiency is another factor that could be related to quarterly fluctuations in gas consumption. Gas consumption is affected not only by the distance travelled and driver behaviour but also by the temperature – through idling, as shown in the *Fuel Consumption Guide* produced annually by Natural Resources Canada.[4]

Figure 1.6 shows that the fuel efficiency of gasoline-powered light vehicles was worse during the colder months (first and fourth quarters). The differences could be attributed to various factors, such as people letting their vehicles idle in the cold weather either to warm up the engine or as a result of more congestion due to unplowed roads and poor weather conditions.

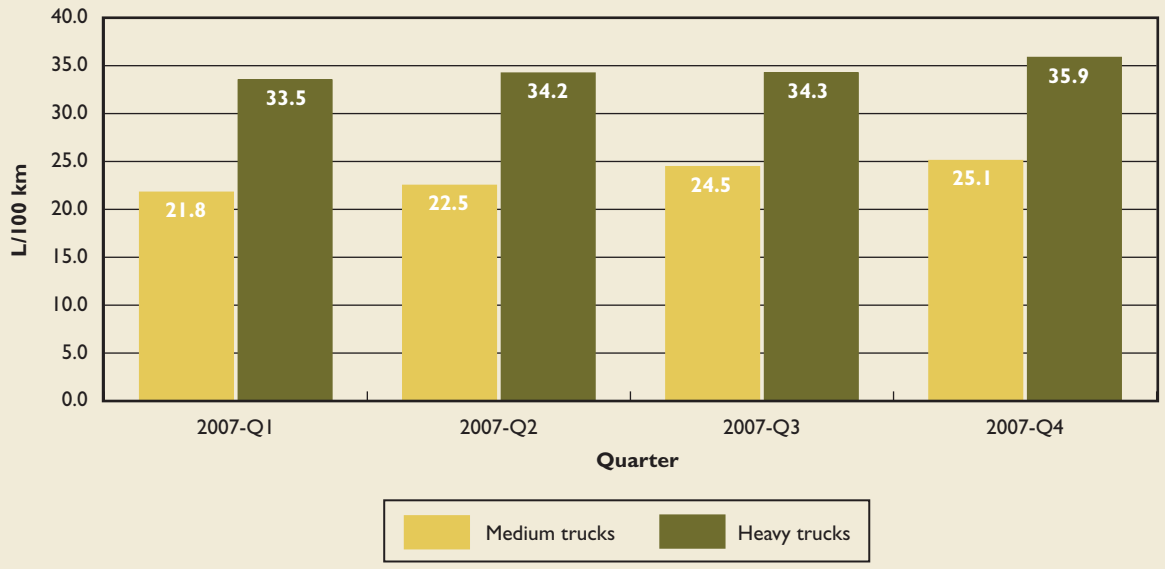
Figure 1.6 Gasoline consumption rate by quarter for light vehicles, 2007



[4] For more information on the *Fuel Consumption Guide*, visit the Office of Energy Efficiency Web Site at ecoaction.gc.ca/vehicles.

Figure 1.7 shows CVS estimates for the fuel efficiency of diesel-powered medium and heavy trucks for the four quarters of 2007. Diesel consumption rates did not vary significantly between quarters and thus may not be related to seasonal temperatures.

Figure 1.7 Quarterly diesel consumption rate for medium and heavy trucks, 2007



Chapter 2. Geographic analysis

This chapter highlights regional and provincial/territorial variations in the composition and use of the vehicle fleet and in vehicle fuel efficiency.

2.1 Composition of the on-road vehicle fleet in Canada's provinces and territories

Provincial and territorial distribution of on-road vehicles in Canada shows that Ontario had the most vehicles in 2007, with 7 million vehicles. The next highest numbers were in Quebec (4.5 million) and Alberta and British Columbia (2.6 million each). These four provinces represented more than 85 percent of all vehicles in Canada. Figures 2.1a and 2.1b show the high correlation between vehicle distribution in and population of each region of the country.

Table 2.1 Number of vehicles in Canada by vehicle type and jurisdiction, 2007

Jurisdiction	Light vehicles	Medium trucks	Heavy trucks	Total
		Number of vehicles		
Newfoundland and Labrador	267 464 B	3 575 E	2 881 E	273 919 B
Prince Edward Island	76 985 C	1 328 E	2 613 E	80 926 C
Nova Scotia	537 784 B	7 517 E	7 671 E	552 973 B
New Brunswick	462 710 B	5 913 E	4 036 E	472 658 B
Quebec	4 417 295 A	46 237 E	39 156 D	4 502 689 A
Ontario	6 957 086 A	84 345 D	112 902 C	7 154 332 A
Manitoba	641 456 B	10 625 E	16 446 E	668 527 B
Saskatchewan	676 469 B	33 960 E	26 533 E	736 963 B
Alberta	2 421 733 B	106 735 D	82 704 D	2 611 173 B
British Columbia	2 495 210 B	89 701 E	16 972 E	2 601 883 B
Yukon	25 423 A	1 662 C	1 332 C	28 417 A
Northwest Territories	21 302 A	808 D	1 463 B	23 573 A
Nunavut	3 123 B	270 E	223 E	3 493 B
Total	**19 003 427 A**	**392 608 B**	**314 878 B**	**19 710 912 A**

The letter to the right of each estimate indicates its quality: A – Excellent, B – Very good, C – Good, D – Acceptable, E – Use with caution and F – Too unreliable to be published.

Due to slight variations in the estimated values, the sum of the jurisdictions may not exactly equal the total, and some data may differ slightly from one table to the next.

Figure 2.1a Distribution of vehicle fleet among provinces and territories, 2007

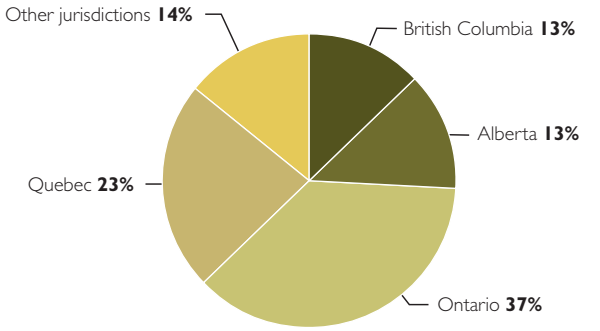
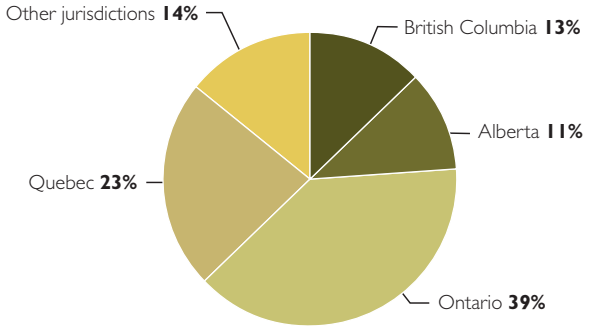


Figure 2.1b Distribution of population among provinces and territories, 2007

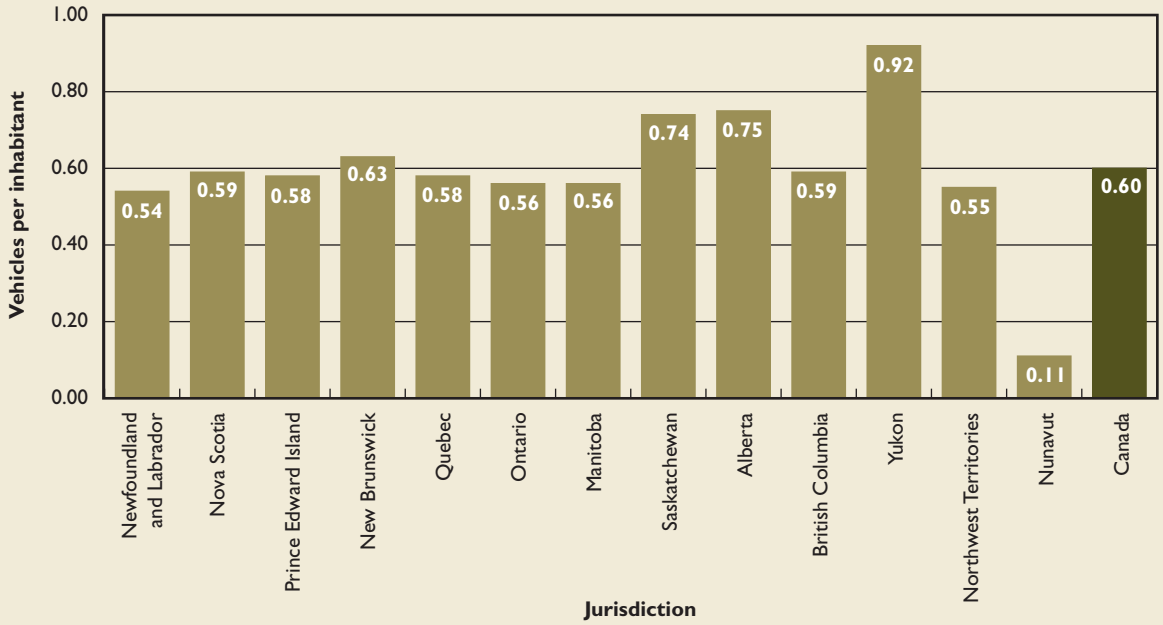


Light vehicles represented 96 percent of the vehicles in Canada. However, in Nunavut, Northwest Territories and Yukon, light vehicles made up only 86 percent, 90 percent and 89 percent respectively of the vehicle fleet. These variations could be attributed to many factors, including terrain, weather, cost, limited road infrastructure and the use of off-road vehicles.

Medium and heavy trucks made up less than 10 percent of the remaining fleet nationally. The percentage of medium and large trucks in the on-road vehicle fleet was largest in Nunavut, Yukon, Saskatchewan and Alberta. The trucks accounted for more than 4 percent of the fleet in these four jurisdictions in 2007. Factors attributed to this include extreme weather conditions and industrial requirements.

As shown in Figure 2.2, the per capita number of vehicles was close to the Canadian average in each jurisdiction except for Nunavut, Saskatchewan, Alberta and Yukon. Moreover, the national average was less than one vehicle for every person (0.6 per capita) in 2007. Nunavut had the lowest number of vehicles, with only one vehicle per 10 inhabitants in 2007 (0.1 per capita). This low rate could be attributed to fewer roads and large distances between population centres. Weather could also play a role, e.g. long winters could mean more reliance on snowmobiles and all-terrain vehicles.

Figure 2.2 Number of vehicles per capita, 2007



2.2 Vehicle use in Canada's provinces and territories

The 2007 CVS reveals a strong correlation among distance travelled, fuel consumption and population demographics. The greatest distances travelled and the highest consumption of gasoline and diesel occurred in the most heavily populated regions.

Table 2.2 shows regional differences in distance travelled and fuel consumption. More than one third (37 percent) of diesel consumption in 2007 was in the Prairie provinces, although this region accounts for less than one quarter (23 percent) of the distance travelled in Canada. This consumption may be linked to the high number of vehicle-kilometres of heavy vehicles in Manitoba, Saskatchewan and Alberta (see Figures 2.4a and 2.4b). Light vehicles represented 94 percent of the vehicle-kilometres in Canada (excluding the Prairie provinces), but only 83 percent of the vehicle-kilometres travelled in the Prairie provinces. Medium and heavy trucks accounted for 17 percent of the vehicle-kilometres driven in the Prairie provinces, whereas they accounted for only 6 percent in other provinces and territories.

Table 2.2 Distance travelled and fuel consumption in the provinces and territories, 2007

Jurisdiction	Vehicle-kilometres	Passenger-kilometres	Gasoline	Diesel	Population
	(millions of km)		(millions of litres)		(thousands)
Newfoundland and Labrador	4 362 B	7 370 B	421 E	86 D	506.3
Prince Edward Island	1 434 C	2 319 D	136 E	32 E	138.6
Nova Scotia	10 613 B	17 908 B	995 D	252 D	934.1
New Brunswick	8 114 B	13 182 B	786 D	84 E	749.8
Quebec	70 702 A	114 622 B	6 422 C	1 953 B	7 700.8
Ontario	125 287 A	196 184 A	12 295 C	3 856 B	12 803.9
Manitoba	13 840 B	22 672 B	1 236 D	656 C	1 186.7
Saskatchewan	13 448 B	21 365 B	1 253 D	676 C	996.9
Alberta	47 798 B	71 630 B	4 413 C	2 736 B	3 474.0
British Columbia	35 799 B	57 198 B	3 691 D	735 D	4 380.3
Yukon	487 B	n/a	n/a	n/a	31.0
Northwest Territories	359 B	n/a	n/a	n/a	42.6
Nunavut	33 D	n/a	n/a	n/a	31.1
Total	**332 276 A**	**524 450 A**	**31 647 B**	**11 066 A**	**32 976.1**

The letter to the right of each estimate indicates its quality: A – Excellent, B – Very good, C – Good, D – Acceptable, E – Use with caution and F – Too unreliable to be published.

Due to rounding, the numbers in the tables may not add up, and some data may differ slightly from one table to the next.

Figure 2.3 shows how many kilometres Canadians travel annually by province and territory. The Canadian average was just over 10 000 kilometres (km), with significant fluctuations witnessed in Nunavut, Yukon, Alberta and Saskatchewan. For the latter three jurisdictions, one likely explanation is that people have to drive further to do their daily activities. As for Nunavut, there are few vehicles; moreover, people tend to drive shorter distances and less frequently. The use of snow transport (e.g. snowmobiles) is more commonplace in Canada's northern regions.

Figure 2.3 Vehicle-kilometres by population in the provinces and territories, 2007

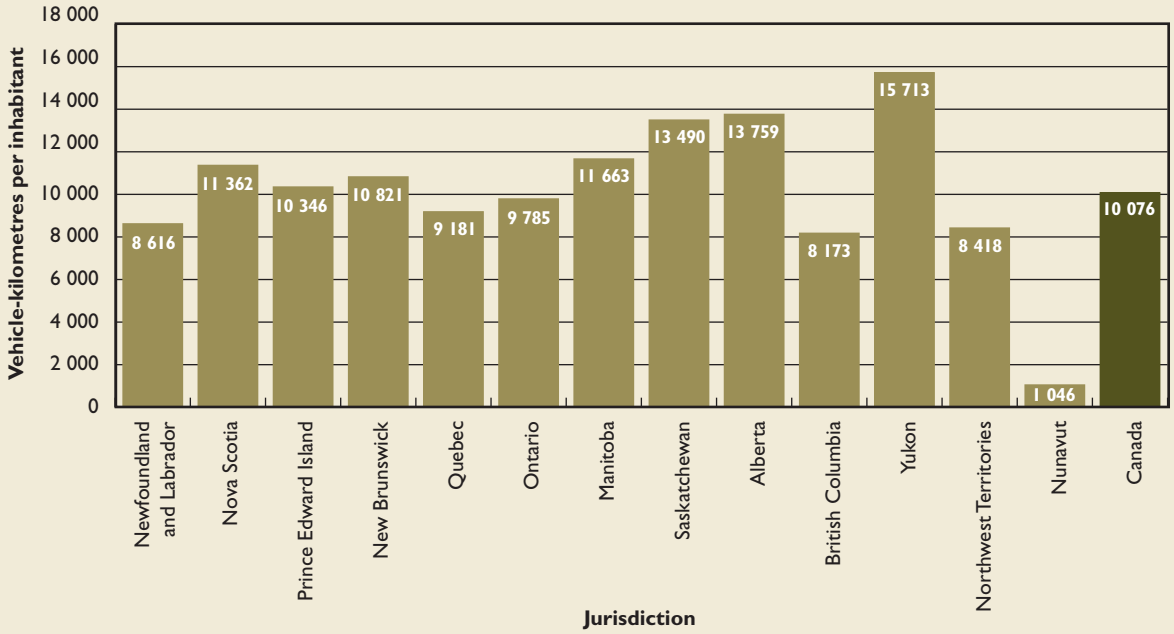


Figure 2.4a Distance travelled in the Prairie provinces by vehicle type, 2007

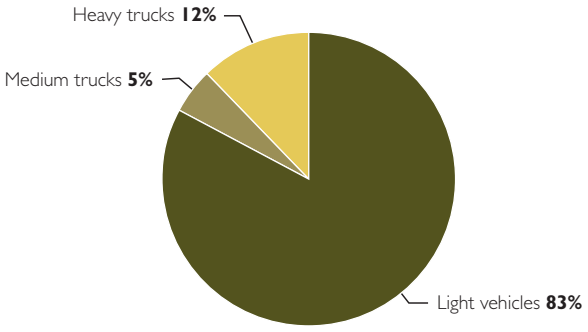
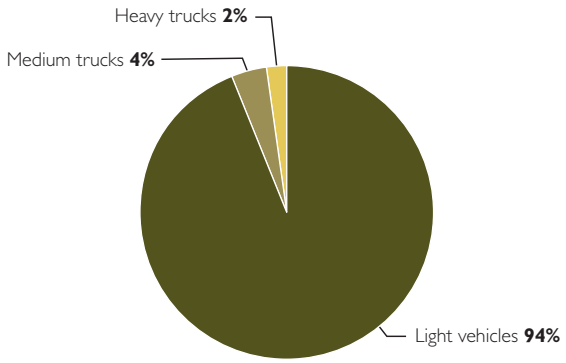
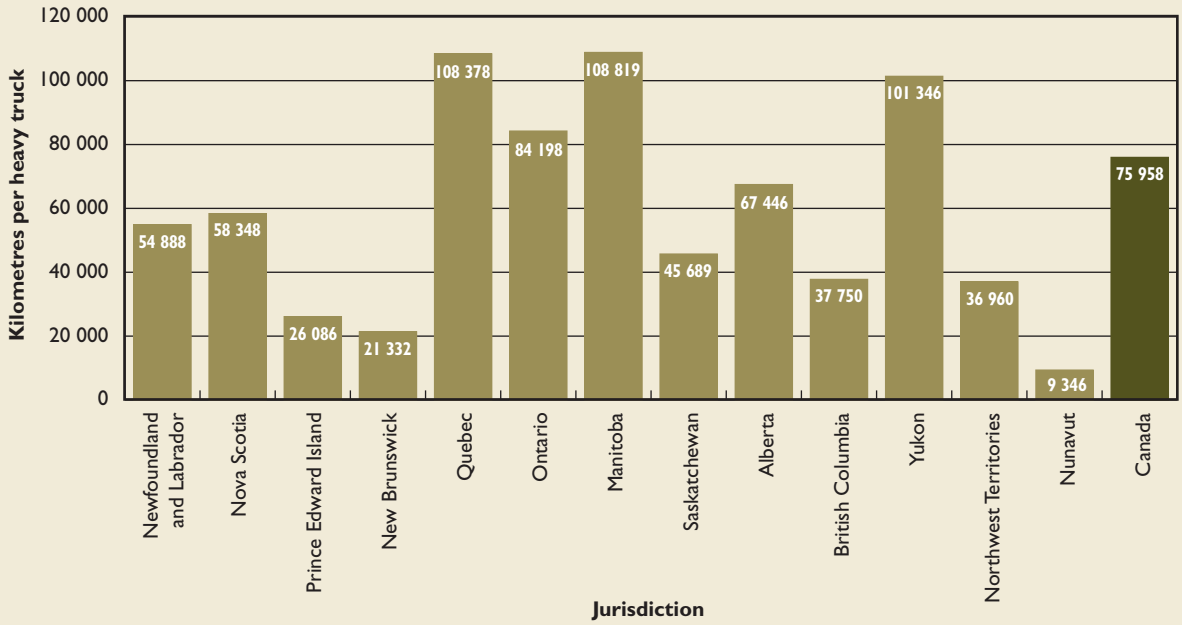


Figure 2.4b Distance travelled in Canada excluding the Prairie provinces by vehicle type, 2007



Another variable that reveals interesting provincial and territorial variations is the average distance travelled by vehicle type. While there were some minor regional differences in the use of light vehicles and medium trucks, the distance travelled per vehicle was similar in most jurisdictions. However, the average distance travelled per heavy truck varied from one jurisdiction to the next, as shown in Figure 2.5. The Canadian average of 75 958 km was exceeded in only four jurisdictions: Ontario, Manitoba, Quebec and Yukon. In Manitoba and Quebec, heavy trucks were used more intensively than in the rest of Canada, travelling an average of more than 100 000 km each year. Manitoba is ideal for heavy trucking because of its demographic centrality, insufficient rail line infrastructure[5] and high trade activity between the Emerson, Manitoba, and Pembina, North Dakota, border crossing. The 2007 survey shows that the annual average distance travelled by heavy trucks was less than 40 000 km in Nunavut, New Brunswick, Prince Edward Island, Northwest Territories and British Columbia.

Figure 2.5 Average annual distance travelled by heavy trucks by jurisdiction, 2007



[5] www.tc.gc.ca/pol/en/Report/anre2001/tc0109be.htm

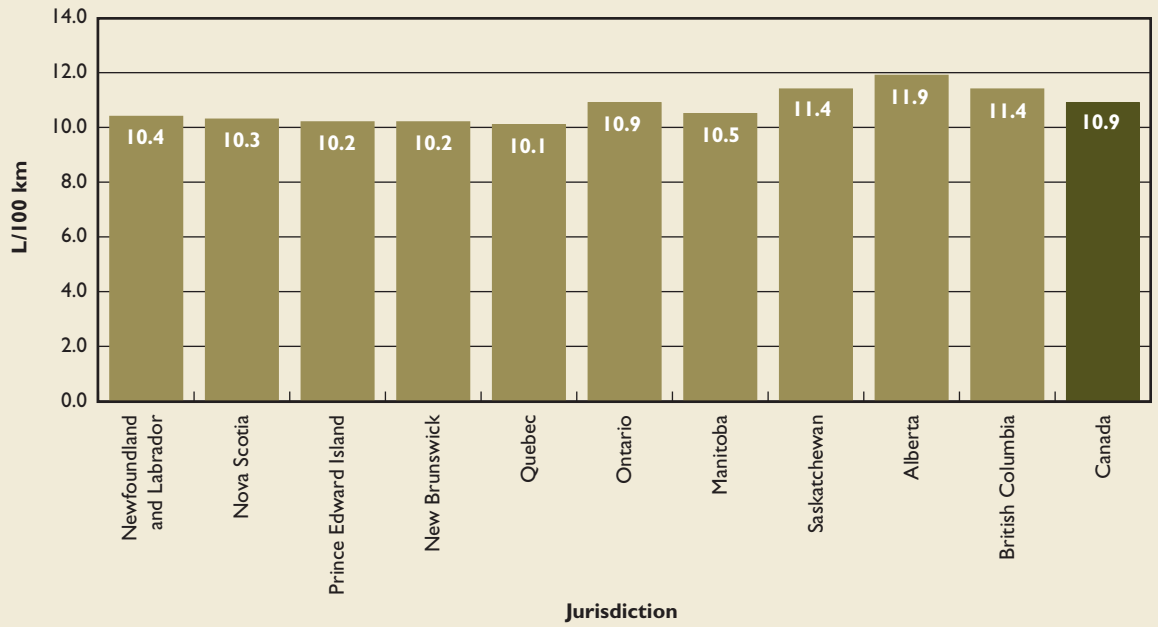
2.3 Provincial fuel consumption rates

Interprovincial variations also emerged in vehicle fuel efficiency. Figure 2.6 shows the gasoline fuel efficiency rates among light vehicles in the provinces in 2007. The average fuel consumption rate by light vehicles in Canada for 2007 was 10.9 L/100 km.

The findings presented in Figure 2.6 show that the three provinces with the highest fuel consumption rates are in western Canada. Fuel efficiency rates for light vehicles were fairly consistent among the other provinces and were slightly better than the Canadian average for all types of vehicles (10.9 L/100 km).

The regional differences highlighted in Figure 2.6 can be related to the composition of the vehicle fleet (sport utility vehicles [SUVs], pickup trucks, vans, etc.), which differed from one province to the next. For example, as shown in Figure 2.7, the percentage of light trucks – vans, SUVs and pickup trucks – in the light vehicle fleet was higher in the western provinces than in the rest of the provinces. Chapter 3 of this report examines the relationship between the class and age of a vehicle and its fuel efficiency. Estimates also showed that a large percentage of light vehicles in the western provinces were more than 14 years old.

Figure 2.6 Gasoline consumption rate by province for light vehicles, 2007



Chapter 2. Geographic analysis

Figure 2.7 Regional differences in the light vehicle fleet, 2007

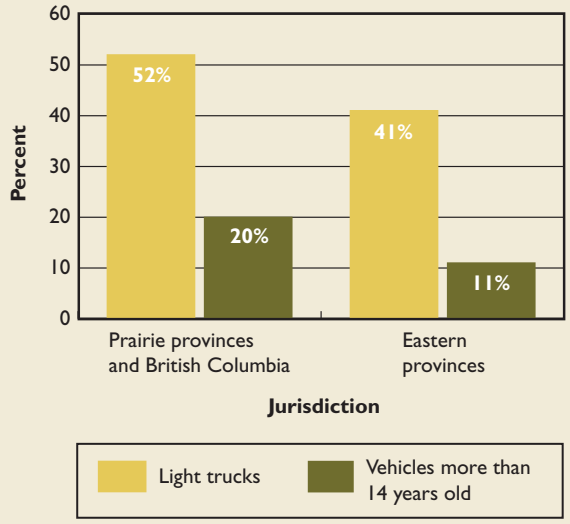
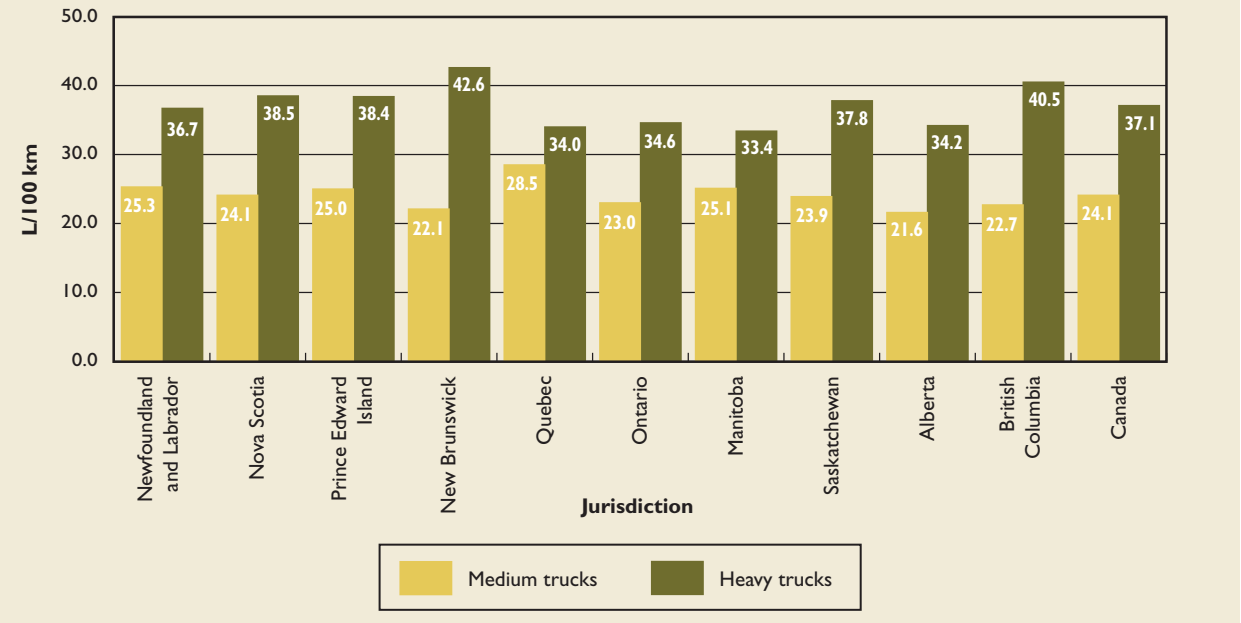


Figure 2.8 shows diesel fuel consumption rates for medium and heavy trucks. It is also interesting that the fuel consumption rates for heavy trucks were slightly lower than the Canadian average in Quebec, Ontario and Manitoba – the three provinces where they were driven most extensively, as shown in Figures 2.4a and 2.4b (on page 17). British Columbia, Nova Scotia and New Brunswick showed slightly higher diesel consumption rates for their heavy truck fleets.

Figure 2.8 Diesel consumption rate by province for medium and heavy trucks, 2007



Chapter 3. Light vehicles

More than 96 percent of the vehicles on Canadian roads falls under the category of light vehicles. The light vehicle fleet consists of cars, station wagons, vans, sport utility vehicles (SUVs) and pickup trucks. These vehicles are used primarily for private purposes. In 2007, more than 80 percent of the vehicle-kilometres travelled by light vehicles constituted trips unrelated to the driver's work.

3.1 Light vehicles: Vehicle body type

The two categories of vehicle body type in the light vehicle category are as follows:

- passenger vehicles, including cars and station wagons
- light trucks, including vans, SUVs and pickup trucks

Table 3.1 shows the body types in the light vehicle fleet for 2007. Cars made up half of the fleet (53 percent), followed by pickup trucks (20 percent), vans (16 percent) and SUVs (10 percent). Vans had a higher number of passenger-kilometres than pickup trucks and SUVs. This finding can be explained by the van's popularity as a family vehicle and its ability to accommodate more passengers than other light vehicles. SUVs accounted for less than 10 percent of the light vehicle fleet and less than 13 percent of the distance travelled in 2007.

Table 3.1 Light vehicles by vehicle body type, 2007

Body type	Number of vehicles	Vehicle-kilometres (millions)	Passenger-kilometres (millions)
Car	10 152 717 B	143 876.8 A	224 266.0 A
Station wagon	302 047 B	4 520.4 D	7 054.9 D
Subtotal – Passenger vehicles	**10 454 764 A**	**148 389.4 A**	**231 313.1 A**
Van	3 064 572 C	54 319.9 B	104 524.3 B
SUV	1 810 801 D	37 509.4 B	62 131.4 B
Pickup truck	3 718 848 C	60 942.3 B	89 917.7 B
Other	– F	– F	– F
Subtotal – Light trucks	**8 548 663 B**	**151 813.9 A**	**255 618.6 A**
Total – Light vehicles	**19 003 427 A**	**300 203.3 A**	**486 931.7 A**

The letter to the right of each estimate indicates its quality: A – Excellent, B – Very good, C – Good, D – Acceptable, E – Use with caution and F – Too unreliable to be published.

Due to rounding, the numbers in the tables may not add up, and some data may differ slightly from one table to the next.

From 2000 to 2007, there was a significant increase of 58 percent in the number of SUVs, along with a 39 percent increase in pickup trucks and an overall increase of 14 percent in light vehicles. Surprisingly, there was only a 1 percent increase in the total number of cars.

Figure 3.1 shows the increasing popularity of light trucks within the light vehicle category. In 2007, light trucks accounted for 45 percent of Canada's light vehicle fleet – up from 37 percent in 2000. Over the same period, light trucks' share of total distance travelled by all light vehicles increased steadily (with the exception of a slight decline in 2003). In 2007, light trucks accounted for more than half of all vehicle-kilometres travelled for the light vehicle segment.

Using the data on vehicle-kilometres and passenger-kilometres travelled in Table. 3.1, the passenger-kilometres/vehicle-kilometres ratio can be determined – an indication of the average vehicle occupancy rate. That is, for every kilometre a vehicle is driven, the number of occupants can be estimated.

As shown in Figure 3.2, this ratio dropped 6.6 percent for passenger vehicles and 1.8 percent for light trucks between 2000 and 2007. These data coincide with the tendency that light trucks (such as vans and SUVs) have a higher occupant capacity than light cars. In 2005, a rising trend in light truck occupancy rate was reported, as shown in Figure 3.2. However, in 2007, the ratio was closer to the 2000 figures and to the average for the eight years.

Figure 3.1 Proportion of light trucks and cars in the light vehicle fleet, 2000–2007

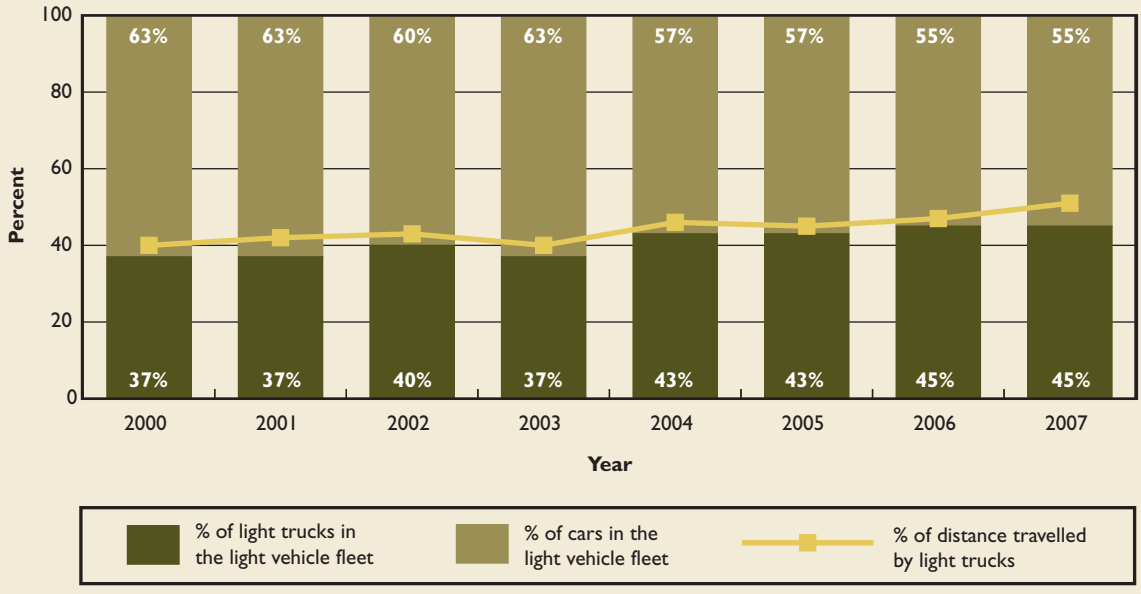
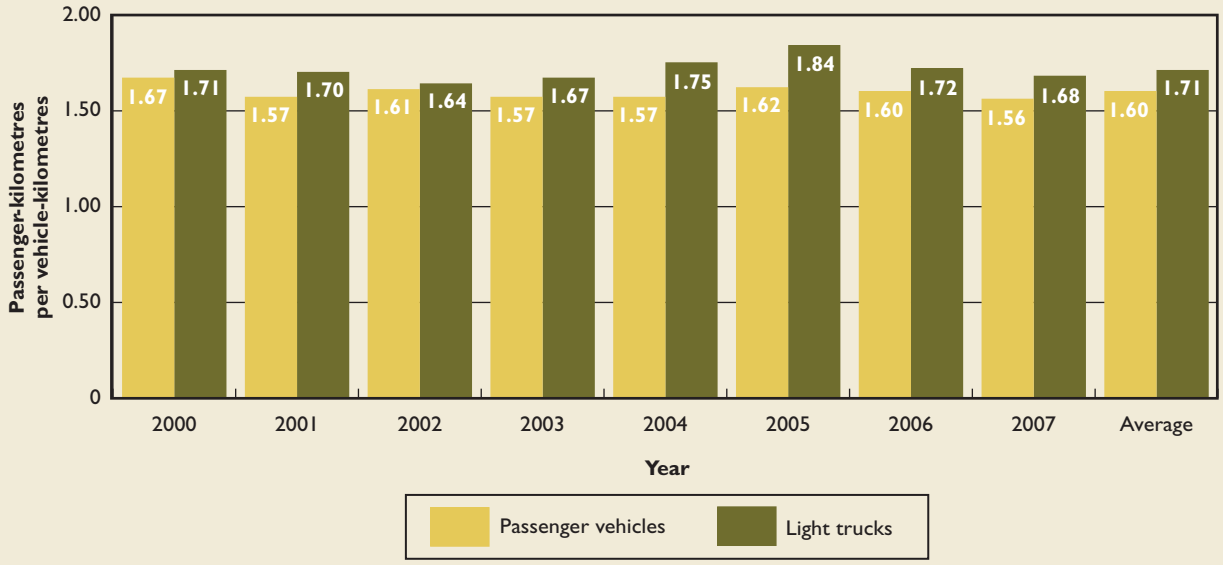
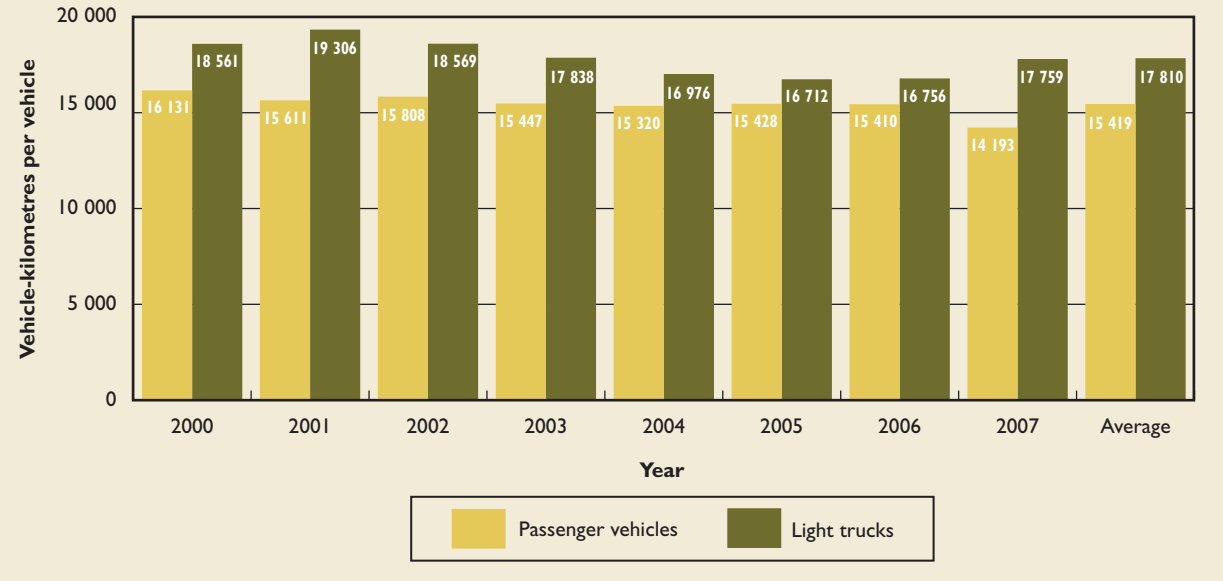


Figure 3.2 Average light vehicle occupancy rate by vehicle body type, 2000–2007



Differences emerged regarding the average number of vehicle-kilometres travelled per vehicle body type. Figure 3.3 shows that light trucks travelled more vehicle-kilometres than did passenger cars, on average.

Figure 3.3 Average distance travelled per light vehicle by body type, 2000–2007



Given current estimates of fuel consumption by vehicle body type, if Canadians' growing interest in light trucks is confirmed or intensified in the coming years, overall total fuel consumption for the light vehicle category will increase. Table 3.2 shows total fuel consumption and the fuel consumption rate (L/100 km) by vehicle body type and fuel type for 2007.

The proportion of total gasoline consumption by light trucks was 16 percent higher than that for passenger vehicles. On-road fuel consumption rates confirmed that the larger body types found in the light trucks segment were less efficient than the body types of cars and stations wagons in the passenger vehicles' segment. The rate of fuel consumption increased with the size of the vehicle. As a result, cars and station wagons offered better fuel efficiency than light trucks, because they consumed, on average, 3.7 L of gasoline per 100 km less than light trucks. As a whole, the light vehicle category consumed gasoline at an average rate of 10.8 L/100 km in 2007.

3.2 Age of light vehicles

An important characteristic of a vehicle's fuel efficiency is its model year or age. Newer vehicles are usually considered to be more fuel efficient. Figure 3.4 shows Canada's light vehicle fleet in 2007 by age of vehicle.

Figure 3.4 Age distribution of light vehicles, 2007

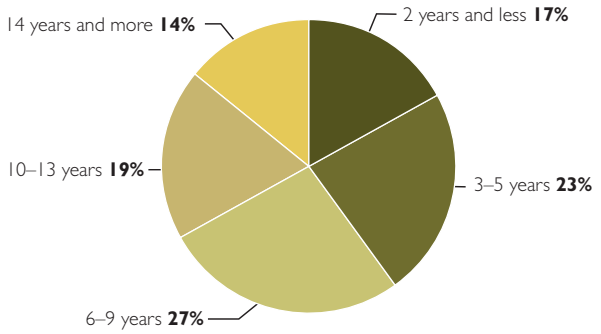


Table 3.2 Effect of light vehicle size on fuel consumption in Canada, 2007

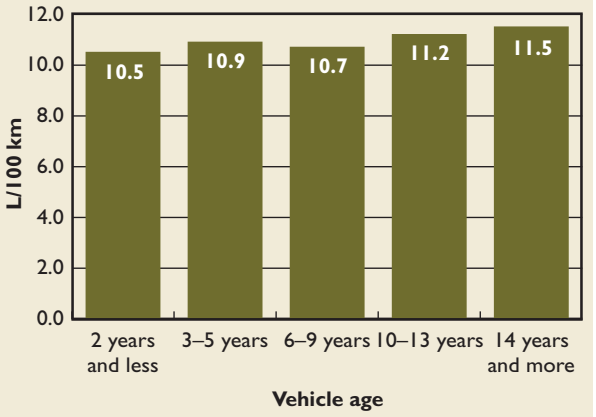
	Fuel consumption (millions of L)		Fuel consumption rate (L/100 km)	
Body type	**Gasoline**	**Diesel**	**Gasoline**	**Diesel**
Car	12 658.9 C	– F	9.0 B	– F
Station wagon	– F	– F	10.2 E	– F
Subtotal – Passenger vehicles	**13 109.7 C**	**– F**	**9.0 B**	**– F**
Van	6 379.4 C	– F	11.9 B	14.7 E
SUV	4 409.8 C	– F	11.8 B	– F
Pickup truck	7 467.7 B	1 236.1 D	14.3 A	14.8 B
Subtotal – Light trucks	**18 195.3 B**	**1 113.7 E**	**12.7 A**	**13.6 B**
Total – Light vehicles	**31 305.0 B**	**1 292.1 E**	**10.8 A**	**12.3 C**

The letter to the right of each estimate indicates its quality: A – Excellent, B – Very good, C – Good, D – Acceptable, E – Use with caution and F – Too unreliable to be published.

Due to rounding, the numbers in the tables may not add up, and some data may differ slightly from one table to the next.

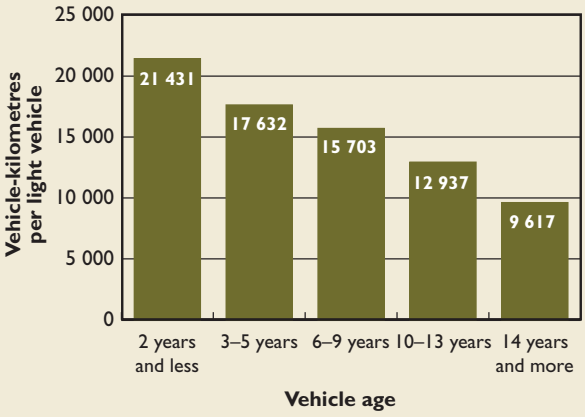
Figure 3.4 shows that two thirds of the light vehicles on Canadian roads in 2007 were less than 10 years old. Older vehicles use less advanced technologies, which may increase fuel consumption. In addition, the greater fuel consumption rate of older vehicles can be exacerbated by general wear and tear. The fuel consumption rates according to vehicle age are presented in Figure 3.5. In 2007, older vehicles did, in fact, consume gasoline at a higher rate than younger light vehicles (a difference of 10 percent).

Figure 3.5 Gasoline consumption rate of light vehicles according to vehicle age, 2007



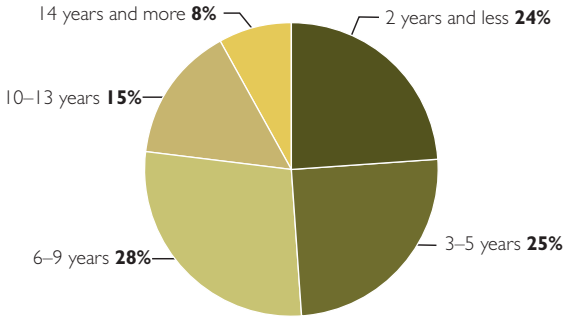
Newer vehicles, on average, travel more kilometres per year per vehicle, as shown in Figure 3.6. In fact, more than three quarters of the distance travelled in 2007 by light vehicles were by vehicles less than 10 years old. Nearly half (49 percent) of the total distance driven was by vehicles five years old and under. One possible explanation for this trend is that the older vehicles may be the secondary vehicle and therefore are not driven as frequently. Furthermore, due to Canada's climate, older vehicles may get stored in the winter. This would especially apply to vehicles 14 years and older.

Figure 3.6 Average vehicle-kilometres travelled per light vehicle by vehicle age, 2007



The percentages in Figure 3.7 illustrate that new vehicles, on average, travelled more vehicle-kilometres annually than older vehicles.

Figure 3.7 Age distribution of light vehicles by vehicle-kilometres travelled, 2007



Chapter 4. Heavy vehicles: Medium and heavy trucks

This chapter examines the heavy vehicle category. Heavy vehicles made up more than 3 percent of the vehicles on Canadian roads in 2007. More than 9 percent of the vehicle-kilometres travelled in Canada were by heavy vehicles. The heavy vehicles' fleet consists of medium and heavy trucks, as follows:

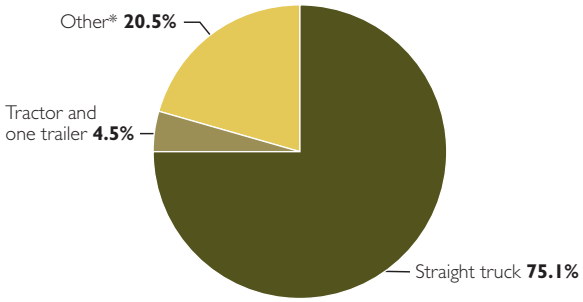
- medium trucks: trucks weighing between 4 500 and 15 000 kilograms (kg)
- heavy trucks: trucks weighing more than 15 000 kg

4.1 Configuration: Heavy vehicles

Vehicle configuration is a key characteristic of the medium and heavy trucks driven on Canadian roads. A straight truck is a complete unit (i.e. a power unit and a box/flat bed that cannot be detached). A tractor, on the other hand, is composed of a cab accompanied by a trailer (detachable) and is typically used for long-distance hauls.

In the medium truck category, straight trucks accounted for more than 75 percent of the total distance travelled in 2007, as shown in Figure 4.1a. Medium trucks are not typically used in combination with trailers. As well, they are commonly used for shorter and/or local hauls.

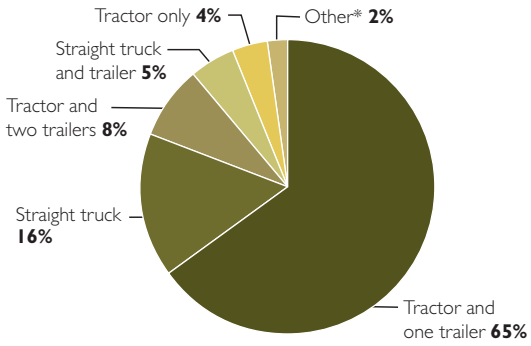
Figure 4.1a Distance travelled by medium trucks according to configuration, 2007



*Other heavy vehicles: types not fitting the other categories, e.g. dump trucks, cement mixer trucks, tanker trucks and fuel trucks.

Heavy trucks are used in a greater variety of configurations. Figure 4.1b shows the proportion of vehicle-kilometres travelled by heavy trucks based on configuration. Tractors with one trailer account for two thirds of the vehicle-kilometres travelled by heavy trucks, followed by straight trucks (16 percent).

Figure 4.1b Distance travelled by heavy trucks according to configuration, 2007



*Other heavy vehicles: types not fitting the other categories, e.g. dump trucks, cement mixer trucks, tanker trucks and fuel trucks.

From 2005 to 2007, there was a 4 percent reduction in the use of tractors pulling two trailers. Although the distance travelled by these "road trains" doubled from 2000 to 2005, a decline followed. A possible explanation for this trend comes from the following:

- rising diesel prices
- the use of alternative transportation methods (e.g. straight trucks increased their distance travelled by 17 percent from 2005 to 2007)
- railway trains being used for longer hauls more frequently
- provincial restrictions on where and when road trains may operate

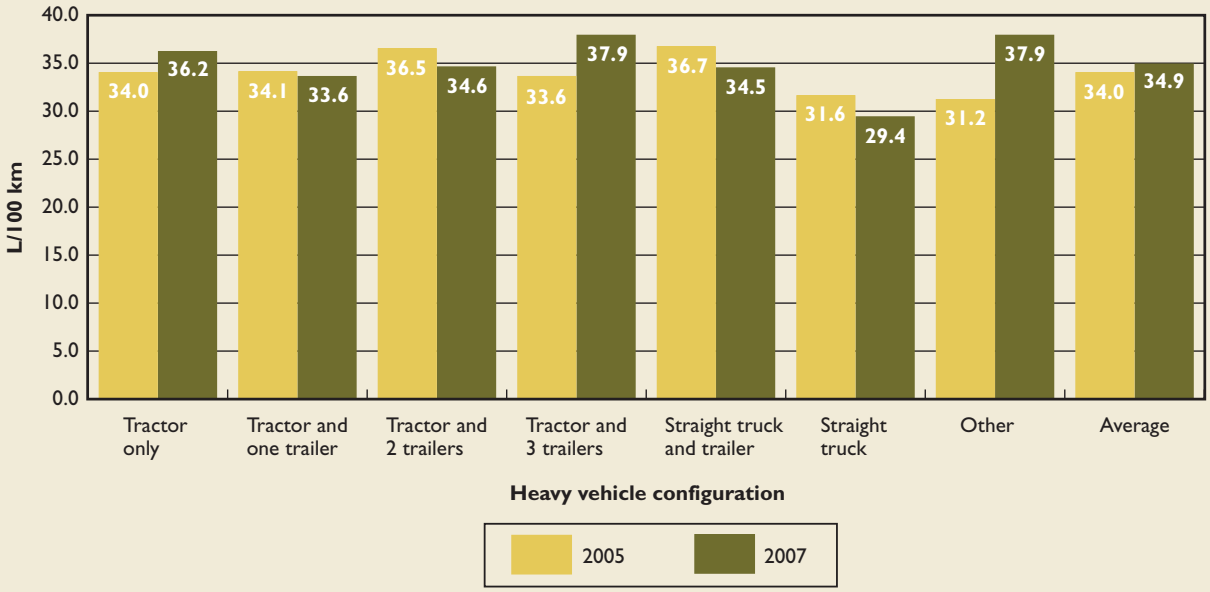
Vehicle configuration is important to the fuel efficiency of medium and heavy trucks. According to an Environment Canada report on atmospheric emissions in the trucking industry, the use of tractors with two or more trailers could benefit fuel consumption. The efficiency of heavy trucks increases with the total weight of the load. This means that less energy is consumed per tonne-kilometre when the weight of the transported merchandise is increased. Road trains can consume relatively less energy per tonne of merchandise transported because their transport capacity is greater than that of trucks with only one trailer.[6]

Figure 4.2 shows that diesel consumption by tractors pulling two trailers is higher than that of tractors pulling only one trailer by only one litre per 100 kilometres (1 L/100 km). Given that their transport capacity is nearly double that of trucks with just one trailer, road trains consume less diesel per tonne of merchandise transported.[7] From 2000 to 2007, average diesel consumption rates among heavy trucks dropped significantly (9 L/100 km). With further technological advancements in fuel efficiency and the trucking industry, diesel consumption rates should continue to improve.

[6] Environment Canada. *Trucks and Air Emissions*. Ottawa, September 2001.

[7] In-depth tonne-kilometre information is not available in the CVS.

Figure 4.2 Diesel consumption rate by heavy vehicle configuration, 2005 and 2007



4.2 Trip purpose for heavy vehicles

In 2007, service calls and the transport of goods and equipment were the main reasons for heavy vehicle trips in Canada, as shown in Table 4.1. However, slightly more than 13 percent of the vehicle-kilometres travelled by heavy trucks occurred when the trucks were empty. Given that not all trips were completed with a full load, it can be concluded that a significant percentage of the distance travelled in 2007 was not optimal for fuel consumption. Given that the performance of a heavy vehicle fleet is determined by the amount of fuel consumed per tonne of goods transported, reducing the distance travelled when a vehicle has no goods would benefit fuel efficiency. From 2000 to 2007, the percentage of vehicle-kilometres travelled by medium trucks while empty increased from 5.8 percent to 6.2 percent. Heavy trucks witnessed a slight decrease over the period, from 13.6 percent to 13.2 percent.

Table 4.1 Trip purpose for medium and heavy trucks, 2000 and 2007

	Vehicle-kilometres (millions)			
	Medium trucks		Heavy trucks	
Year	**2000**	**2007**	**2000**	**2007**
Trip purpose				
Service call	686.2 C	1 676.4 D	730.9 E	1 460.9 C
Carrying goods or equipment	2 952.2 B	3 671.2 C	15 474.1 A	17 627.2 B
Empty	343.8 D	506.2 E	2 803.1 B	3 155.4 C
Other work purpose	324.2 C	554.0 E	258.4 E	508.8 E
Driving to work	1 600.9 B	1 702.8 E	1 306.2 D	978.2 E
Total	**5 930.2 A**	**8 149.7 B**	**20 715.9 A**	**23 921.6 A**

The letter to the right of each estimate indicates its quality: A – Excellent, B – Very good, C – Good, D – Acceptable, E – Use with caution and F – Too unreliable to be published.

Due to rounding, the numbers in the tables may not add up, and some data may differ slightly from one table to the next.

4.3 Heavy vehicle activity

Most truck traffic on Canadian roads is related to one of the following activities:

- for-hire trucking – a company that transports goods as its principal activity
- private trucking – a company that transports goods as a secondary activity that is part of the distribution process of its primary output
- owner-operators – people who transport goods either independently or for one of the above-mentioned companies

Table 4.2 shows the number of medium and heavy trucks in the 2007 CVS based on their type of activity. (For a description of in-scope vehicles, see Annex 4, Glossary.)

Table 4.2 Number of in-scope vehicles and vehicle-kilometres for medium and heavy trucks by activity type, 2007

	Number of vehicles		Vehicle-kilometres (millions)	
Activity type	**Medium trucks**	**Heavy trucks**	**Medium trucks**	**Heavy trucks**
For-hire	– F	142 575 D	1 549.2 E	13 555.8 B
Owner-operator	64 361 E	76 328 E	1 357.5 E	5 616.3 B
Private	197 218 D	64 796 E	3 792.8 C	3 219.7 C
Other	74 417 E	– F	1 411.0 D	1 338.7 D
Total	**392 608 B**	**314 877 B**	**8 149.7 B**	**23 921.6 A**

The letter to the right of each estimate indicates its quality: A – Excellent, B – Very good, C – Good, D – Acceptable, E – Use with caution and F – Too unreliable to be published.

Due to rounding, the numbers in the tables may not add up, and some data may differ slightly from one table to the next.

Figure 4.3 shows the distance travelled by heavy vehicles according to activity type.

Private trucking accounted for almost half of the distance travelled by medium trucks in 2007. This activity type usually consists of companies that handle the distribution of their products by using their own vehicles. The heavy truck category, meanwhile, was dominated by for-hire and owner-operated trucking. These two types accounted for more than 80 percent (19 172 113 807 km) of the distance travelled by heavy trucks.

Table 4.3 provides the total fuel consumption and fuel consumption rate of heavy vehicles. The fuel consumption rate, especially in heavy trucks, seems to be affected by activity type. In 2007, heavy trucks belonging to for-hire trucking firms or owner-operators consumed less diesel per 100 km than those belonging to private firms.

Figure 4.3 Share of distance travelled by medium and heavy trucks by activity type, 2007

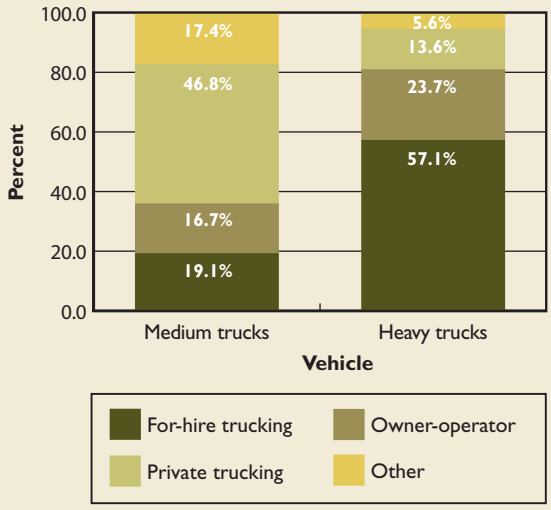


Table 4.3 Diesel consumption rate and total fuel consumption for medium and heavy trucks by activity type, 2007

	Diesel consumption rate (L/100 km)				Diesel consumed (millions of L)			
Activity type	**Medium trucks**		**Heavy trucks**		**Medium trucks**		**Heavy trucks**	
For-hire	21.6	C	33.7	A	301.3	E	4 559.8	B
Owner-operator	23.7	C	35.3	A	277.6	E	1 985.2	B
Private	24.2	B	36.9	A	695.9	D	1 161.5	C
Other	24.4	C	38.3	B	279.7	E	512.3	D
Average & Total	**23.5**	**A**	**34.5**	**A**	**1 554.5**	**B**	**8 218.8**	**A**

The letter to the right of each estimate indicates its quality: A – Excellent, B – Very good, C – Good, D – Acceptable, E – Use with caution and F – Too unreliable to be published.

Due to rounding, the numbers in the tables may not add up, and some data may differ slightly from one table to the next.

4.4 Age of heavy vehicles

The heavy vehicle fleet was similar to the light vehicle fleet in age distribution. Medium trucks, however, were older than other categories of vehicles in 2007. As a result, there were more medium trucks over 10 years of age in 2007. Figures 4.4a and 4.4b show that the percentage of vehicles that were five years old and less was similar for medium and heavy trucks.

Figure 4.4a Distribution of medium trucks according to vehicle age, 2007

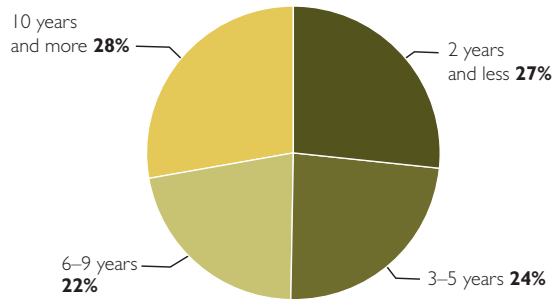
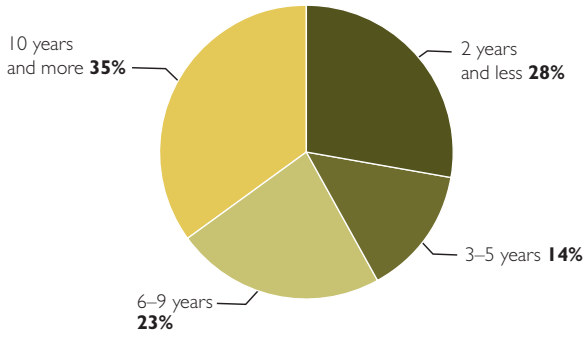


Figure 4.4b Distribution of heavy trucks according to vehicle age, 2007



Figures 4.5a and 4.5b show that newer vehicles were used the most in medium trucks and heavy trucks in 2007. Differences emerged for older vehicles. Vehicles over 10 years of age accounted for only 13 percent of the distance travelled by heavy trucks, but accounted for 18 percent of the distance travelled by medium trucks.

Figure 4.5a Distribution of vehicle-kilometres travelled by medium trucks according to age, 2007

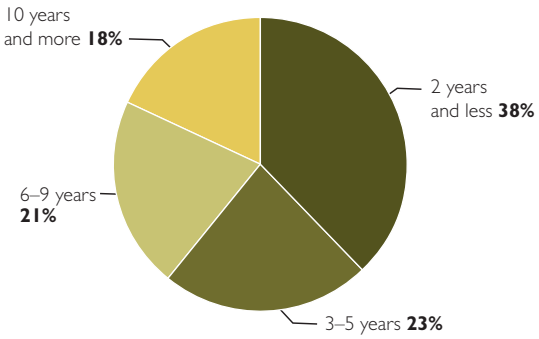
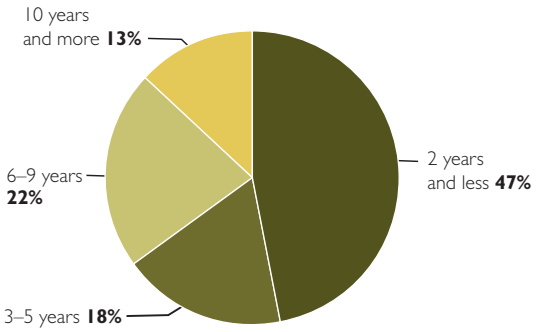


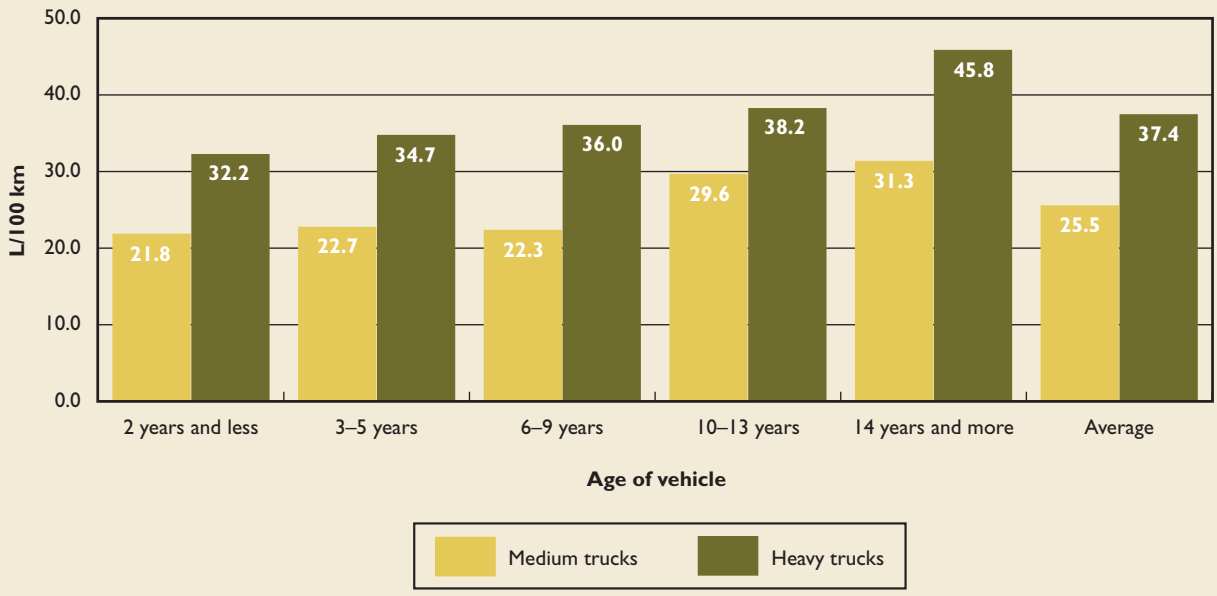
Figure 4.5b Distribution of vehicle-kilometres travelled by heavy trucks according to age, 2007



Chapter 4. Heavy vehicles: Medium and heavy trucks

The age of medium trucks affects the fleet's fuel efficiency. Figure 4.6 reveals that older vehicles usually consumed more fuel per 100 km than newer vehicles. For both medium and heavy trucks, the diesel consumption rate among vehicles older than 10 years was higher (by approximately 5 L/100 km) than the average consumption of the fleet. As a result, it is apparent that newer heavy vehicles will have improved diesel consumption rates more than older ones, resulting in an overall increase in fuel efficiency.

Figure 4.6 Diesel consumption rate of medium and heavy trucks by age, 2007



Chapter 5. Trip analysis

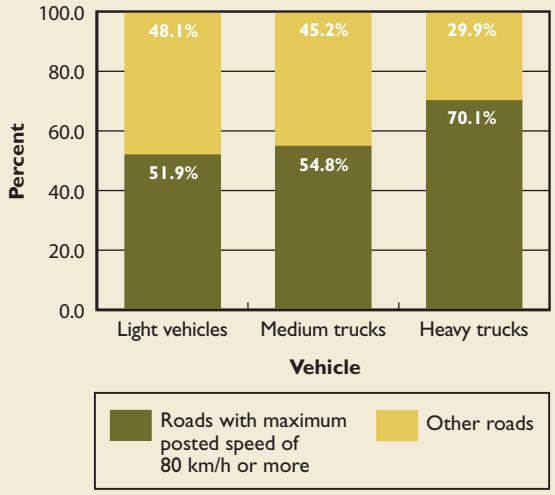
5.1 Road types used by vehicles

NRCan produces the annual *Fuel Consumption Guide*,[8] which provides Canadians with information on the fuel consumption of new light vehicles. In the Guide, fuel consumption rates are presented for city and highway driving. Fuel efficiency is generally better in the latter case, as highway driving is conducted at constant speeds with little stopping and starting.

Figure 5.1 presents the percentage of distance travelled on highways with a maximum speed limit of 80 kilometres per hour (km/h) or more compared with the distance travelled on roads with lower speed limits.

In 2007, light vehicles and medium trucks made less use of roads with a maximum speed limit of 80 km/h or more than did heavy trucks. Approximately 55 percent of the vehicle-kilometres travelled by medium trucks was on roads with a maximum speed limit of 80 km/h or more, while 70 percent of the distance travelled by heavy trucks was on highways.

Figure 5.1 Distribution of distance travelled by road type, 2007



[8] oee.nrcan-rncan.gc.ca/transportation/tools/fuel-consumption-guide/fuel-consumption-guide.cfm

Figure 5.2 Fuel consumption rate of vehicles by road type, 2007

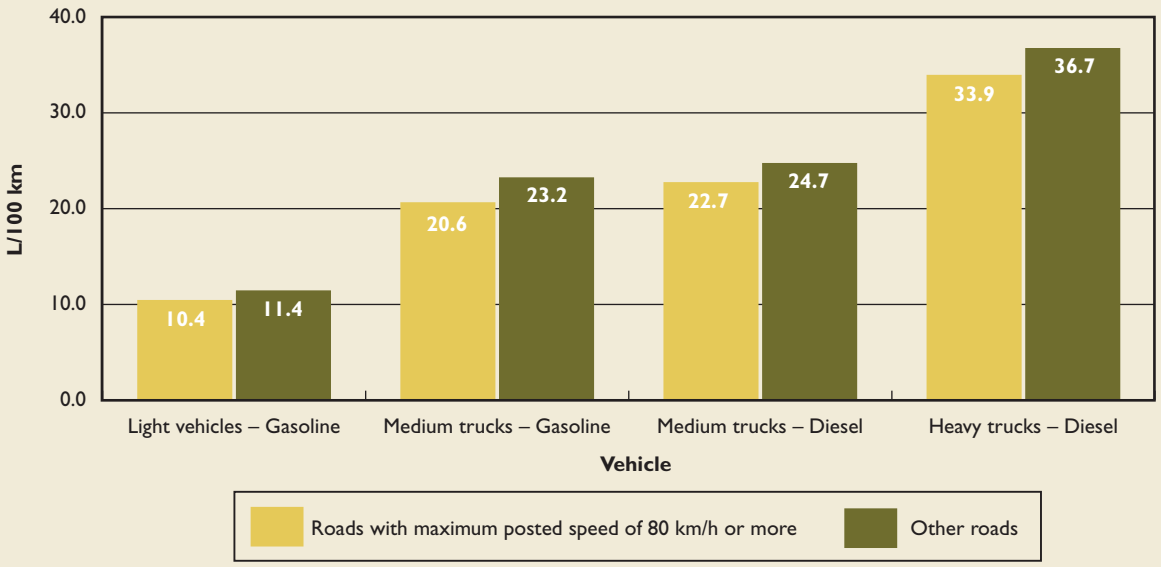


Figure 5.2 shows the fuel efficiency of vehicles by road type. The findings show that fuel consumption per 100 km was indeed affected by road type. The fuel efficiency for each category of vehicle was better on highways (maximum speeds of 80 km/h or more), where stops are less frequent.

5.2 Rush hour and fuel consumption

Light vehicles constitute the main means of daily transportation for most Canadians. Table 5.1 shows the distances travelled in 2007 by light vehicles according to place of origin and destination. About 15 percent of the 173 billion km travelled by light vehicles in 2007 was between the driver's home and work, which occurred most often during rush hour, when traffic is heavy. The traffic jams that are common during rush hour have several impacts on the environment. According to a Transport Canada report on the cost of urban congestion in Canada, between 470 million and 570 million litres of fuel are wasted each year in traffic jams in the largest urban areas. This wasted fuel means an annual output of 1.2 to 1.4 megatonnes of greenhouse gases due to traffic congestion.[9]

[9] Transport Canada. *The Cost of Urban Congestion in Canada.* Ottawa, 2006.

Table 5.1 Vehicle-kilometres travelled by light vehicles in Canada by origin and destination, 2007

	Kilometres (millions)											
	End											
Start	Home		Work		Personal *		Leisure**		Other		Total	
Home	52 961.4	B	25 437.3	B	10 005.4	D	10 238.7	E	39 747.9	B	138 390.7	A
Work	22 641.5	B	7 466.7	D	2 129.9	E	–	F	6 242.9	E	39 357.0	B
Personal*	11 457.3	C	–	F	4 344.6	E	–	F	3 554.7	C	21 832.9	B
Leisure**	10 815.3	D	–	F	–	F	–	F	–	F	23 573.3	C
Other	35 952.5	C	5 456.8	E	4 518.0	E	5 407.6	E	25 061.7	C	76 401.3	B
Total	**133 827.9**	**A**	**39 573.4**	**B**	**22 334.3**	**B**	**23 942.9**	**C**	**79 867.8**	**A**	**300 203.3**	**A**

**Personal includes shopping centre, bank and other place of personal business.*
***Leisure includes entertainment, recreational facility and restaurant.*

The letter to the right of each estimate indicates its quality: A – Excellent, B – Very good, C – Good, D – Acceptable, E – Use with caution and F – Too unreliable to be published.

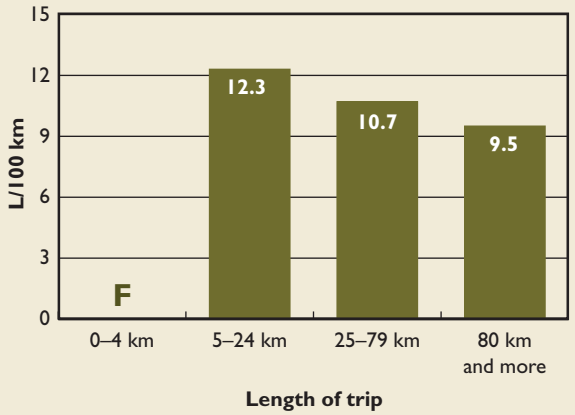
Due to rounding, the numbers in the tables may not add up, and some data may differ slightly from one table to the next.

Census data from 2006 show that the median distance travelled by most Canadians when going to work was 7.6 km, while only 14 percent of all workers travelled more than 25 km to get to their regular workplace. The 2007 CVS shows that 60 percent of the distance travelled by Canadians in light vehicles was for trips less than 25 km and was characterized by drivers going to and returning from their regular workplace.[10]

The data also allow the comparison of the rate of gasoline consumption of light vehicles based on trip length. Figure 5.3 indicates that the fuel efficiency of light vehicles was lower during short-distance trips in 2007. Various factors could contribute to the findings shown in Figure 5.3. For example, given that many of these short trips were not on highways, there would have been more frequent stops and idling, which increase fuel consumption. Furthermore, if a significant percentage of these trips took place during rush hour, there may have been more traffic jams.

Finally, if a motor did not reach its optimum operating temperature, it was likely to burn more fuel, as is often the case during very short trips.

Figure 5.3 Gasoline consumption rate of light vehicles by trip length, 2007

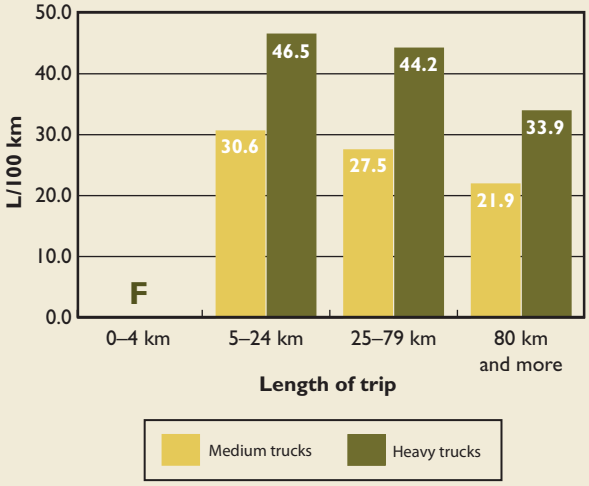


F indicates data too unreliable to be published.

[10] www12.statcan.ca/census-recensement/2006/rt-td/pow-ltd-eng.cfm

Figure 5.4 shows that the same observations can be made for medium and heavy trucks.

Figure 5.4 Diesel consumption rate of heavy vehicles by trip length, 2007



F indicates data too unreliable to be published.

5.3 Driver's age and gender

The 2007 CVS investigates the relationship between the driver's age, gender and vehicle use. These variables may affect, for example, the type of car needed to meet work and family requirements.

Table 5.2 shows that in 2007, gasoline-powered vehicles of all categories driven by men travelled twice as many vehicle-kilometres and passenger-kilometres as those driven by women.

Table 5.2 Use of gas-powered vehicles by driver's gender, 2007

	Men		Women	
Vehicle-kilometres (millions)	194 230.7	A	95 355.9	B
Passenger-kilometres (millions)	320 556.4	A	151 593.3	B

The letter to the right of each estimate indicates its quality:
A – Excellent, B – Very good, C – Good, D – Acceptable,
E – Use with caution and F – Too unreliable to be published.

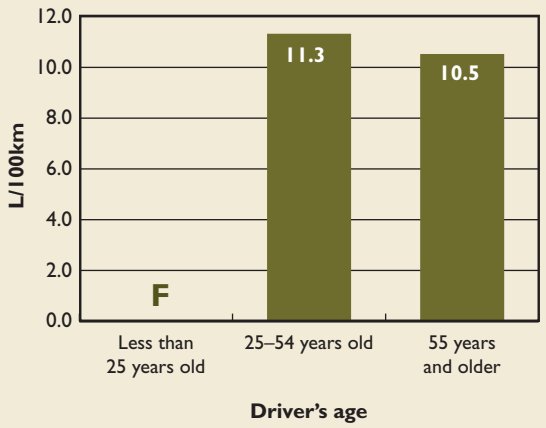
Due to rounding, the numbers in the tables may not add up, and some data may differ slightly from one table to the next.

Figure 5.5 shows fuel consumption rates for gas-powered vehicles by gender of driver. In 2007, there was a difference between the fuel efficiency of vehicles driven by men (11.1 L/100 km) and that of vehicles driven by women (10.6 L/100 km).

Figure 5.5 Gasoline consumption rate by driver's gender, 2007

Driver's age had a limited impact on vehicle fuel efficiency. Figure 5.6 shows that the gas consumption rate of vehicles driven by people between 25 and 54 years old was less than 1 L/100 km more than that of vehicles driven by people 55 years old and over. There was not enough information available to determine the fuel efficiency of vehicles driven by people under the age of 25.

Figure 5.6 Gasoline consumption rate by driver's age, 2007



F indicates data too unreliable to be published.

Annex A. Note on data quality and interpretation of results

The Canadian Vehicle Survey (CVS) is a quarterly vehicle-based survey. It provides quarterly and annual estimates of the distance travelled by on-road vehicles in Canada and their fuel consumption.[11] In 2007, there were 26 987 vehicles in the sample from the provinces and 11 693 in the sample from the territories. Since participation is voluntary, a certain percentage of these samples included non-respondents. The response rate was about 61 percent for the provinces and 12 percent for the territories, resulting in a good response rate for the CVS compared with similar surveys conducted elsewhere in the world.

While considerable effort is exerted to ensure that high standards are maintained throughout all survey operations, the resulting estimates are inevitably subject to a certain degree of error. The total survey error is defined as the difference between the survey estimate and the true value for the population. The total survey error consists of two types of errors: sampling and non-sampling.

Sampling errors occur because the CVS studies only a segment of the population, rather than the entire population, as in a census. Factors such as sample size, sample design and estimation method affect the sampling error. If the population is heterogeneous, as is the case for the CVS, a large sample size is needed to reduce sampling errors. In addition, the CVS relies on a stratified sample design to divide the population into similar groups, thereby reducing sampling errors by producing estimates for homogeneous groups. These estimates are then aggregated to produce estimates for the entire population. Each estimate in the report is associated with a coefficient of variation (CV), which is the basis for determining an all-encompassing quality indicator. CVs measure the sampling error of the estimates and take into account variability due to non-response and imputation

CVs are also used to establish confidence intervals (*I*), which express the accuracy of an estimate in concrete terms. The *I* indicates the level of confidence according to which the true value of a characteristic of the population under study occurs within certain limits. For example, an *I* of 95 percent, *I(0.95)*, implies that if the sampling were repeated indefinitely, with each sample providing a different *I*, 95 percent of the intervals would contain the true value.[12]

[11] Annex B provides more information on the scope and methodology of the CVS.

[12] Satin, A. and W. Shastry, Statistics Canada. *Survey Sampling: A Non-mathematical Guide*, 2nd edition, Catalogue No. 12-602E. Ottawa, 1993, p. 14.

To illustrate how all of these concepts are linked, take as an example a CVS estimate stating that on-road vehicles travelled 332.3 billion vehicle-kilometres in Canada in 2007. This is an excellent estimate because it has a CV of 0.026 and, therefore, a quality indicator of "A." To determine the *I* of 95 percent attributed to this estimate, the following calculation is performed:[13]

$$I(0.95) = [332.3 \text{ billion } x\ (1 - 1.96\ x\ CV),\ 332.3 \text{ billion } x\ (1 + 1.96\ x\ CV)]$$

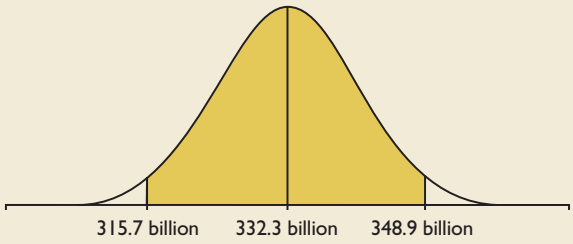
$$I(0.95) = [332.3 \text{ billion } x\ (1 - 1.96\ x\ 0.026),\ 332.3 \text{ billion } x\ (1 + 1.96\ x\ 0.026)]$$

$$I(0.95) = [315.3 \text{ billion}, 349.2 \text{ billion}]$$

Based on this *I*, it can be stated with a 95 percent degree of confidence that the distance travelled in Canada in 2007 was between 315.3 billion and 349.2 billion vehicle-kilometres. The smaller the *I*, the greater the chances that the survey estimate is close to the true value. Figure A-1 shows the *I* for the preceding example. It is important to remember the confidence interval when analysing survey results.

Table A-1 is a reference for readers who want to assess the *I* attributed to an estimate based on the quality indicators in this report. Note that the report uses stringent standards identified by Statistics Canada for determining whether an estimate is "excellent" or "very good."

Figure A-1 95 percent confidence interval for CVS estimate of vehicle-kilometres in Canada, 2007



[13] If a normal distribution is assumed, the *I* of 95 percent corresponds with the estimate plus or minus about two times the standard error. The standard error is equal to the square root of the variance, which corresponds to the product of the estimate and the CV.

Annex A. Note on data quality and interpretation of results

Table A-1 Range of the confidence intervals attributed to CVS estimates

Quality indicator	Quality of estimate	Coefficient of variation	Range of the confidence intervals
A	Excellent	Less than 5.0%	Estimate ± 0.0% to 9.9%
B	Very good	5.0% – 9.9%	Estimate ± 10.0% to 19.9%
C	Good	10.0% – 14.9%	Estimate ± 20.0% to 29.9%
D	Acceptable	15.0% – 19.9%	Estimate ± 30.0% to 39.9%
E	Use with caution	20.0% – 34.9%	Estimate ± 40.0% to 69.9%
F	Too unreliable to be published	35.0% or more	Estimate ± 70.0% and over

Non-sampling errors can also contribute to the total survey error. This second type of error can occur at almost any stage of the survey. In particular, errors can arise when a respondent provides incorrect information, does not answer a question or misinterprets a question. Non-sampling errors can also arise when data are being processed. Some of these errors will be cancelled over a large number of observations, but systematically occurring errors will contribute to a bias in the estimates. For example, if people demonstrating similar characteristics consistently tend not to respond to the survey, a bias may result in the estimates.

Some non-sampling errors are difficult to quantify and are not reflected by quality indicators. However, the CVS quality indicators take into account variance due to non-response and imputation and, as such, account for some of the non-sampling errors. Other measures, such as survey response rate and imputation rate, can also serve as indicators for non-sampling errors.

Annex B. Scope and methodology of the Canadian Vehicle Survey

This section summarizes the methodology used in the Canadian Vehicle Survey, conducted by Statistics Canada on behalf of Transport Canada and Natural Resources Canada (NRCan) in 2007. More information is available in the *Canadian Vehicle Survey: Annual 2007 (Revised)*, produced by the Transport Division of Statistics Canada.[14]

General description

The CVS is a voluntary survey of vehicles that is conducted quarterly. The survey design also allows for calculation of annual estimates based on the data collected during the four quarters.

The survey population consists of all motor vehicles registered in Canada at any time in 2007 that have not been scrapped or salvaged. Buses (since 2004), motorcycles, off-road vehicles (e.g. snowmobiles) and special equipment (e.g. cranes, snowploughs) are excluded from the registration lists used in the sample.

The survey population is derived from the vehicle registration lists sent by the governments of the 10 provinces and three territories to Statistics Canada three months before the reference period. This population differs slightly from the population of interest, as vehicles that were registered less than three months before the quarter began, or during the quarter, are not included in that quarter's sample (the sample for each quarter is derived from the population of the preceding quarter).

The registration lists received by Statistics Canada undergo a rigorous preparation procedure:

- Out-of-scope vehicles are removed.
- Vehicles with expired registration are removed.
- Records with duplicate Vehicle Identification Numbers within a given list are removed, leaving the one updated most recently.
- Records with irregular data are verified.

The most recent set of prepared lists is used to select the sample for each quarter. These sets of vehicle lists and the days within the respective quarter constitute the survey population.

Survey design

The CVS uses a two-stage sample design. A sample of vehicles is selected in the first stage, and a sample of consecutive days within the quarter is selected in the second stage.

In the first stage, all vehicles from the survey population are stratified into 78 strata according to vehicle type, jurisdiction and vehicle age. Then a systematic sample of vehicles (first-stage sample) is selected from the survey population to spread the sample over all regions.

In the second stage, a first reporting day within the quarter is randomly assigned to each vehicle that had been selected in the first stage. Within each stratum,

[14] Statistics Canada. *Canadian Vehicle Survey: Annual.* Catalogue No. 53-223-XIE. www.statcan.ca/bsolc/english/bsolc?catno=53-223-X.

Annex B. Scope and methodology of the Canadian Vehicle Survey

the first reporting day is evenly spread over the quarter to ensure a uniform number of responses over time and for each day of the week. This step is not applied to the vehicles registered in the three territories because only odometer readings are collected.[15]

The sample from the 10 provinces consisted of 26 987 vehicles for the four quarters of 2007. The sample from the three territories consisted of 10 988 vehicles.[16] Table B-1 shows the number of vehicles sampled in the provinces and territories in 2007 by type of vehicle.

Table B-1 Number of vehicles in sample by jurisdiction and vehicle type

Jurisdiction	Light vehicles	Medium trucks	Heavy trucks	Total
	Number of vehicles in sample by jurisdiction			
Newfoundland and Labrador	926	221	204	1 351
Prince Edward Island	543	147	180	870
Nova Scotia	1 105	278	269	1 652
New Brunswick	1 182	272	228	1 682
Quebec	3 476	542	470	4 488
Ontario	5 611	618	661	6 890
Manitoba	1 119	291	336	1 746
Saskatchewan	1 337	400	360	2 097
Alberta	1 917	590	533	3 040
British Colombia	2 224	614	333	3 171
Total for provinces	**19 440**	**3 973**	**3 574**	**26 987**
Yukon	1 576	1 423	784	3 783
Northwest Territories	3 352	737	917	5 006
Nunavut	2 528	231	145	2 904
Total for territories	**7 456**	**2 391**	**1 846**	**11 693**
Total for Canada	**26 896**	**6 364**	**5 420**	**38 680**

[15] Less information is collected in the territories because respondents there are asked to participate in several surveys a year.

[16] A larger sample in the territories enables Statistics Canada to compensate for a lower response rate in these jurisdictions.

Annex B. Scope and methodology of the Canadian Vehicle Survey

Data collection

Data collection for the vehicles sampled is conducted differently in the provinces than in the territories. In the provinces, the registered owners of the sampled vehicles are contacted for a Computer-Assisted Telephone Interview (CATI). During the CATI, the following information is collected about each sampled vehicle:

- vehicle type
- fuel type used
- distance driven the previous week
- anticipated vehicle use during the following six weeks
- current odometer reading
- vehicle maintenance
- household characteristics

Respondents are then asked to complete a trip log. If they agree, the trip log is mailed to them. There are two types of logs: one for light vehicles and one for medium and heavy trucks.

Respondents receiving a light-vehicle log are requested to record information for 20 consecutive trips made in the selected vehicle, beginning on the assigned first reporting day. Respondents have to record a new trip each time the driver enters the vehicle or a passenger enters or exits the vehicle.[17]

Respondents receiving a heavy-vehicle log (medium and heavy trucks) are requested to record information for all the trips made in the selected vehicle over the assigned seven days. A new trip begins if there is a stop made of over 30 minutes, if the driver changes, if the reason for the trip or the use of the vehicle changes, if the truck configuration is modified or if the truck goes from full to empty or the reverse.

The following information is recorded for each trip:

- start-and-stop dates and times
- start-and-stop odometer readings
- starting point and destination (light vehicles) or trip purpose (heavy vehicles)
- number and age group of passengers (light vehicles) or number of passengers at the start and end of the trip (heavy vehicles)
- gender and age group of the driver
- total cost, per unit cost and amount of fuel purchased
- distance travelled on roads with a posted speed limit of 80 km/h or more
- truck configuration (heavy vehicles)
- dangerous goods (heavy vehicles)

Since 2004, when NRCan became co-sponsor of the CVS, respondents have been asked to continue recording fuel purchases until they reported two fill-ups or five purchases or until the 28-day reporting period was over. Less information is collected in the territories. Statistics Canada sends a questionnaire at the beginning of the quarter and one at the end, asking for an odometer reading so the distance travelled during the quarter can be identified. Information is also collected on the vehicle's status (still owned, sold or scrapped), body style and type of fuel used.

[17] This definition has been used as of the first quarter of 2004 and is different from that used in previous versions of the CVS.

Annex B. Scope and methodology of the Canadian Vehicle Survey

Data edit and imputation

Once all the necessary information for the survey has been collected, Statistics Canada conducts a series of computerized and manual verifications to ensure that the records are consistent and that there are no errors as a result of data capture.

Missing values and data found to be in error are imputed by another automated system using different imputation rules depending on the vehicle, available information and type of data to be imputed. For example, data can be imputed based on responses to other questions or by using data from similar vehicles. The imputed data are examined again for completeness and consistency.

Response rate

Statistics Canada defines the CVS response rate as the number of vehicles for which the respondents have provided full or partial answers to the questions concerning vehicle-kilometres only, divided by the total number of vehicles in the sample. Tables B-2a and B-2b show the response rates obtained for each quarter by vehicle type.

The response rate for the *fuel* component of the CVS is lower than the response rates in the preceding tables. While the exact response rate for this part of the survey is not available, Table B-3 shows that 2 739 respondents reported their fuel purchases for 26 987 vehicles sampled in the provinces in 2007. Therefore, the data on fuel consumption have a high imputation rate, which helps explain the lower quality of fuel consumption estimates in this report.

Table B-2a Response rate for the CVS – All provinces

Quarter	Light vehicles	Medium trucks	Heavy trucks
		Percent	
Quarter 1	64.8	63.9	65.5
Quarter 2	60.0	58.8	60.1
Quarter 3	61.2	59.2	55.2
Quarter 4	58.3	55.0	56.7
Annual	**61.0**	**59.2**	**59.4**

Table B-2b Response rate for the CVS – All territories

Quarter	Light vehicles	Medium vehicles	Heavy trucks
		Percent	
Quarter 1	14.8	9.6	10.8
Quarter 2	13.7	10.9	9.7
Quarter 3	14.0	13.6	12.6
Quarter 4	12.5	7.2	9.5
Annual	**13.7**	**10.2**	**10.6**

Table B-3 Number of respondents reporting their fuel purchases (all provinces and vehicle types)

Number of purchases	Number of respondents
1	841
2	1 019
3	292
4	177
5	409
6	1
Total	**2 739**

Table B-4 Indicators for coefficients of variation

Coefficient of variation	Indicator of quality	Quality of estimate
Less than 5.0%	A	Excellent
5.0% to 9.9%	B	Very good
10.0% to 14.9%	C	Good
15.0% to 19.9%	D	Acceptable
20.0% to 34.9%	E	Use with caution
35.0% or over	F	Too unreliable to be published

Estimates and quality indicators

Estimates are based on the principle that each vehicle in the sample represents a certain number of vehicles in the population of interest. A sample weight is therefore assigned to each vehicle in the sample, and the purpose of the final set of weights is to reflect as closely as possible the characteristics of the vehicle population during the reference period. All estimates for 2007 presented in this report were produced using an estimate module developed by Statistics Canada.

This module also calculates the coefficient of variation (CV), reflecting the quality of each estimate. The CV takes into account variability due to sampling and variability due to non-response and imputation. For example, a variance due to relatively high imputation has a negative effect on the quality of fuel consumption estimates. Estimates with a CV of more than 35 percent are not reliable enough to be published. Table B-4 describes the indicators used in this report to describe the quality of estimates.

For more information on the methodology used in the Canadian Vehicle Survey, contact the Transport Division, Statistics Canada, at

Transport Division
Statistics Canada
100 Tunney's Pasture Driveway
Ottawa ON K1A 0T6
Tel.: 1-866-500-8400
E-mail: transportationstatistics@statcan.ca

Annex C. Data tables of figures in this summary report

The following figures have been converted to data tables for statistical purpose. Note that the letter to the right of each estimate indicates its quality: A – Excellent, B – Very good, C – Good, D – Acceptable, E – Use with caution and F – Too unreliable to be published.

Due to rounding, the numbers in the tables may not add up, and some data may differ slightly from one table to the next.

Annex C. Data tables of figures in this summary report

Figure 1.1 Quarterly trends in the number of vehicles, 2000–2007

Quarter	Light vehicles	Medium trucks	Heavy trucks
	Number of vehicles		
2000-Q1	16 351 082 A	308 874 A	248 798 A
2000-Q2	16 488 370 A	328 165 A	247 332 A
2000-Q3	16 827 585 A	314 934 A	263 199 A
2000-Q4	16 901 524 A	326 026 A	262 684 A
2001-Q1	16 553 807 A	318 882 A	242 543 A
2001-Q2	16 768 334 A	293 840 A	239 705 A
2001-Q3	16 882 879 A	364 017 A	267 514 A
2001-Q4	16 957 123 A	343 433 A	264 827 A
2002-Q1	17 058 953 A	303 500 A	254 569 A
2002-Q2	17 228 838 A	294 344 A	264 204 A
2002-Q3	17 560 825 A	346 572 A	281 053 A
2002-Q4	17 349 077 A	317 281 A	273 817 A
2003-Q1	17 316 583 A	284 374 A	269 908 A
2003-Q2	17 505 720 A	329 849 A	279 543 A
2003-Q3	17 668 097 A	328 789 A	289 332 A
2003-Q4	17 734 763 A	347 207 A	277 320 A
2004-Q1	17 540 773 A	295 694 A	256 772 A
2004-Q2	17 636 650 A	346 458 A	271 165 A
2004-Q3	17 990 806 A	341 433 A	298 236 A
2004-Q4	17 962 646 A	322 516 A	285 594 A
2005-Q1	17 934 280 A	301 233 A	277 196 A
2005-Q2	17 960 779 A	312 567 A	292 616 A
2005-Q3	18 310 873 A	371 922 A	313 213 A
2005-Q4	18 333 023 A	318 034 A	298 826 A
2006-Q1	18 314 239 A	318 857 A	296 716 A
2006-Q2	18 392 623 A	327 052 A	299 296 A
2006-Q3	18 703 827 A	361 605 A	318 500 A
2006-Q4	18 737 130 A	319 156 A	309 275 A
2007-Q1	18 680 183 A	358 248 A	300 093 A
2007-Q2	18 790 204 A	385 620 A	310 457 A
2007-Q3	19 334 525 A	417 544 A	330 410 A
2007-Q4	19 208 797 A	409 019 A	318 549 A

Annex C. Data tables of figures in this summary report

Figure 1.2 Age of vehicle fleet, 2007

	Light vehicles	Medium trucks	Heavy trucks	Total
	Number of vehicles			
2 years and less	3 314 738 C	89 818 E	87 218 D	3 491 774 C
3–5 years	4 297 355 B	79 212 E	44 401 E	4 420 968 B
6–9 years	5 264 836 B	73 186 D	72 723 E	5 410 744 B
10–13 years	3 543 175 B	– F	56 447 E	3 656 277 B
14 years and more	2 587 470 C	93 737 E	54 088 E	2 735 294 C

Figure 2.4a Distance travelled in the Prairie provinces by vehicle type, 2007

	Light vehicles	Medium trucks	Heavy trucks
	Vehicle-kilometres		
Alberta	39 841 911 671 B	2 378 219 179 C	5 578 119 721 B
Manitoba	11 845 363 503 B	205 076 016 D	1 789 622 242 C
Saskatchewan	11 719 588 904 B	516 121 221 D	1 212 282 026 C

Annex C. Data tables of figures in this summary report

Figure 2.4b Distance travelled in Canada excluding the Prairie provinces by vehicle type, 2007

	Light vehicles	Medium trucks	Heavy trucks
	Vehicle-kilometres		
British Columbia	33 570 777 622 B	1 587 185 372 C	640 706 707 C
New Brunswick	7 909 235 499 B	118 204 905 D	86 084 299 D
Newfoundland and Labrador	4 146 367 276 B	57 689 493 E	158 121 281 D
Nova Scotia	10 013 969 688 B	151 365 357 D	447 614 206 C
Northwest Territories	292 099 479 C	12 438 723 C	54 074 905 C
Nunavut	28 998 383 D	1 440 566 D	2 088 918 C
Ontario	113 820 405 228 A	1 960 150 115 C	9 506 126 758 B
Prince Edward Island	1 350 379 634 C	15 379 504 E	68 163 321 E
Quebec	65 337 250 351 B	1 121 153 108 C	4 243 683 834 B
Yukon	326 914 093 C	25 249 944 C	134 951 268 C

Figure 3.4 Age distribution of light vehicles, 2007

Age	No. of Vehicles
2 years and less	3 314 738 C
3–5 years	4 297 355 B
6–9 years	5 264 836 B
10–13 years	3 543 175 B
14 years and more	2 587 470 C

Figure 3.7 Age distribution of light vehicles by vehicle-kilometres travelled, 2007

Age	Vehicle-kilometres
2 years and less	71 038 648 120 B
3–5 years	75 771 607 811 A
6–9 years	82 673 578 290 A
10–13 years	45 836 936 579 B
14 years and more	24 882 490 531 B

Annex C. Data tables of figures in this summary report

Figure 4.1a Distance travelled by medium trucks according to configuration, 2007

Truck configuration	Vehicle-kilometres	
Straight truck	5 853 306 390	B
Straight truck and trailer	–	F
Tractor and one trailer	348 107 680	E
Tractor and two trailers	–	F
Other	1 596 928 345	D

Figure 4.1b Distance travelled by heavy trucks according to configuration, 2007

Truck configuration	Vehicle-kilometres	
Straight truck	9 602 110,910	B
Straight truck and trailer	1 447 338 584	D
Tractor and one trailer	15 898 853 921	B
Tractor and two trailers	1 939 354 925	C
Tractor and three trailers	–	F
Tractor only	914 732 895	D
Other	2 036 035 177	C

Figure 4.3 Share of distance travelled by medium and heavy trucks by activity type, 2007

Activity type	Medium trucks		Heavy trucks	
	Vehicle-kilometres			
For-hire trucking	1 549 243 146	E	13 555 824 911	B
Owner-operator	1 357 510 407	E	5 616 288 896	B
Private trucking	3 792 830 263	C	3 219 736 367	C
Other	1 410 960 454	D	1 338 674 220	D

Annex C. Data tables of figures in this summary report

Figures 4.4a and 4.4b Distribution of medium and heavy trucks according to vehicle age, 2007

Age	Medium trucks	Heavy trucks
	Number of vehicles	
2 years and less	89 818 E	87 218 D
3–5 years	79 212 E	44 401 E
6–9 years	73 186 E	72 723 D
10 years and more	150 391 E	110 535 E

Figures 4.5a and 4.5b Distribution of vehicle-kilometres travelled by medium and heavy trucks according to age, 2007

Age	Medium trucks	Heavy trucks
	Vehicle-kilometres	
2 years and less	3 012 379 297 B	11 141 585 752 B
3–5 years	1 913 264 530 C	4 342 763 335 B
6–9 years	1 745 056 752 C	5 262 815 797 B
10 years and more	1 478 972 923 E	3 174 474 602 E

Figure 5.1 Distribution of distance travelled by road type, 2007

Vehicle type	Roads with maximum posted speed of 80 km/h or more	Other roads
	Vehicle-kilometres	
Light vehicles	155 383 196 874 A	144 172 052 500 A
Medium trucks	4 446 456 931 B	3 664 087 338 B
Heavy trucks	16 635 350 554 A	7 095 173 841 B

Annex D. Glossary

Alternative fuel
Alternative fuels include all fuels other than standard ones (gasoline and diesel) used in road transportation. The most common alternative fuels in Canada are propane and compressed natural gas.

Fuel consumed
In the Canadian Vehicle Survey (CVS), fuel consumed is the fuel used to operate a vehicle. This variable is determined for each vehicle based on declared fuel purchases and distance travelled.

Fuel consumption rate
The fuel consumption rate is the amount of fuel (in litres) used by a vehicle to travel 100 kilometres. This rate is expressed in L/100 km and can be calculated based on actual road conditions or in the laboratory.

Fuel type
The fuel type is based on the information provided by the respondent or from the registration lists. All vehicles are divided into three classes: vehicles powered by gasoline, by diesel and by other energy sources (e.g. natural gas, liquid petroleum gas and propane).

Heavy trucks
In the CVS, the heavy truck category includes all heavy vehicles with a gross vehicle weight of 15 tonnes or more.

Heavy vehicles
In the CVS, this combined category includes medium trucks and heavy trucks that share several traits in terms of use.

In-scope vehicles
In-scope vehicles include all motor vehicles – except buses, motorcycles, off-road vehicles (e.g. snowmobiles, dune buggies, amphibious vehicles) and special equipment (e.g. cranes, street cleaners and backhoes) – registered in Canada during the survey reference period that have not been scrapped or salvaged.

Light trucks
In the CVS, light trucks is a subcategory of light vehicles and includes pickup trucks, vans and sports utility vehicles.

Light vehicles
In the CVS, the light vehicle category includes all vehicles with a gross vehicle weight of less than 4.5 tonnes.

Medium trucks
In the CVS, the medium truck category includes all heavy vehicles with a gross vehicle weight of 4.5 tonnes or more but less than 15 tonnes.

Number of in-scope vehicles in the CVS
The number of in-scope vehicles is an estimate of the average number of vehicles registered during the quarter based on the registration lists from jurisdictions and survey responses. This estimate may differ slightly from the number of vehicles on the registration lists because it includes all survey findings. The number of in-scope vehicles includes both vehicles used and those not used on the roads during the reference period.

Annex D. Glossary

Other (heavy vehicles)
Other (heavy vehicles) has no specific definition as it is a catch-all for types not fitting the other categories. However, some examples are dump truck, cement mixer truck, tanker truck and fuel truck.

Other (light vehicles)
Other (light vehicles) has no specific definition as it is a catch-all for types not fitting the other categories. However, some examples are taxi, ice-cream truck, tow truck and courier truck.

Passenger-kilometres
Passenger-kilometres are the sum of the distances travelled by individual passengers, the driver being considered one of the passengers (e.g. total passenger-kilometres for a specific vehicle would be the sum of the distances travelled by individual passengers in that vehicle). For light vehicles, respondents must report the number of passengers for each trip. For heavy vehicles, the number of passengers is calculated as the average of the number of passengers at the beginning of each trip and the number of passengers at the end of each trip.

Passenger vehicles
Passenger vehicles is a subcategory of light vehicles and includes cars and station wagons.

Straight truck
A straight truck is a complete unit – a power unit and a box that cannot be detached. A truck that is all one piece; the front part (engine) and back trailer do not come apart.

Tonne-kilometre
A tonne-kilometre (tkm) is the transportation of one tonne over a distance of one kilometre.

Tractor
The tractor is the cab where the driver is located. A road tractor is designed to pull a trailer containing freight. If a truck comes apart, the road tractor is the front end (the engine).

Vehicle-kilometre
A vehicle-kilometre is the distance travelled by vehicles on roads (e.g. total vehicle-kilometres for a specific vehicle would be the distance travelled by that vehicle on the road).

Vehicle type
Vehicle type is the weight classification created for the CVS and is based on the information available on the vehicle registration lists. The vehicles are divided into three weight types: Light vehicles with gross vehicle weights below 4.5 tonnes, medium vehicles with gross vehicle weights between 4.5 and 15 tonnes and heavy vehicles with gross vehicle weights of 15 tonnes or more.