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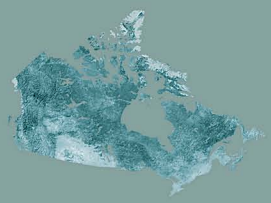

CANADIAN VEHICLE SURVEY

2009 SUMMARY REPORT

Canada

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

Cat. No. M141-18/2009 (Print)
ISSN 1927-4297

Cat. No. M141-18/2009E-PDF
ISSN 1927-4300 (On-line)

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Executive summary

The Canadian Vehicle Survey (CVS) is a voluntary, vehicle-based survey that provides quarterly and annual estimates of road vehicle activity (vehicle-kilometres [VKM] and passenger-kilometres [PKM]) of vehicles registered in Canada.

This summary report describes the characteristics of Canada's vehicle fleet and patterns in vehicle use and fuel consumption.

The principal findings from the 2009 CVS include the following:

- **The fuel consumption rate remained relatively constant between 2005 and 2009 for light vehicles that use gasoline** (10.6 to 10.7 litres per 100 kilometres [L/100 km]). For light vehicles that use diesel fuel, the rate decreased 6.8 percent, from 11.4 to 10.6 L/100 km between 2005 and 2009. Gasoline-powered vehicles constituted 96.9 percent of the light vehicles, while diesel-powered vehicles represented only 2.9 percent.
- **Fuel consumption rates decreased for medium trucks between 2005 and 2009.** The rate for gasoline-powered trucks went from 26.6 to 25.1 L/100 km, and the rate for diesel-powered trucks went from 26.4 to 24.4 L/100 km.
- **The fuel consumption rate for heavy trucks that use diesel also decreased** from 35.1 L/100 km in 2005 to 33.4 L/100 km in 2009. This decrease occurred almost entirely between 2008 and 2009. In fact, the fuel consumption rate of diesel-powered trucks rose between 2006 and 2008.
- **Alberta's light vehicle fleet is growing quickly.** From 2000 to 2009, the number of light vehicles in Alberta increased at an average annual growth rate of 3.5 percent while the Canadian average was 1.9 percent. Alberta also has the highest provincial rate of ownership of light vehicles per household. Alberta's average fuel consumption rate is the third-highest provincial rate, and the average distance travelled for light vehicles is the third-highest provincial rate.
- **Between 2000 and 2009, there was a significant change in the composition of the light vehicle fleet.** The share of the light truck category (vans, sport utility vehicles [SUVs] and pickup trucks) increased substantially relative to the share of cars. Most notably, the number of SUVs almost doubled, and their share of the light vehicle fleet increased from 6.9 percent to 12.8 percent. Meanwhile, the share of cars decreased from 60.5 percent to 55.4 percent, while the share of station wagons increased by 1 percentage point to reach 3.5 percent in 2009.
- **In 2009, there were 1.47 vehicles per household on average, which is an increase from 1.43 in 2000. Meanwhile, the average distance travelled for each light vehicle decreased from 16 944 to 15 336 km over the same period.**

Contents

List of annexes

List of figures and tables

Figures

Tables

Introduction

The Canadian Vehicle Survey (CVS) is a quarterly survey of vehicle transportation activities in Canada. Before the CVS was created, few empirically-based estimates existed for the number of vehicle-kilometres (VKM) and passenger-kilometres (PKM) travelled on Canadian roads.

Since 2004, Natural Resources Canada (NRCan) has co-sponsored the CVS in collaboration with Transport Canada and Statistics Canada. Through the analysis of the CVS data, NRCan attempts to shed light on the characteristics of Canada's vehicle fleet and patterns in vehicle use and fuel consumption.

In 2010, Transport Canada and NRCan decided to change the method for collecting CVS data. Statistics Canada did not join the redesign project because of the modifications requested by the partner organizations. Consequently, the 2009 data collected by Statistics Canada for the CVS will be the last annual data that will be produced by Statistics Canada.

Transport Canada, NRCan and Environment Canada are now working toward the 2011 Canadian Vehicle Use Study.

This summary report was prepared by Tami van Wyk and Samuel Blais of the Demand Policy and Analysis Division of the Office of Energy Efficiency (OEE). Overall direction of the project was provided by Andrew Kormylo.

For more information on programs and for the tools, free publications and other resources to help conserve energy and reduce greenhouse gas emissions, visit NRCan's OEE Web site at **oee.nrcan.gc.ca**.

Contents of this report

The *2009 Canadian Vehicle Survey Summary Report* offers a review and analysis of select key data from the 2009 survey. Similar information and analysis are in the two previous summary reports: *2007 Canadian Vehicle Survey Summary Report* and *2008 Canadian Vehicle Survey Update Report.*

Chapter 1 describes the key characteristics of Canada's on-road vehicle fleet, while Chapter 2 highlights the regional differences of the fleet across Canada.

Chapters 3 and 4 present data on the light vehicle fleet and the medium and heavy truck fleet, respectively.

Annexes A and B describe the methodology employed by the CVS. All data used to create the figures in this report are summarized in Annex C, and Annex D contains a glossary.

Note to readers: Due to rounding, the numbers in this summary report may not add up to the totals shown in the tables or to 100 percent, where applicable.

CHAPTER 1

Canada's on-road vehicle fleet

Canada's transportation sector includes activities related to transporting passengers and goods by road, rail, water and air. In 2008, this sector's energy consumption accounted for 29.7 percent of secondary energy use in Canada.[1] Road transportation consumes more than three quarters (78.9 percent) of this energy.

The greenhouse gas (GHG) emissions in the transportation sector — 179.2 megatonnes of carbon dioxide equivalent (CO_2e) emissions — accounted for approximately half (47.0 percent) of the direct end-use GHG emissions.[2] In fact, the transportation sector emits more GHGs than any other end-use sector in Canada.

Transportation still relies heavily on petroleum products for on-road use. Exceptions include electricity in some buses and plug-in hybrids. A more complete list of other fuels used in the transportation sector is provided in Section 1.3 of this report.

In the last few years, many provinces have mandated that gasoline must contain ethanol or other renewable fuel. Ontario requires a blend average of 5.0 percent ethanol in gasoline, Manitoba has an average blend mandate of 8.5 percent ethanol, and Saskatchewan's mandate is an average blend of 7.5 percent ethanol.[3]

Figure 1 shows that personal vehicles are an important household commodity; 84.4 percent of Canadian households owned or leased at least one vehicle in 2007.[4]

This chapter describes the key characteristics of Canada's on-road vehicle fleet derived from Canadian Vehicle Survey (CVS) data. The data used include the entire on-road vehicle fleet, with certain exceptions such as buses and motorcycles. For a description of the methodology employed by the CVS, see Annex B in this report.

1.1 Number and age of vehicles

Table 1 shows the number of vehicles in Canada from 2000 to 2009, as well as the growth rate for each category during this period. Vehicles are divided into three categories according to weight:

- 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

According to CVS estimates, the number of in-scope vehicles grew at an average of 2.0 percent per year over 2000 to 2009 (19.1 percent for the entire period), reaching 20.5 million vehicles in 2009. The medium truck category exhibited the fastest growth rate at 3.6 percent per year during this period.

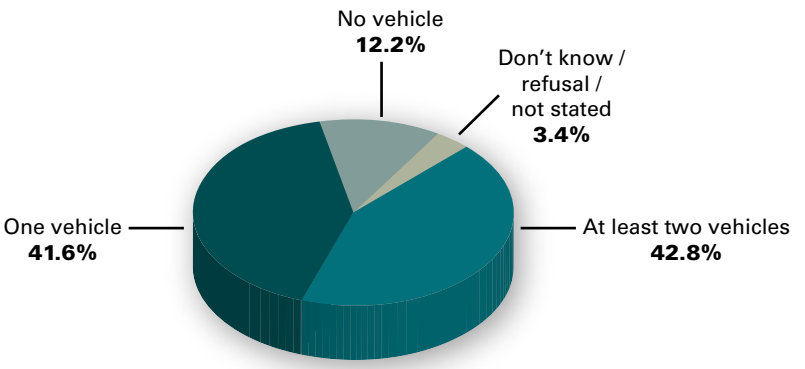
1 Natural Resources Canada, Office of Energy Efficiency, 2011, *Energy Use Data Handbook, 1990 to 2008*.

2 Direct emissions exclude emissions from the electricity generation sector.

3 Natural Resources Canada, Office of Energy Efficiency, Fuels Policy and Programs.

4 Statistics Canada, Household and Environment Survey.

Figure 1 — Share of households in Canada by number of owned/leased vehicles, 2007



2007
12 932 350 households

Source: National Energy Use Database — 2007 Survey of Household Energy Use, Natural Resources Canada, Office of Energy Efficiency

Table 1 — Vehicles in Canada by vehicle type, 2000 to 2009

Year	Light vehicles	Medium trucks	Heavy trucks	Total
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	17 547 499 A	321 878 A	278 848 A	18 148 225 A
2004	17 782 719 A	326 525 B	277 942 B	18 387 185 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	19 007 572 A	392 608 B	314 877 B	19 715 057 A
2008	19 426 504 A	412 811 B	327 106 B	20 166 421 A
2009	19 755 945 A	437 997 B	317 219 B	20 511 161 A
2000–2009 Growth	**18.7%**	**37.1%**	**24.2%**	**19.1%**
2000–2009 CAGR	**1.9%**	**3.6%**	**2.4%**	**2.0%**

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.

CAGR: compound annual growth rate.

Figure 2 reveals that the rapid increase in the number of medium and heavy trucks is not as pronounced when the focus is the on-road transportation sector in general, because medium trucks and heavy trucks account for only 2.1 percent and 1.5 percent of vehicles on the road, respectively.

The age distribution of vehicles in 2009 is illustrated in Figure 3. In the light vehicle fleet, 18.7 percent of vehicles were less than 3 years old while half were between 3 and 9 years old.

Figure 2 — Share of vehicles in Canada by vehicle type, 2000 and 2009

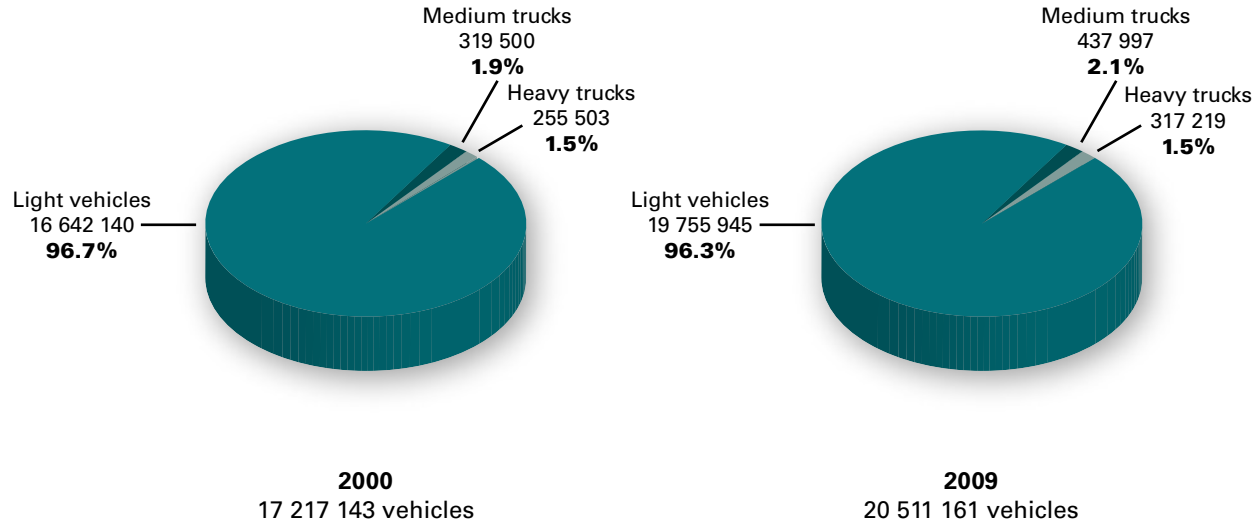
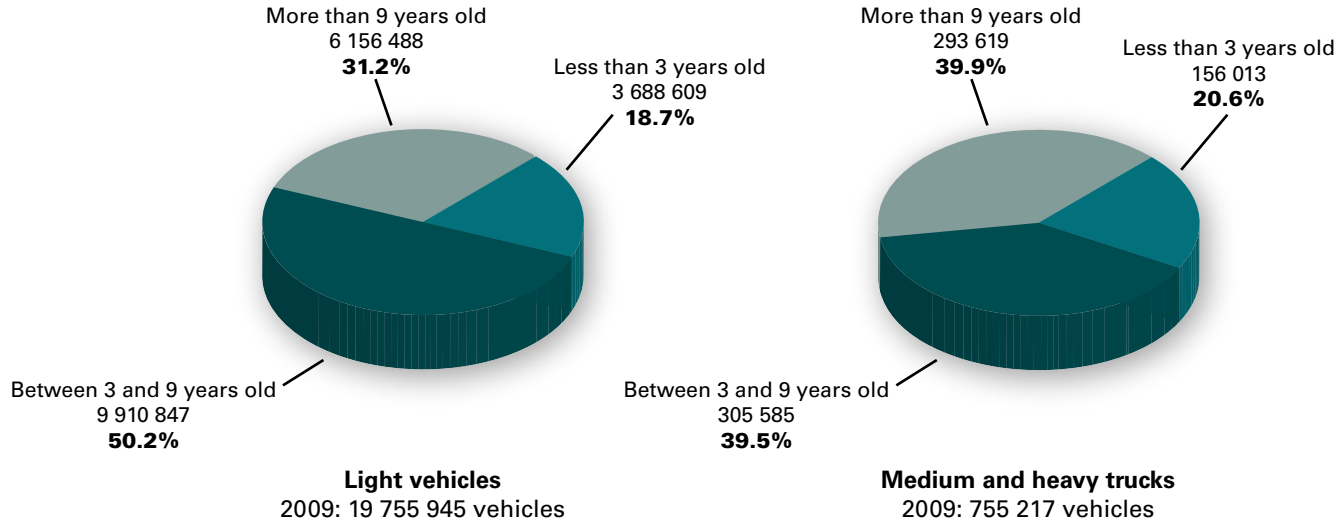


Figure 3 — Age of vehicle fleets by vehicle type, 2009



The rapid growth in the use of medium and heavy trucks in recent years translates into a relatively larger share of vehicles that were less than 3 years old in 2009. Medium and heavy trucks have also retained a large number of older vehicles. In the medium and heavy truck fleet, 39.5 percent of the vehicles were between 3 to 9 years old and 39.9 percent were more than 9 years old as of 2009.

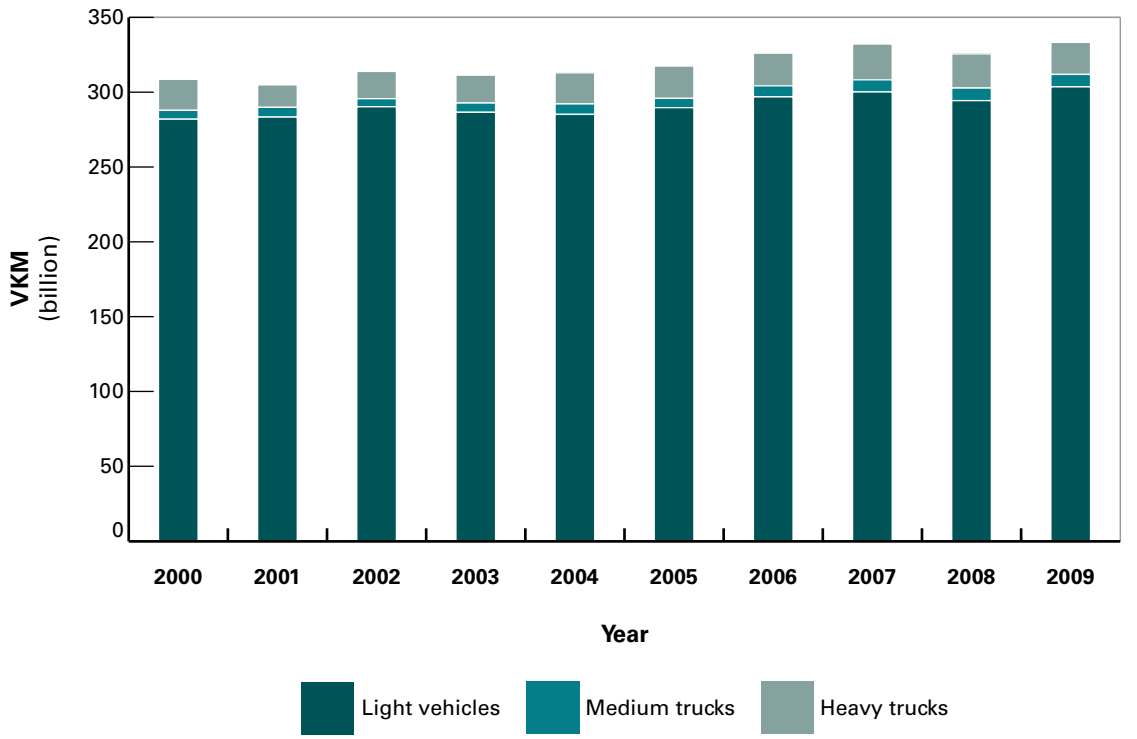
1.2 Vehicle-kilometres

In 2009, Canadian vehicles travelled almost 334 billion kilometres (km) (see Figure 4). Of these kilometres travelled, 91.1 percent of vehicle-kilometres (VKM) travelled were by light vehicles. Medium and heavy trucks accounted for the remaining 8.9 percent of VKM, even though they comprised less than 4 percent of the vehicle stock (see Figure 2). This fact implies that, on average, medium and heavy trucks were driven further than light vehicles.

Over 2000 to 2009, the compound annual growth rate of VKM was 3.8 percent for medium trucks, 0.8 percent for light vehicles and 0.4 percent for heavy trucks.

VKM increased at an average rate of 2.5 percent per year from 2000 to 2009, although decreases in total VKM occurred in 2001, 2003 and 2008. The largest decrease was in 2008 when VKM decreased by 2.0 percent, coinciding with a recession and a peak in gasoline and diesel prices across Canada.[5]

Figure 4 — Vehicle-kilometres travelled by vehicle type, 2000 to 2009



[5] Natural Resources Canada, 2010, *The Fuel Focus Report*, www.nrcan.gc.ca/eneene/sources/pripri/latder-eng.php.

Figure 5 — Canadian average weekly retail price of regular gasoline, 2007 to 2009

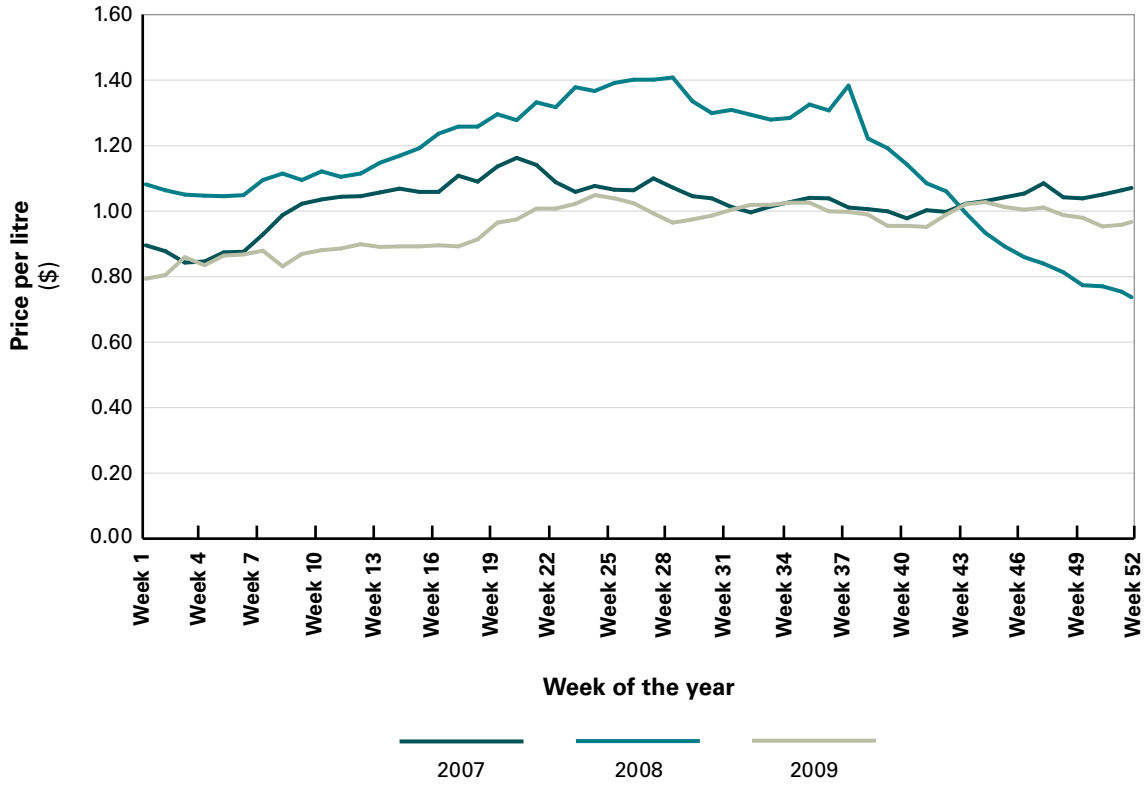


Figure 5 illustrates that the price of gasoline was approximately 30 cents per litre higher during the 2008 summer period (weeks 25 to 37) than it was in the summers of 2007 and 2009.

In Figure 6, the second and third quarters of each year represent the summer period, and the VKM are highest during the summer.

The summer VKM for 2009 were higher than those for 2008, in part, because

- The high gas prices in 2008 caused people to drive fewer kilometres.
- The lower gas prices in 2009, which were reduced to the level of 2007, caused people to drive more kilometres.

1.3 Fuel consumption

Table 2 lists the number of vehicles according to type of vehicle and type of fuel consumed in 2009. Virtually all vehicles (99.7 percent) consumed either gasoline (including up to 10 percent ethanol blends) or diesel. Light vehicles used primarily gasoline (96.9 percent), while heavy vehicles used primarily diesel (97.5 percent). Meanwhile, medium trucks were more varied in their fuel consumption, with about three quarters (72.2 percent) running on diesel and the remainder running on gasoline.

Other types of fuel used by Canadian drivers included electricity, propane, natural gas and 85 percent ethanol/gasoline blends.[6] These fuels were used in less than 1 percent of all vehicles.

[6] For more information on alternative fuels, visit oee.nrcan.gc.ca/transportation/alternative-fuels/index.cfm.

Figure 6 — Quarterly vehicle-kilometres travelled by light vehicles, 2007 to 2009

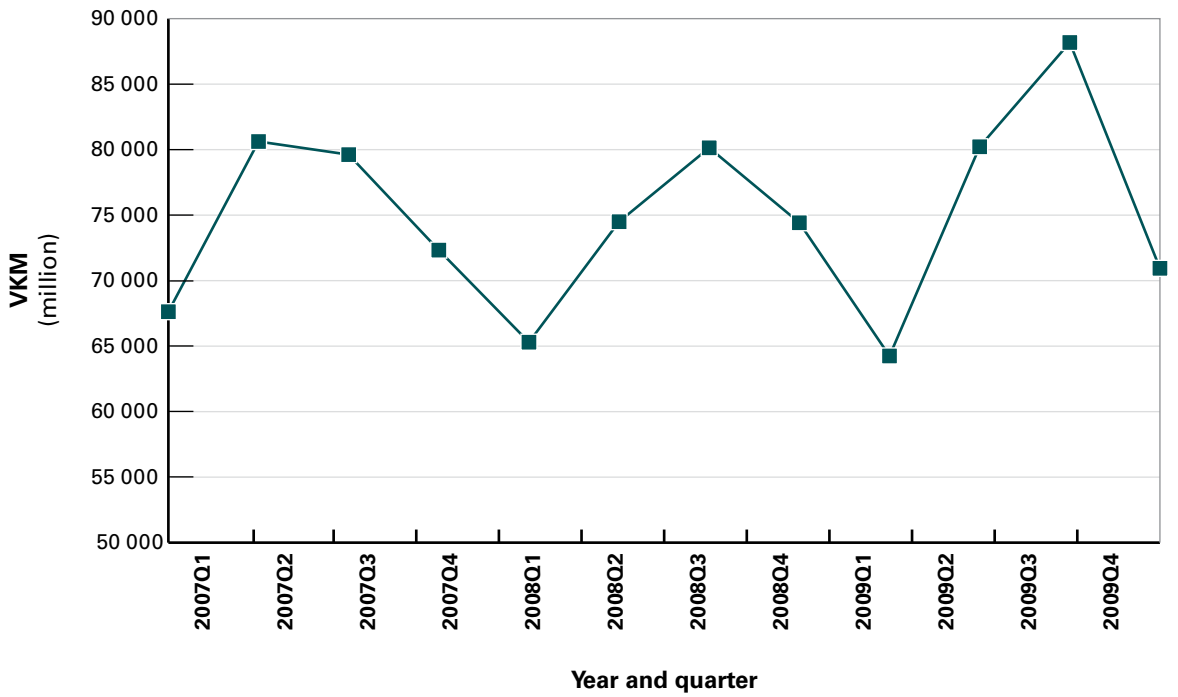


Table 2 — Vehicles in Canada by vehicle type and fuel type, 2009

Fuel type	Vehicles			Total
	Light vehicles	Medium trucks	Heavy trucks	
Gasoline	19 145 666 A	115 572 E	F	19 269 153 A
Diesel	563 608 E	316 380 E	309 305 B	1 189 293 C
Other	F	F	N/A	F
Total	**19 755 945 A**	**437 997 B**	**317 219 B**	**20 511 161 A**

The letter F indicates quality indictor: 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 7 shows the fuel consumption rate (FCR) for gasoline and diesel in 2005 and 2009 for each vehicle type.[7] The rate remained relatively constant for light vehicles: a slight increase for gasoline (10.6 to 10.7 L/100 km) and a slight decrease for diesel (11.4 to 10.6 L/100 km).

FCRs decreased for medium trucks (from 26.6 to 25.1 L/100 km for gasoline-powered trucks and from 26.4 to 24.4 L/100 km for diesel-powered trucks).

[7] 2005 is used because before 2005, fuel consumption was estimated by using a different methodology.

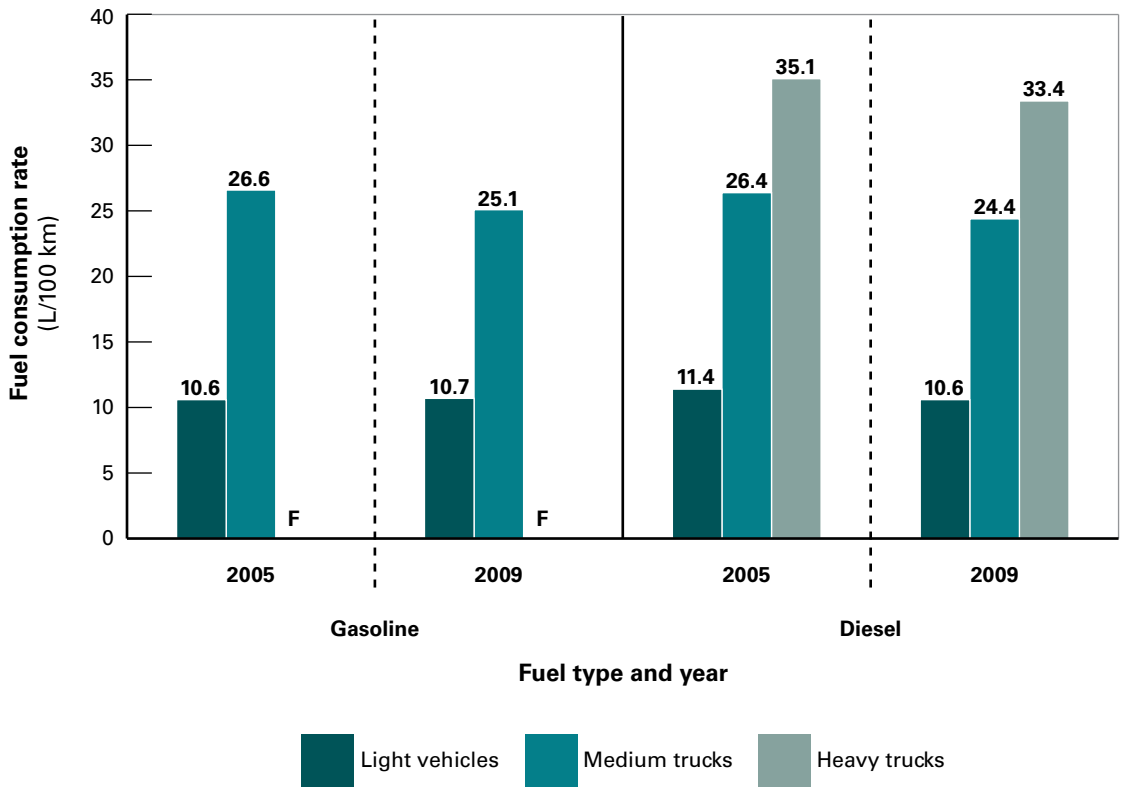
The FCR for heavy trucks also decreased, from 35.1 L/100 km in 2005 to 33.4 L/100 km in 2009. This decrease occurred almost entirely from 2008 to 2009; in fact, from 2006 to 2008, the fuel consumption of diesel-powered trucks rose.

In 1995, the Government of Canada introduced regulations for reducing air pollutants. These regulations include the *Sulphur in Diesel Fuel Regulations*, the *Sulphur in Gasoline Regulations* and the *Benzene in Gasoline Regulations*.[8]

These regulations caused changes in the composition of diesel fuel. Consequently, diesel-powered engines had to be modified to accommodate the altered fuel. The use of the new diesel fuel in the standard engines temporarily halted gains in fuel efficiency. After the engines were modified to accommodate the new diesel fuel, FCRs began to decline between 2008 and 2009.

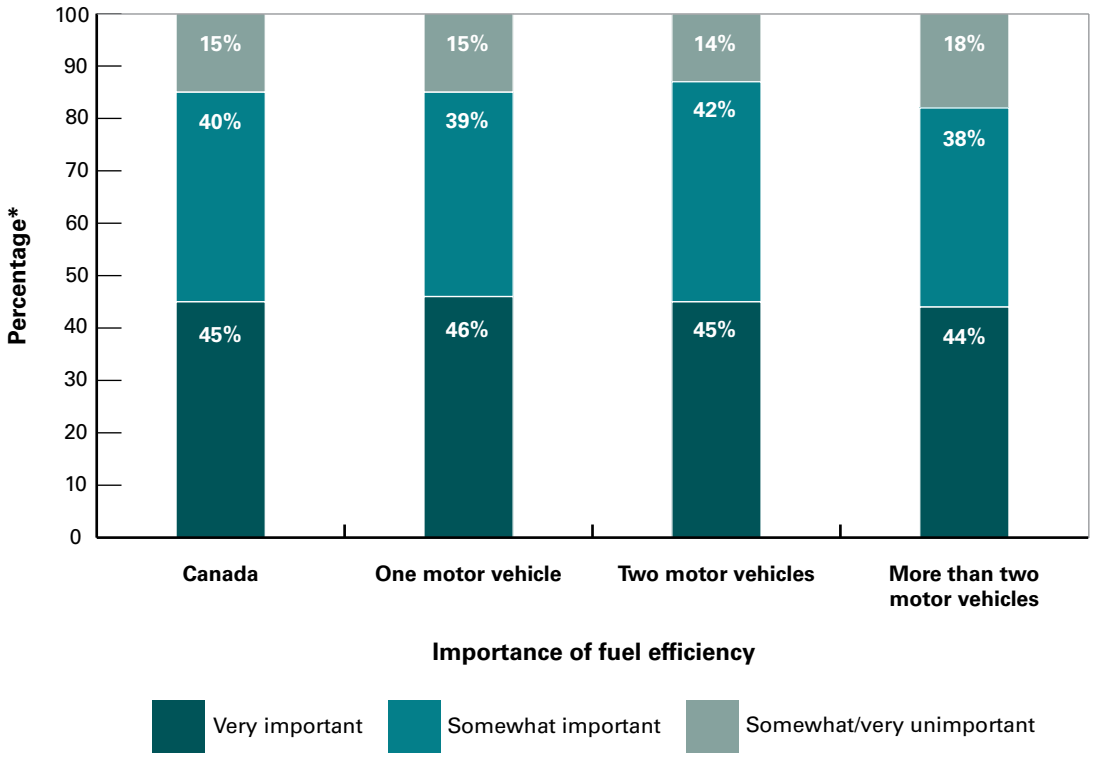
One method of improving fuel efficiency is to drive a vehicle that runs on diesel, rather than gasoline. This practice is especially prevalent in Europe. In 2008, diesel vehicles accounted for approximately 52 percent of new passenger vehicle sales in the European Union, up from 32 percent in 2000.

Figure 7 — Fuel consumption rate by vehicle type and fuel type, 2005 and 2009



[8] Natural Resources Canada, 2010, *Industrial Consumption of Energy (ICE) Survey — Summary Report of Energy Use in the Canadian Manufacturing Sector, 1995–2008.*

Figure 8 — When last motor vehicle was purchased/leased, importance of fuel efficiency in decision, by number of motor vehicles owned/leased, 2007



National Energy Use Database — 2007 Survey of Household Energy Use, Natural Resources Canada, Office of Energy Efficiency

* Total percentage (100%) excludes all households that did not own or lease a vehicle, did not know, did refuse to answer or, finally, did not state.

Diesel engines have significantly higher fuel efficiency than current gasoline, spark-ignition engines. In some vehicles, fuel efficiency can be improved by 20 percent to 50 percent compared with gasoline. Today's light-duty diesel engines generally perform as well as comparable gasoline engines but have better fuel economy. Better fuel economy translates to lower CO_2 emissions.[9]

Historically, the high cost of controlling pollutant emissions has been a barrier to more widespread use of diesel vehicles. Emissions of nitrogen oxides (NO_x) and particulate matter (PM) have been particularly problematic.

Nonetheless, technological advances over the past 20 years have enabled greater control of diesel emissions while maintaining high performance, thus positioning diesel passenger vehicles for re-emergence in the United States market.

[9] U.S. Department of Energy, Energy Efficiency and Renewable Energy, July 2010, *Diesel Power: Clean Vehicles for Tomorrow*, www1.eere.energy.gov/vehiclesandfuels/pdfs/diesel_technical_primer.pdf.

Since 2004, the United States Environmental Protection Agency (EPA) Tier 2 standards have been the same for all light-duty vehicles, regardless of the category (car or sport utility vehicle [SUV]) or fuel type (gasoline or diesel). However, in the future, technological advances will be needed to meet more stringent emissions regulations.

Because of the improvements made for controlling diesel emissions and the significantly higher fuel efficiency of a diesel engine, choosing to drive a diesel vehicle is becoming a more viable alternative for more people.[10]

Figure 8 confirms that fuel efficiency is a priority for Canadians when they select a vehicle. In fact, 45 percent of Canadians stated that fuel efficiency was a very important consideration for them the last time they purchased or leased a motor vehicle, and another 40 percent stated that fuel efficiency was somewhat important.

Since 1990, significant technological improvements have made vehicles more fuel-efficient and safer. As shown in Table 3, newer vehicles are heavier and have more powerful engines. Also, a larger proportion of these vehicles are now four-wheel drive (4WD) and all-wheel drive (AWD). Although 4WD and AWD increase a vehicle's safety, these technologies are less fuel-efficient, in general.

On the other hand, the movement toward building vehicles that have electronic fuel injection and more gears has made the vehicles more fuel-efficient. The EPA reported, "One way to make the engine operate more closely to its best efficiency point is to increase the number of gears in the transmission and, for automatic transmissions, employ a lockup torque converter. Three important changes in transmission design have occurred in recent years: the use of additional gears for both automatic and manual transmissions; the automatics are using more conversion to lockup torque converter transmissions; and the use of continuously variable transmissions (CVTs)."[11]

Note that six-speed transmissions currently account for less than 5 percent of transmissions built in North America but are expected to reach 40 percent by 2012.[12] Seven-speed transmissions are available.

As discussed earlier, some of these improvements make a vehicle less fuel-efficient (heavier and more powerful), while others improve the FCR (gears and injection). Between 1990 and 2008, fuel efficiency improved as the lab-tested FCR of light vehicles sold in a single model year declined (see Table 3).

The FCR for cars and station wagons decreased from 8.2 L/100 km in 1990 to 7.8 L/100 km in 2000 and was 7.1 L/100 km in 2008. The FCR for light trucks decreased from 11.3 L/100 km in 1990 to 11.1 L/100 km in 2000 and further dropped to 9.5 L/100 km in 2008.

[10] U.S. Department of Energy, Energy Efficiency and Renewable Energy, July 2010, *Diesel Power: Clean Vehicles for Tomorrow*, **www1.eere.energy.gov/vehiclesandfuels/pdfs/diesel_technical_primer.pdf**.

[11] U.S. Environmental Protection Agency, *Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2010*, November 2010, **www.epa.gov/oms/fetrends.htm**.

[12] CSM Worldwide, **www.csmauto.com**.

Table 3 — Vehicles in Canada by vehicle characteristics, 1990, 2000 and 2008

	Model year		
	1990	2000	2008
Number of gears	**Share**	**Share**	**Share**
3 gears	30.0%	4.0%	–
4 gears	47.0%	78.0%	46.0%
5 gears	23.0%	18.0%	38.0%
6 gears	–	–	15.0%
7 gears or more	–	–	1.0%
Gross vehicle weight	**kilograms**	**kilograms**	**kilograms**
	approx. 1450	approx. 1680	approx. 1720
Engine	**Share**	**Share**	**Share**
4 cylinders and less	50.0%	38.0%	48.0%
5 or 6 cylinders	38.0%	49.0%	40.0%
7 cylinders and more	12.0%	13.0%	12.0%
Fuel control	40% fuel injection	Multi-point and electronic fuel injection	Electronic fuel injection
Horsepower	**HP**	**HP**	**HP**
	127	171	214*
Drive type	**Share**	**Share**	**Share**
Front	75.0%	71.0%	59.0%
Rear	15.0%	10.0%	6.0%
4WD and AWD	10.0%	19.0%	35.0%
Fuel consumption rate (L/100 km)**	**FCR (Share)**	**FCR (Share)**	**FCR (Share)**
Car and station wagon	8.2	7.8	7.1
4WD and AWD	9.2 (1.0%)	9.1 (2.0%)	9.1 (7.0%)
Rear	9.7 (5.0%)	9.9 (5.0%)	8.9 (7.0%)
Light truck (van and SUV)	11.3	11.1	9.5
4WD and AWD	11.6 (34.0%)	12.2 (41.0%)	10.5 (67.0%)
Rear	11.4 (43.0%)	11.8 (17.0%)	10.7 (6.0%)

* Data estimated from: U.S. Environmental Protection Agency, *Light-Duty Automotive Technology and Fuel Economy Trends: 1975 Through 2008*, September 2008

** Average fuel consumption rate for motor gasoline fleet of selected model year vehicles, from Transport Canada Web site.

CHAPTER 2

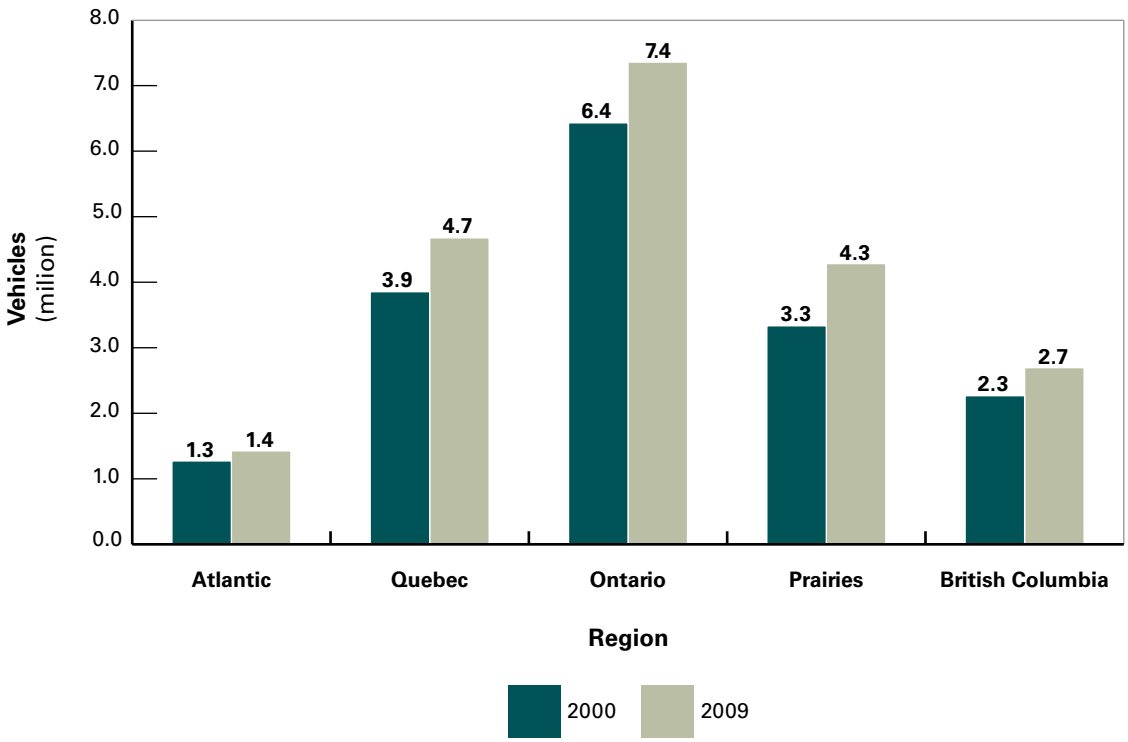
Geographic analysis

This chapter highlights regional and provincial variations in the characteristics of the vehicle fleet across Canada.

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

Figure 9 illustrates the number of vehicles in Canada for 2000 and 2009 by region. Vehicle distribution is highly correlated with population: together, Ontario and Quebec accounted for 58.7 percent of the Canadian fleet in 2009, with 7.4 million vehicles in Ontario and 4.7 million in Quebec. The Prairies have risen to 4.3 million vehicles, British Columbia now stands at 2.7 million, and the Atlantic provinces made up 1.4 million of the Canadian fleet in 2009. These numbers mean that in 2009, the Prairies represented 20.9 percent of the on-road vehicle fleet; British Columbia, 13.1 percent; and the Atlantic region, 7.0 percent.

Figure 9 — Number of vehicles in Canada by region, 2000 and 2009



This figure excludes the territories because their vehicle fleets are small, accounting for 58 351 vehicles in 2009.

Growth in vehicles for this period was highest in Alberta, which had a compound annual growth rate of 3.5 percent, followed by Ontario with 2.2 percent and Newfoundland and Labrador with 2.1 percent. Growth in the remaining provinces was between 1.5 percent and 1.9 percent per year except for most of the Atlantic region, where growth was approximately 1 percent per year.

Figure 10 displays the average number of light vehicles per household for each jurisdiction in Canada. Vehicle ownership remains highest in Alberta and Saskatchewan, with an average of 1.87 and 1.79 vehicles per household, respectively. Quebec had the lowest vehicle ownership rate of 1.35 vehicles per household.

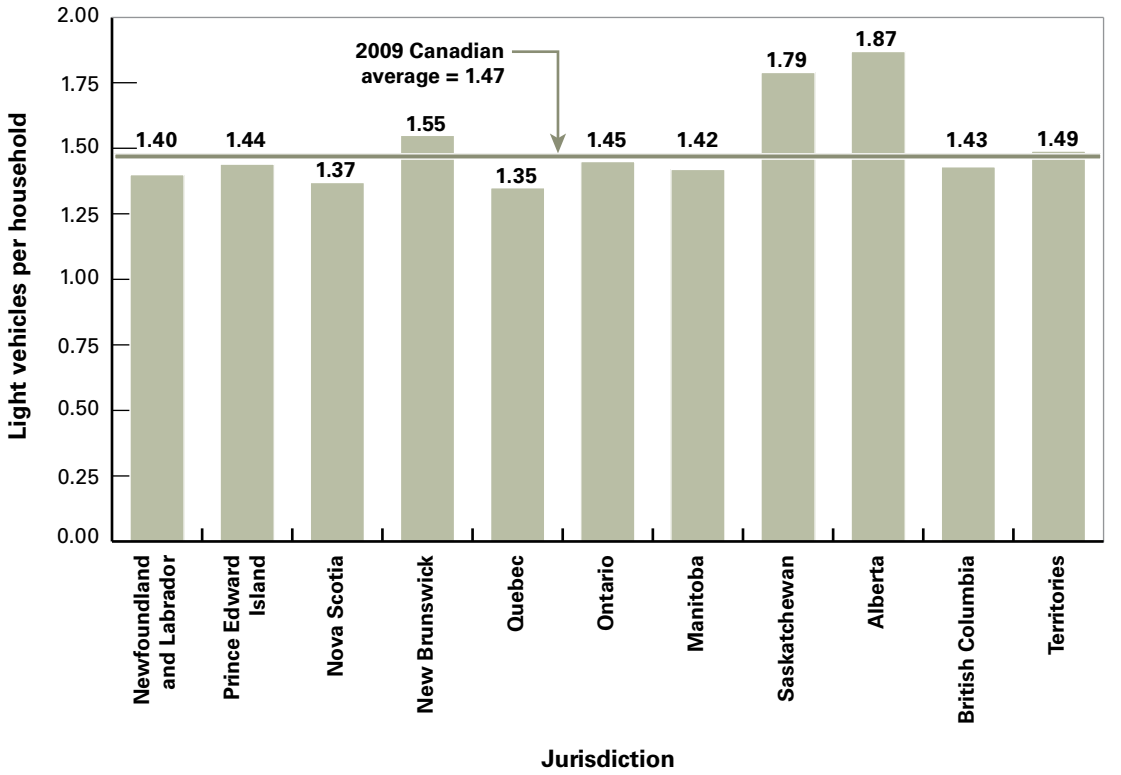
The Canadian average in 2009 was 1.47 vehicles per household, which is significantly higher than the 2000 average of 1.43. Between 2000 and 2009, vehicle ownership rates remained stable in Nova Scotia, Ontario and British Columbia but increased in the other provinces and the territories.

2.2 Variation in the distance travelled among regions

Figure 11 illustrates the average annual distance travelled by light vehicles in each jurisdiction for 2000 and 2009. In 2009, light vehicles were driven an average of 15 366 kilometres (km) in Canada. Light vehicles were driven the furthest in Nova Scotia (17 427 km) and the shortest distance in British Columbia (12 892 km).

The most notable change in distance travelled by light vehicles from 2000 to 2009 is in Newfoundland and Labrador. Whereas in 2000 the province had the highest average distance travelled by light vehicles (19 965 km), in 2009 the distance was 15 056 km, which is below the Canadian average of 15 366 km.

Figure 10 — Number of light vehicles per household by jurisdiction, 2009



Factors that may contribute to these regional differences include

- household types and demographics
- alternative transportation options
- vehicle ownership rates
- fuel prices
- climate

From 2000 to 2009, Nova Scotia was the only jurisdiction that increased its average annual distance travelled by light vehicles. One explanation for this difference is that Nova Scotia had the smallest growth in light vehicles since 2000, at 7.2 percent. The Canadian average growth rate was 18.7 percent for light vehicles from 2000 to 2009. The data indicate that Nova Scotia will rely more heavily on its primary vehicle, while other jurisdictions will more evenly distribute their amount of distance travelled between their primary and secondary vehicles.

Furthermore, Nova Scotia is distinct in its geographical composition. According to Statistics Canada's 2006 Census, the 15 largest census metropolitan areas (CMAs) in the country are in Ontario, Quebec, British Columbia and Alberta. The only two exceptions to this list are Winnipeg, Manitoba, which is ranked 8th; and Halifax, Nova Scotia, which has the 13th-largest population.

Halifax is the only city in the Atlantic region among the largest 15 CMAs in Canada. Halifax has a large land area of 5496 square kilometres (km^2) — which ranks fourth after Edmonton, Toronto and Ottawa — and has a low population density of 67.8 people/km^2 (2006 data). In contrast, Toronto has a similar land area of 5904 km^2 and

Figure 11 — Average distance travelled by light vehicles by jurisdiction, 2000 and 2009

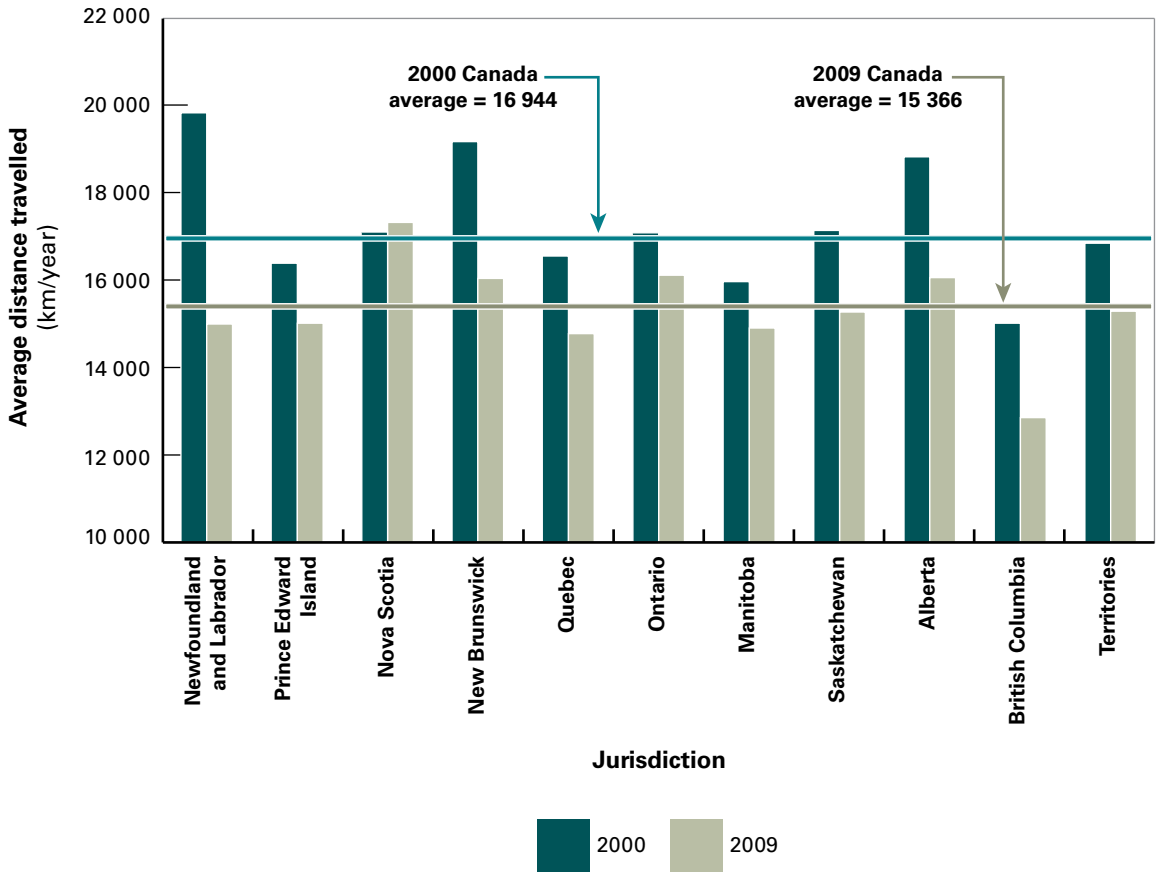
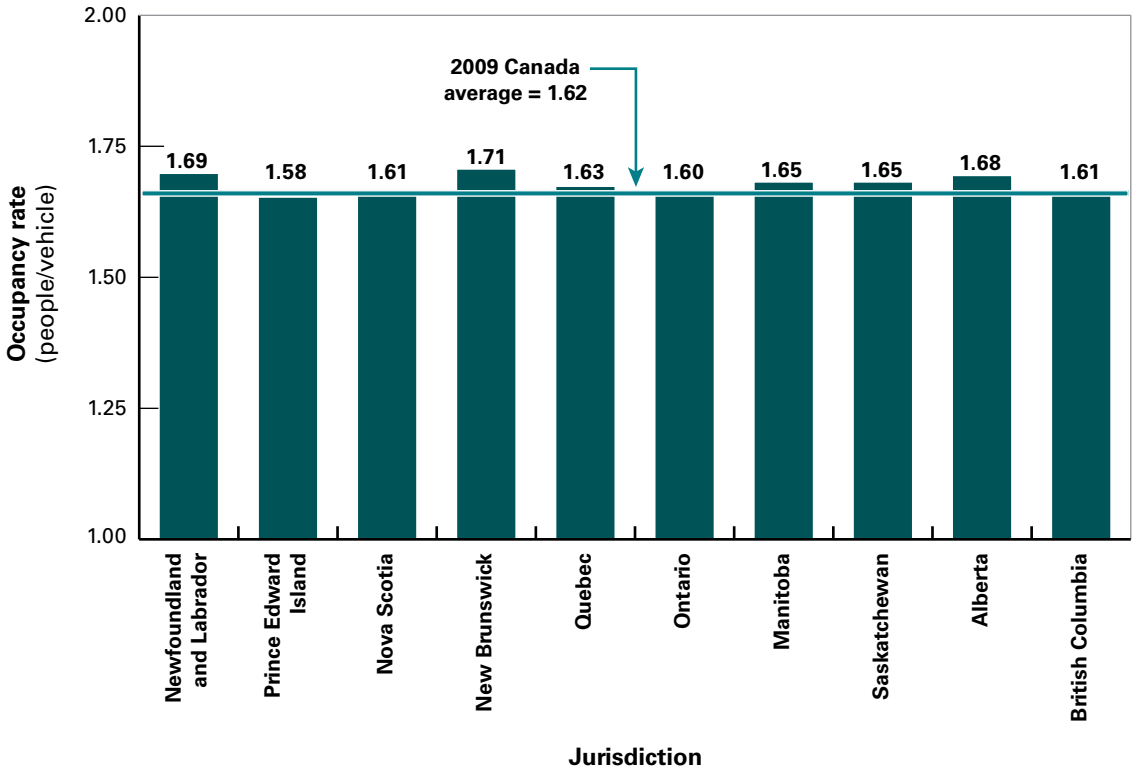


Figure 12 — Occupancy rate of light vehicles by jurisdiction, 2009



has a much larger population density of 866.1 people/km^2 (2006 data). In other words, Halifax is big in size but sparse in population.

This unique dispersion of Halifax, combined with the fact that Halifax comprises more than 40 percent of Nova Scotia's population, creates favourable conditions for higher annual VKM for this province.

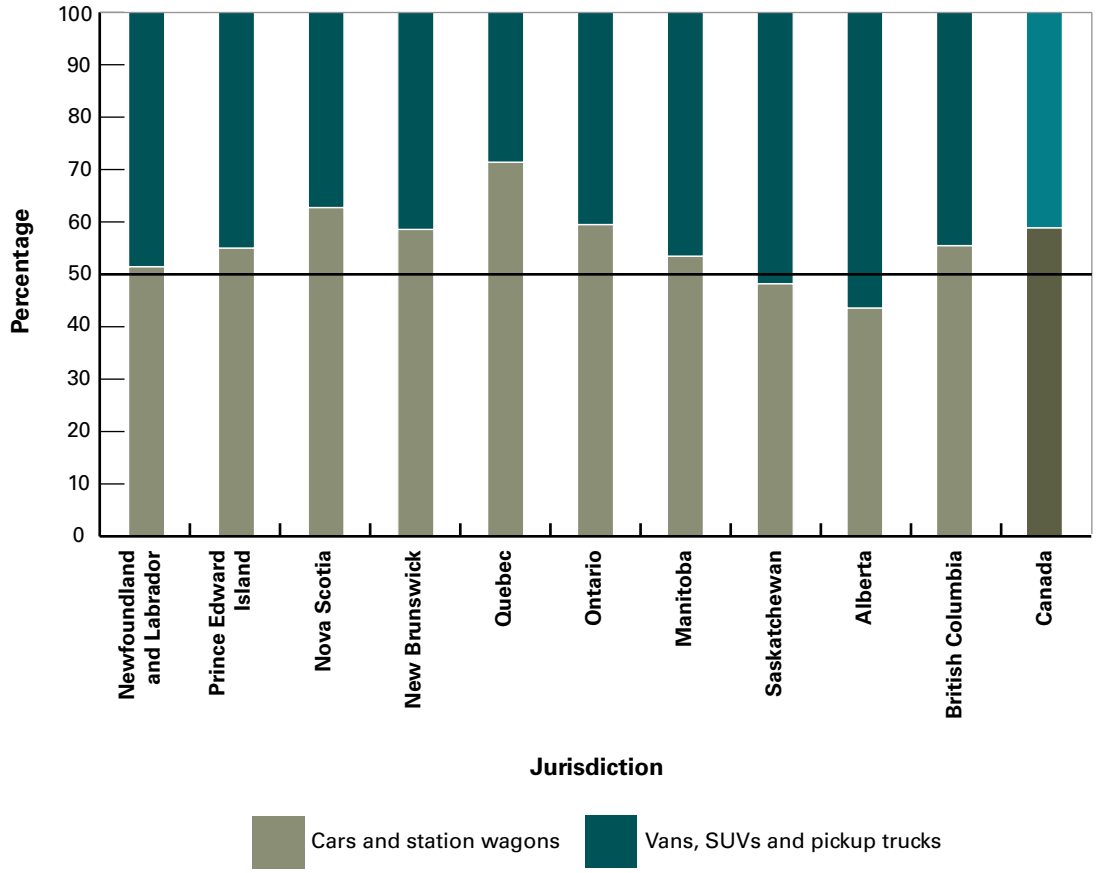
The next two largest Atlantic cities in 2006 were St. John's, Newfoundland and Labrador, with a land area of 805 km^2 and a population density of 225.1 people/km^2; and Moncton, New Brunswick, with a land area of 2406 km^2 and a population density of 52.5 people/km^2 (as of 2006). These two Atlantic cities are ranked 20th and 29th, respectively, based on their population.

Figure 12 illustrates that the occupancy rate of light vehicles (people per vehicle) varies across jurisdictions. For example, the Prairies, New Brunswick, and Newfoundland and Labrador have higher occupancy rates than the Canadian average.

Figure 13 shows the distribution of cars and light trucks by jurisdiction. As will be discussed later in Chapter 3, the occupancy rate of light trucks is higher than the occupancy rate of cars (see Figure 24). Therefore, it is not surprising that the jurisdictions that have higher occupancy rates have more light trucks in their light-duty vehicle fleet.

The average annual distance travelled by medium trucks in Canada was 18 938 km in 2009 (see Figure 14). Medium trucks are generally used locally for short distances and within the city, while heavy trucks are usually used to travel long distances between the metropolitan areas.

Figure 13 — Share of body type of light vehicles by jurisdiction, 2009



It is not surprising to see that Quebec, Ontario, Alberta and British Columbia are above the Canadian average in distance travelled by medium trucks because the biggest metropolitan areas in Canada, according to size and population, are in these four provinces. Therefore, they are a hub for higher concentrations of market activity and, as a result, will use medium trucks more intensively than the other jurisdictions.

The exception is Nova Scotia, which had the highest distance travelled by medium trucks for 2009 at 22 779 km. This distance travelled can be explained by the factors listed at the beginning of Section 2.2.

Nova Scotia not only has the biggest CMA of the Atlantic provinces in Halifax, in terms of population, but also has a land area comparable with Toronto and the third-largest port, based on operating revenue in 2007 (after Vancouver and Montréal).[13] Halifax benefits from all these factors, which provide an environment for creating an industrial hub of activity.

[13] Transport Canada, *Transportation in Canada 2009, Annual Report — May 2010*, Table M9: Canada Port Authorities (CPA) Financial Comparison, 2007 and 2008, www.tc.gc.ca/eng/policy/report-aca-anre2009-2500.htm.

Figure 14 — Average distance travelled by medium trucks by jurisdiction, 2009

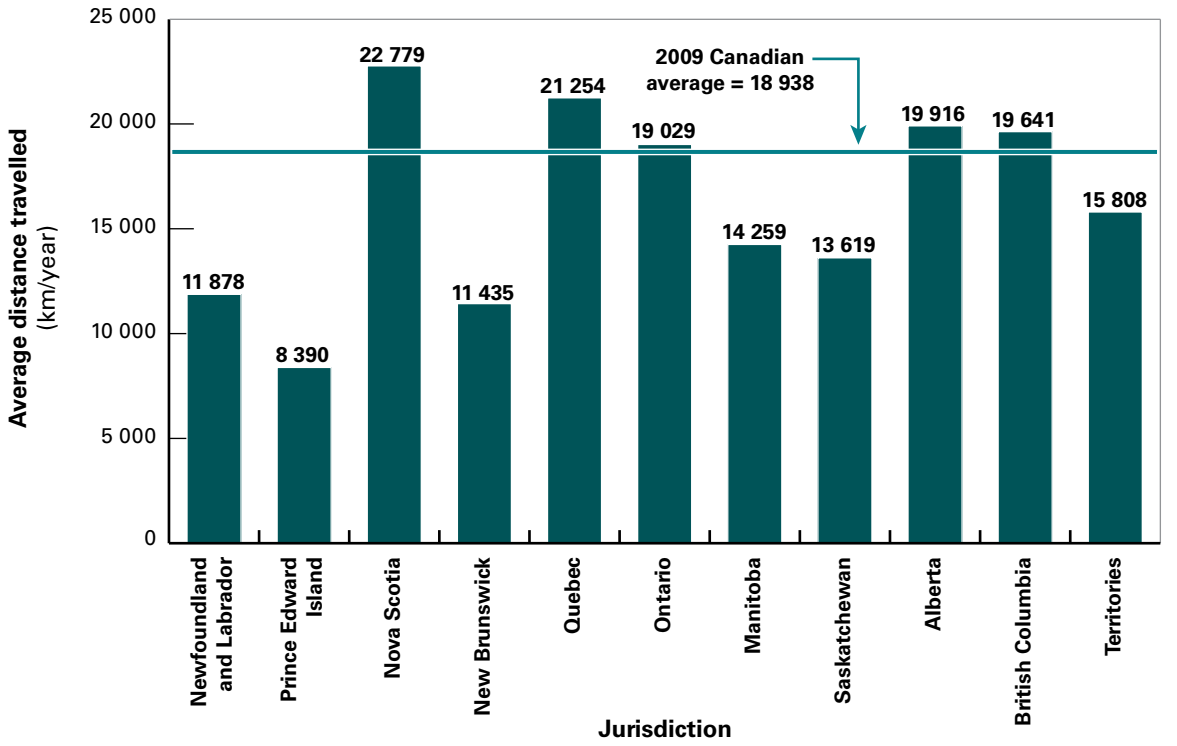


Figure 15 — Average distance travelled by heavy trucks by jurisdiction, 2009

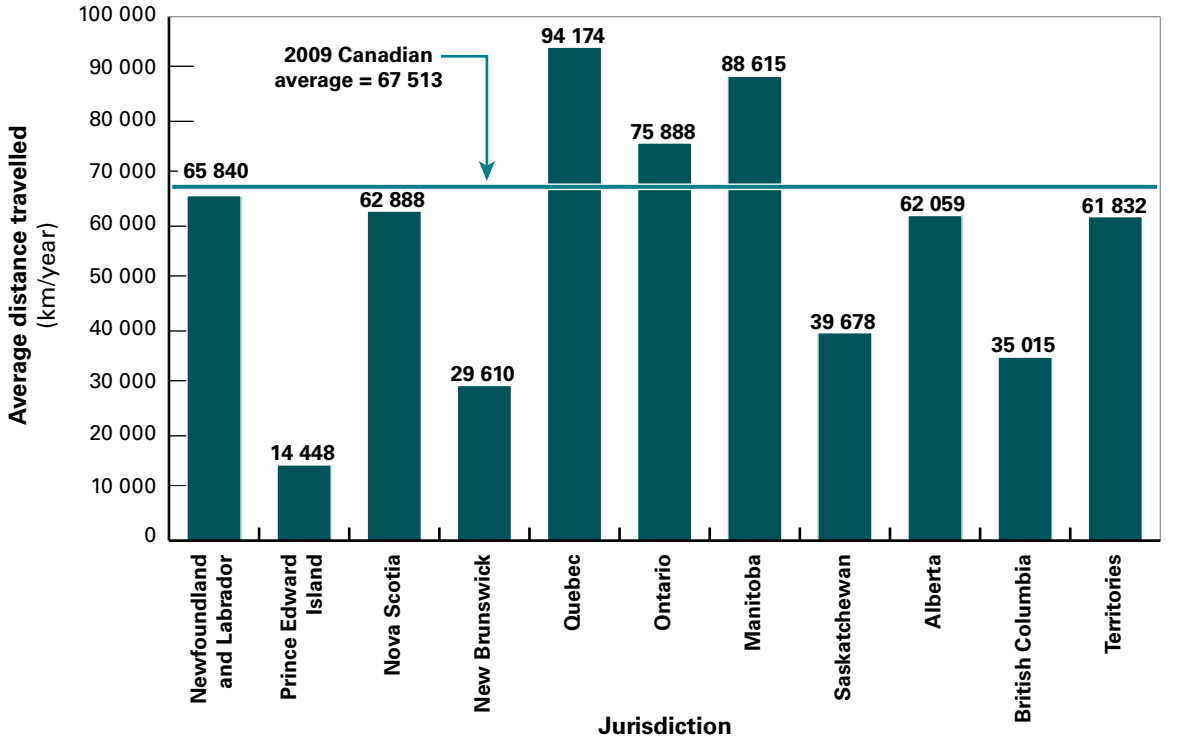
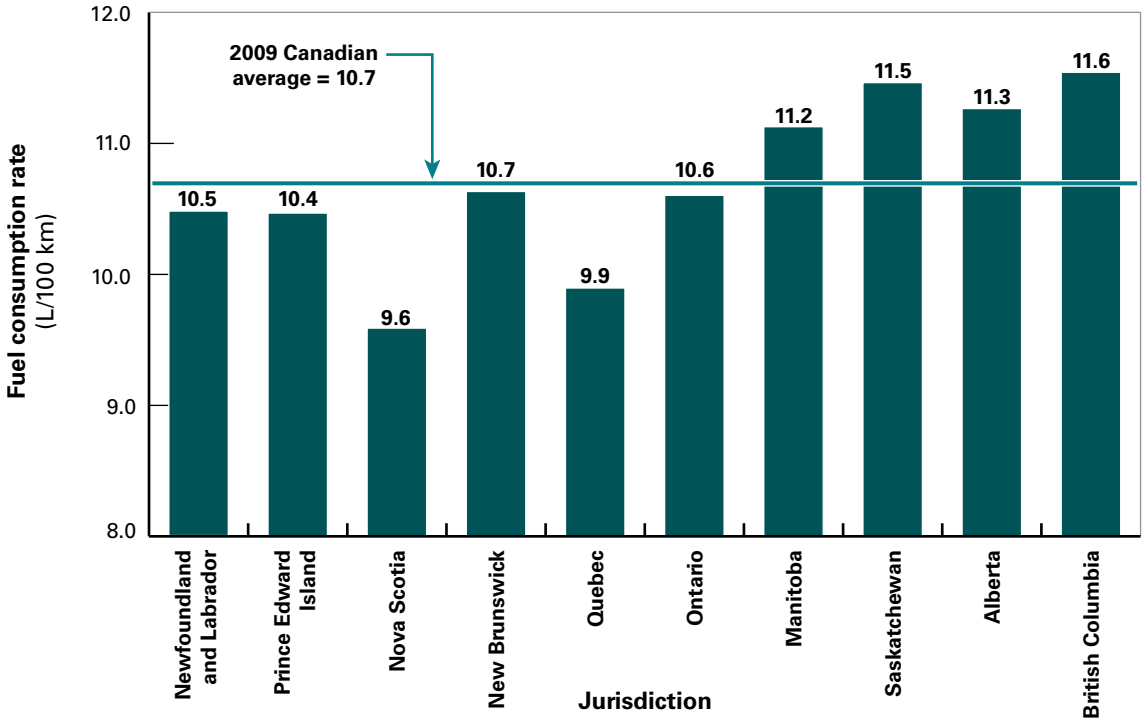


Figure 16 — Fuel consumption rate of gasoline-powered light vehicles by jurisdiction, 2009



The CVS data showed that heavy trucks were generally driven much further (an average of more than 67 500 km in 2009) than other vehicle types (see Figure 15). Average annual distances exceeded 90 000 km in Quebec, 80 000 km in Manitoba and 70 000 km in Ontario. On the other hand, heavy trucks travelled much less distance in Prince Edward Island, New Brunswick, Saskatchewan and British Columbia.

Numerous factors probably contribute to the variation in distance travelled among regions for medium and heavy trucks, including

- structure of the economy
- geographic size
- geographic range of trucking operations, which could include out-of-province trucking kilometres

2.3 Provincial fuel consumption rates

Substantial regional variations exist in the fuel consumption rates (FCRs) of light vehicles (see Figure 16). In 2009, the average FCR of gasoline-powered light vehicles in Canada was 10.7 litres per 100 kilometres (L/100 km).[14,15] Fuel consumption was below the Canadian average in all of eastern Canada but was above average for the remainder of the provinces, west of Ontario.

Numerous factors may influence these variations, including

- composition and age of the vehicle fleet
- fuel prices
- patterns of vehicle use

[14] The FCR for diesel-powered light vehicles is not shown because the data are of too poor quality to publish.

[15] Fuel consumption data are not available for the territories.

In the Prairies, the vehicle fleet contained a greater proportion of vans, sport utility vehicles (SUVs) and pickup trucks (see Figure 13) than in the rest of Canada. The vehicle fleet in these jurisdictions also had a higher proportion of older vehicles, which tend to be less fuel-efficient than newer vehicles.

Figures 17 and 18 show the diesel FCRs of medium and heavy trucks, respectively. The fuel consumption of medium trucks ranged from 21.4 to 30.1 L/100 km, and the Canadian average was 24.4 L/100 km. The diesel FCR of heavy trucks ranged from 32.4 to 39.1 L/100 km, and the Canadian average was 33.4 L/100 km.

Several of the Atlantic provinces had higher diesel FCRs for medium trucks. Newfoundland and Labrador, New Brunswick, and Prince Edward Island all had consumption rates well above the 2009 Canadian average of 24.4 L/100 km. Prince Edward Island had the highest at 30.1 L/100 km.

Heavy truck fleets in Prince Edward Island, Saskatchewan and British Columbia had the highest FCRs in 2009. As shown in Figure 15, heavy trucks also travelled shorter distances on average in these provinces than in the rest of the country.

Therefore, their higher FCRs could be explained partly by

- a lower ratio of highway driving relative to city driving
- the share of heavy trucks that are more than 10 years old is higher in these provinces, and these older trucks tend to be less fuel-efficient
- the region's topography (e.g. mountainous roads in British Columbia and a high proportion of winding roads in Prince Edward Island)

Most of the other provinces had FCRs of 32 to 33 L/100 km, with the exception of Nova Scotia (35.6 L/100 km).

Figure 17 — Diesel consumption rate of medium trucks by jurisdiction, 2009

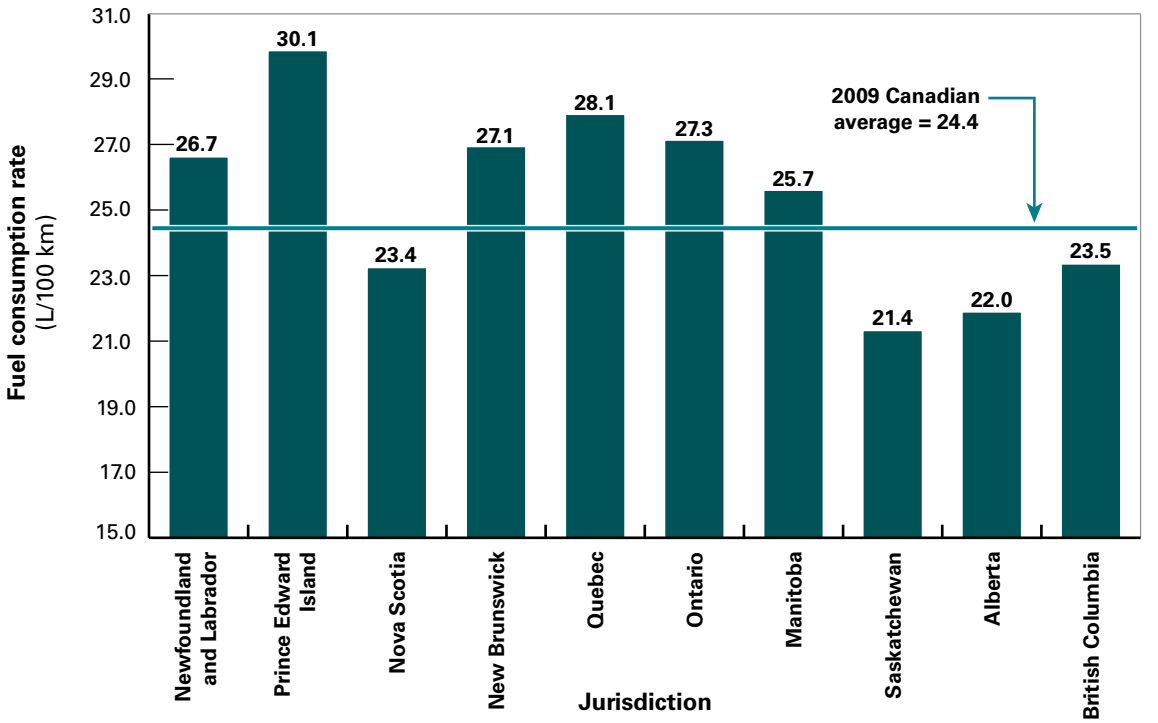
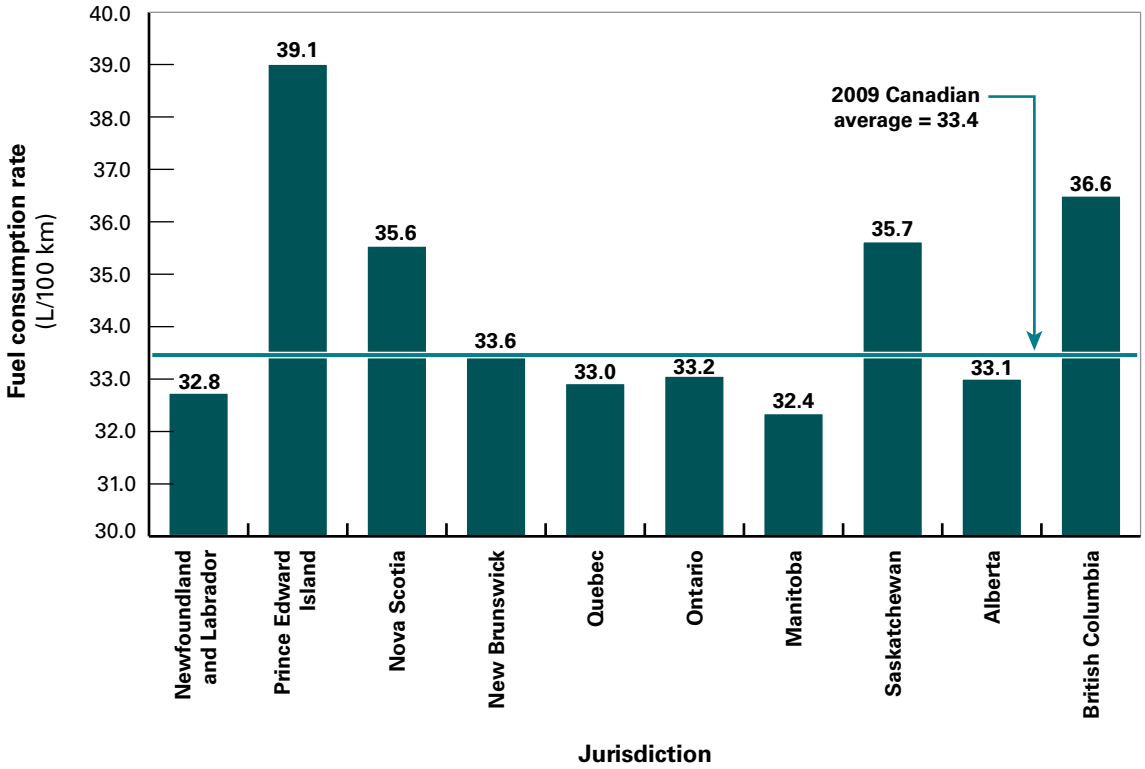


Figure 18 — Diesel consumption rate of heavy trucks by jurisdiction, 2009



CHAPTER 3

Light vehicles

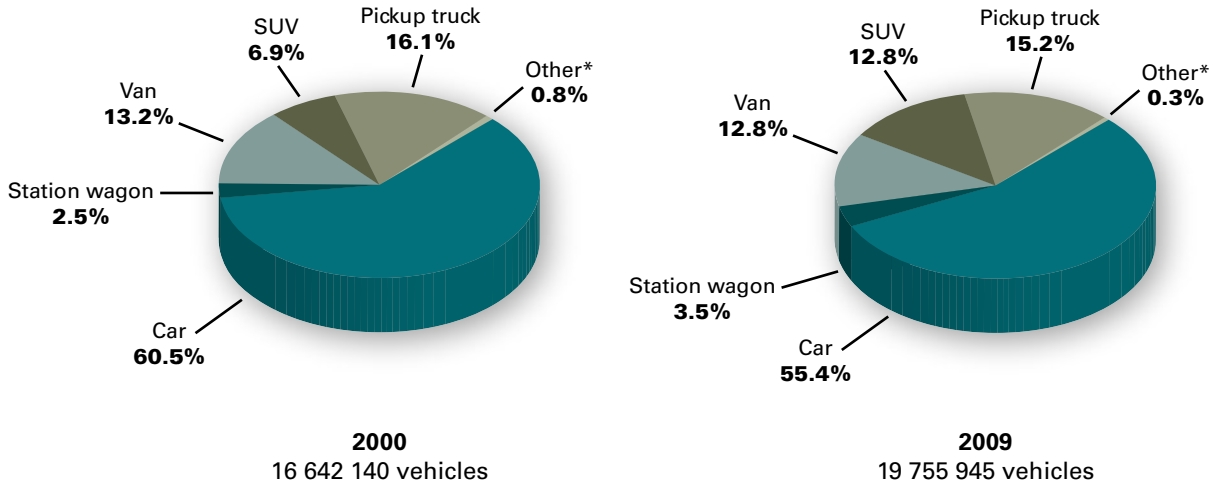
The light vehicle fleet includes vehicles that weigh less than 4.5 tonnes (t) and accounts for more than 96 percent of all vehicles in Canada. These vehicles are primarily used for private purposes and include cars, station wagons, vans, sport utility vehicles (SUVs) and pickup trucks.

3.1 Number of light vehicles by body type

Figures 19 and 20 highlight the changes in the composition of the light vehicle fleet (change in the share of body type) that occurred between 2000 and 2009. During this period, the share of the entire light truck category (vans, SUVs and pickup trucks) increased substantially relative to the share of cars.

Most notably, the number of SUVs almost doubled their share of the light vehicle fleet (increasing from 6.9 percent to 12.8 percent). Meanwhile, the share of cars decreased from 60.5 percent to 55.4 percent, and the share of station wagons increased by 1 percentage point to reach 3.5 percent (see Figure 19).

Figure 19 — Light vehicles by body type, 2000 and 2009



2000
16 642 140 vehicles

2009
19 755 945 vehicles

2000 data are derived from Statistics Canada's *Canadian Vehicle Survey: Annual* (Cat. No. 53-223). The share by body type, found in the publication, was applied to the total number of light vehicles in 2000 (16 642 140 vehicles).

* Straight trucks, tractor-trailers and buses as defined by Statistics Canada.

Figure 20 — Distribution of light vehicles by body type, 2000 to 2009

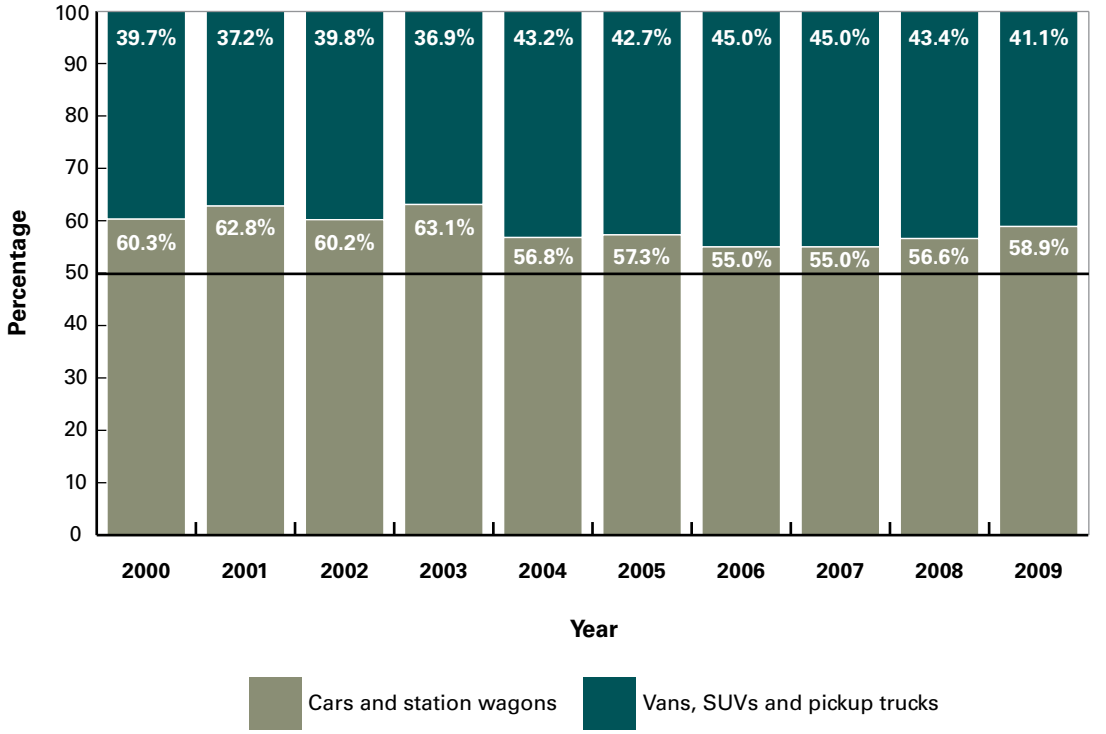


Figure 20 illustrates how the composition of the light vehicle category has changed since 2000. The share of light trucks increased steadily from 2000 to 2007 and reached 45 percent of the light vehicle category in 2006 and 2007. Since then, however, the light trucks' share has diminished somewhat, and it represented only 41.1 percent of the light vehicle category in 2009. The recession and increasing gasoline prices may explain this change in the trend.

The changes in the composition of the light vehicle fleet have implications for fuel consumption because vans, SUVs and pickup trucks generally tend to consume more fuel than do cars and station wagons. In 2009, the average gasoline-powered car and station wagon consumed 9.3 litres per 100 kilometres (L/100 km), while the average van, SUV and light truck consumed 12.6 L/100 km. As discussed in Section 2.3, the provinces that have higher fuel consumption rates (FCRs) also have a higher share of vans, SUVs and pickup trucks in their light vehicle fleet.

3.2 Passenger-kilometres

Passenger-kilometres (PKM) travelled in light vehicles were 475 billion in 2000, peaking at 497 billion in 2005. By 2009, PKM were 493 billion, 3.8 percent higher than in 2000 (see Figure 21). This yielded a compound annual growth rate of 0.4 percent over 2000 to 2009. The trend in PKM can be related partly to that in vehicle-kilometres (VKM) (as described in Section 1.2) in which the 2008 estimate was lower than both 2007 and 2009 because of the higher gas prices in the summer of 2008.

Figure 21 — Passenger-kilometres travelled in Canada by light vehicles by body type, 2000 to 2009

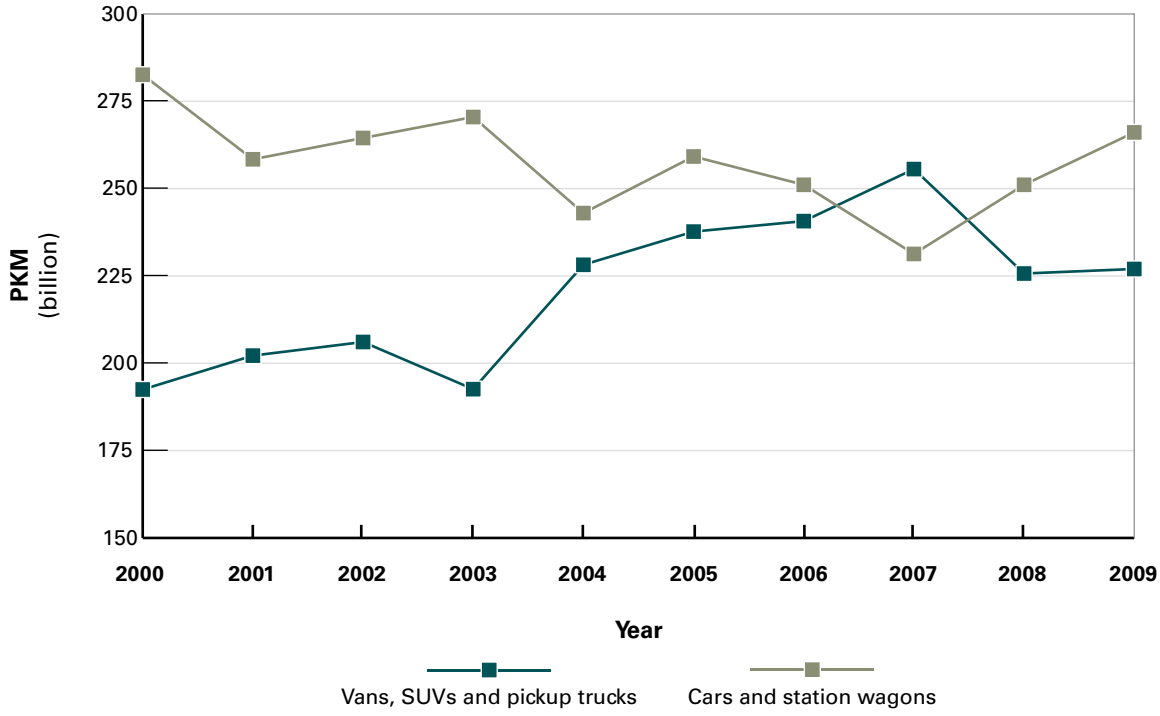


Figure 21 illustrates the breakdown of PKM by vehicle body type, which reflects the changing composition of the light vehicle fleet.

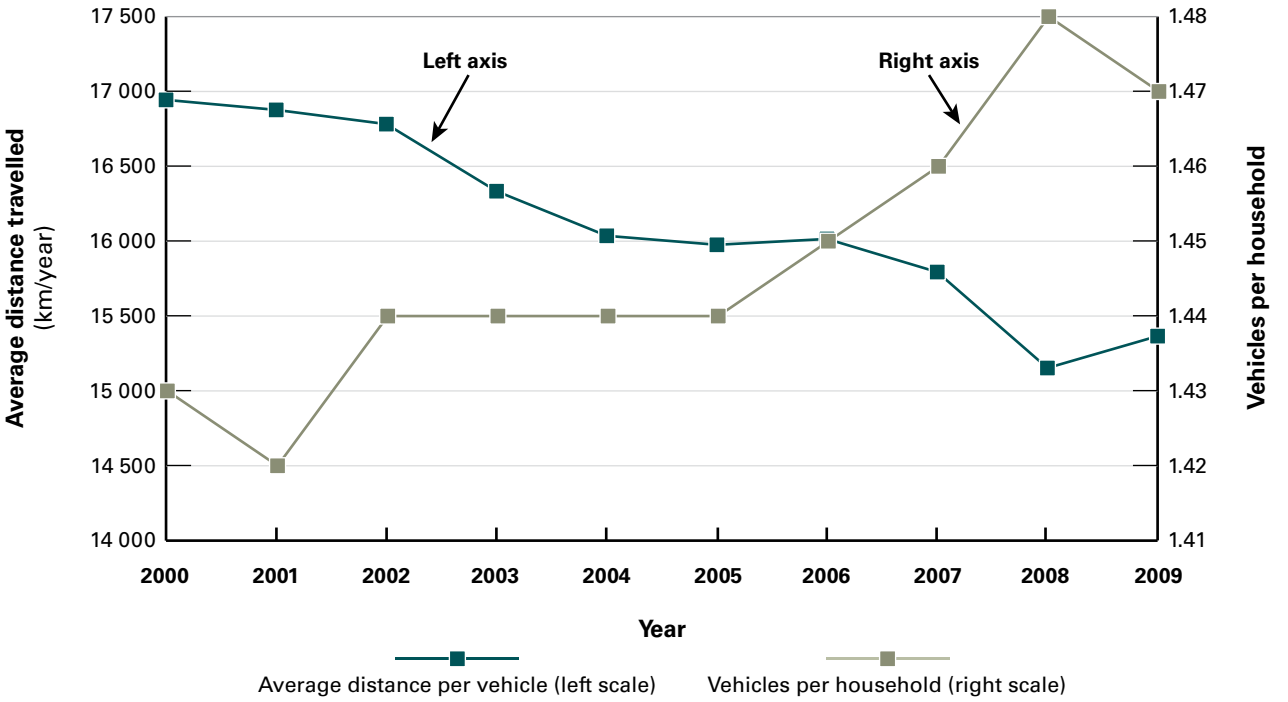
From 2000 to 2006, PKM for cars and station wagons decreased, while those for vans, SUVs and pickup trucks increased. However, from 2007 to 2009, this trend reversed. Furthermore, the current light vehicle models make it harder to differentiate between SUVs, cars and, especially, station wagons. As a result, vehicles with larger body types are being utilized for purposes traditionally reserved for cars.

3.3 Vehicle-kilometres

VKM in the light vehicle fleet increased at an average annual rate of 0.8 percent between 2000 and 2009 (a total growth of 7.7 percent over the period). This increase is well below the growth of light vehicles, which averaged 1.9 percent per year during this period.

Figure 22 shows that the average light vehicle in Canada was driven 15 336 km in 2009, down from almost 17 000 km in 2000. During this same period, vehicle ownership increased from 1.43 to 1.47 vehicles per household. In other words, although the number of light vehicles in Canada has increased since 2000, Canadians have travelled less distance in each vehicle. In addition, the occupancy rate of light vehicles decreased from 1.68 to 1.62 people per vehicle over this period.

Figure 22 — Average distance travelled by and number of light vehicles per household, 2000 to 2009



Differences also emerged regarding the number of average VKM travelled per year by body type. Figure 23 shows that light trucks (e.g. vans, SUVs and pickup trucks) travelled more, on average, than passenger cars. However, the trends are converging, and the two body types are becoming more similar in their average distance travelled. This trend is reflected by the larger negative compound annual growth rate of light trucks at -1.9 percent per year compared with -1.5 percent per year for cars and station wagons.

The occupancy rate can be estimated for every kilometre that a vehicle is driven by using the PKM/VKM ratio. As shown in Figure 24, this ratio dropped 6.0 percent for cars and station wagons and 0.6 percent for light trucks between 2000 and 2009, indicating fewer passengers in vehicles.

3.4 Age of light vehicles

Figure 25 shows Canada's light vehicle fleet for 2005 and 2009 by vehicle age. The number of vehicles in all age categories increased between these years. The age distribution shows that the largest change is in the category of vehicles that are 6 to 9 years old, which reflects the strong sales of new vehicles in the early 2000s. In 2009, approximately one in five vehicles was less than 3 years old, and more than two thirds of vehicles were 9 years old or less (see Figure 26). Vehicle age is an important determinant of fuel consumption because newer vehicles tend to be more fuel-efficient.

Figure 23 — Average distance travelled by light vehicles by body type, 2000 to 2009

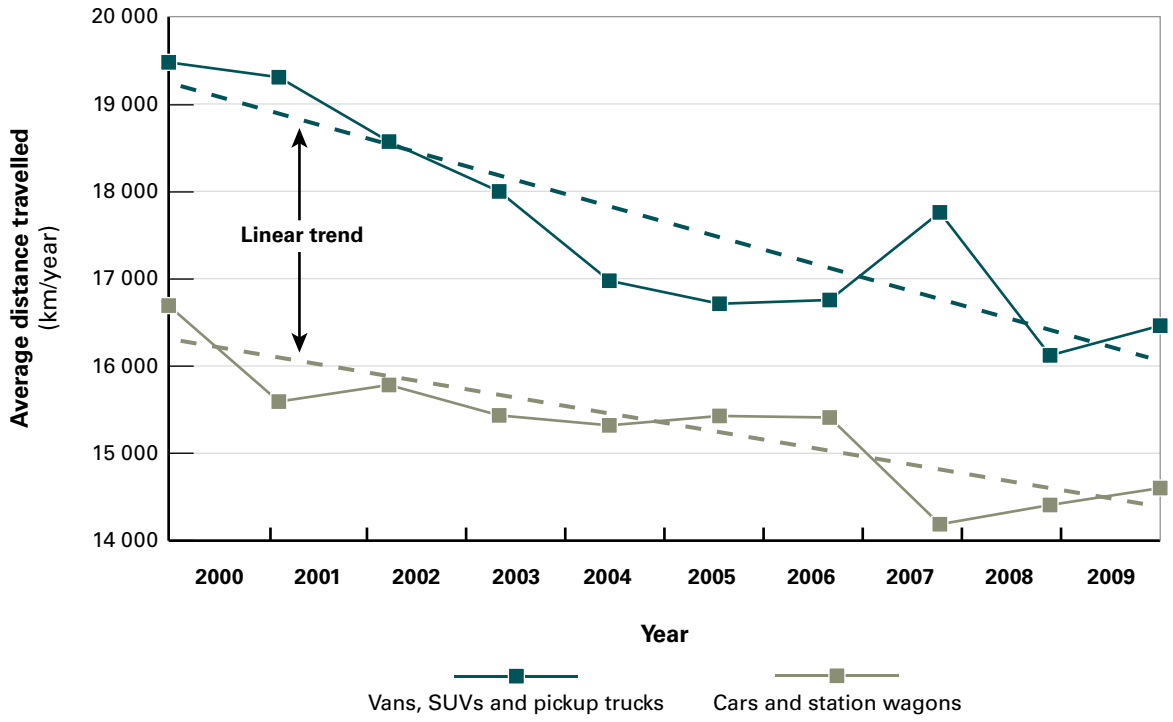


Figure 24 — Canadian vehicle occupancy rate of light vehicles by body type, 2000 to 2009

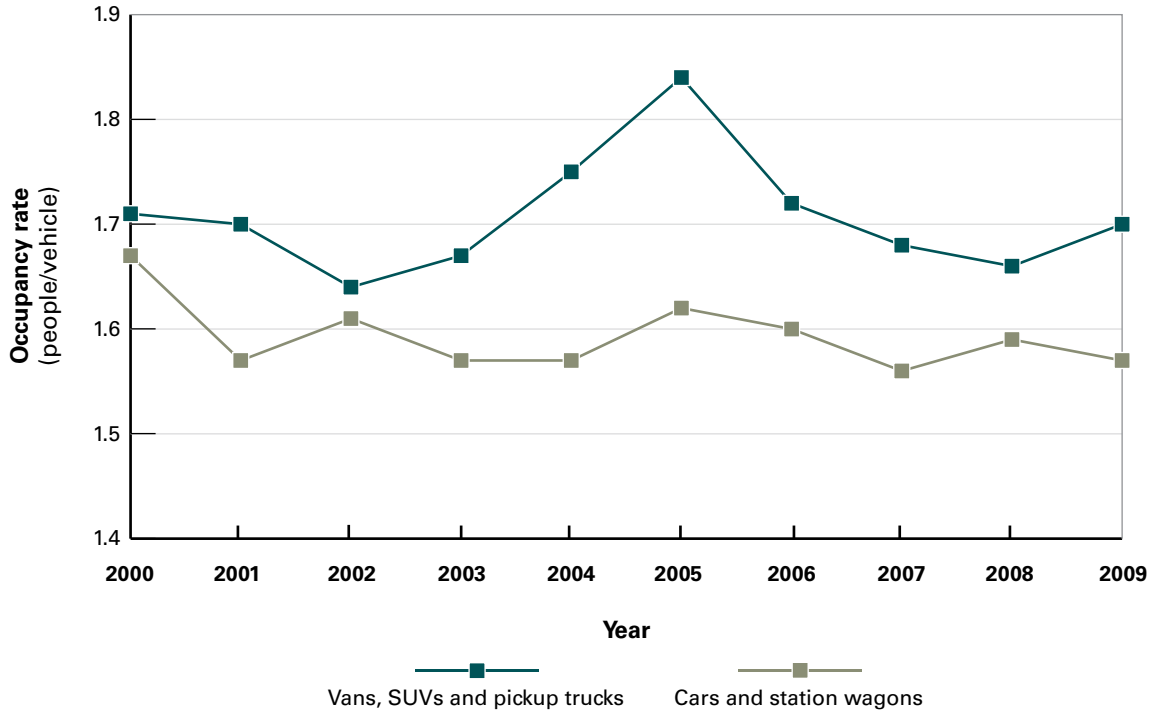


Figure 25 — Number of light vehicles by vehicle age, 2005 and 2009

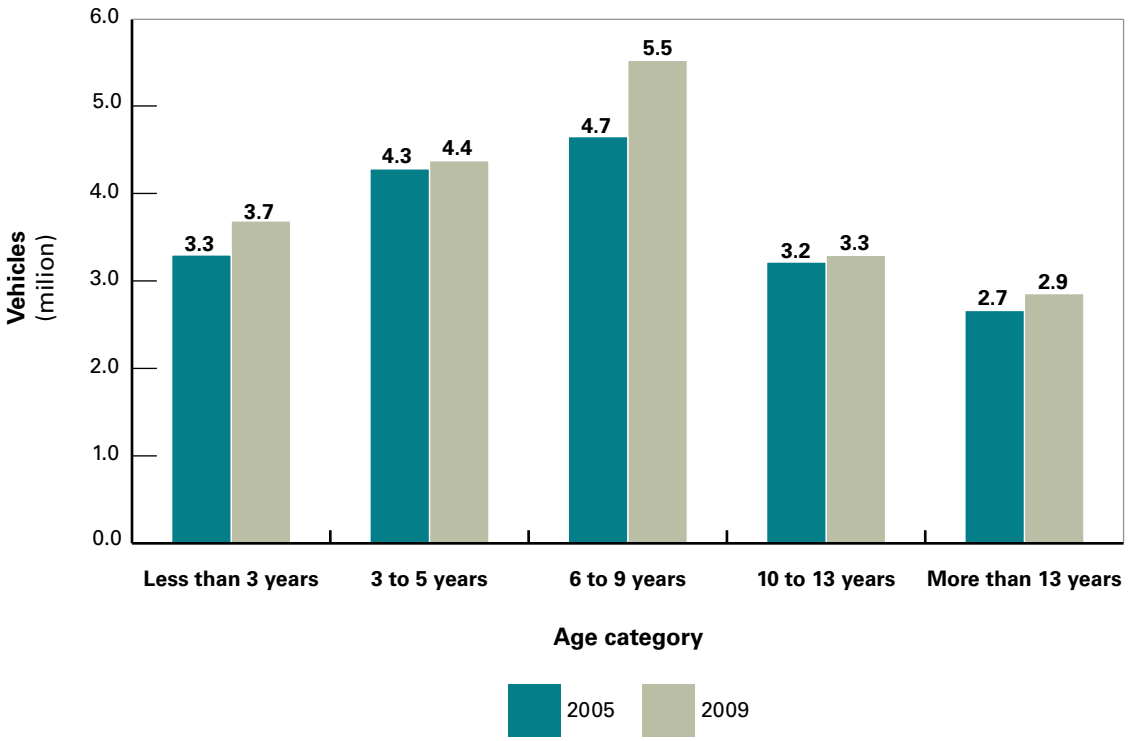
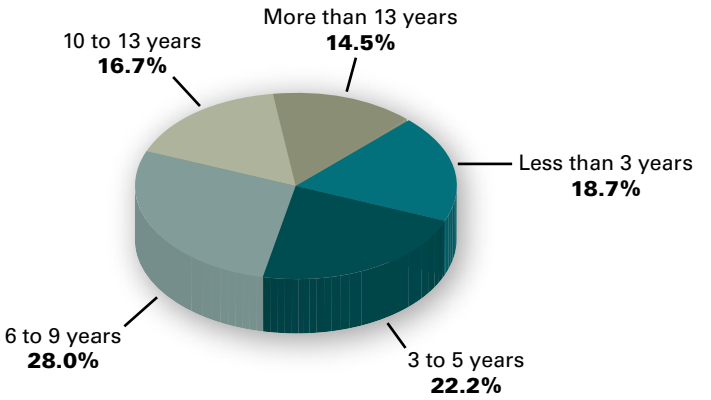


Figure 26 — Share of light vehicles by vehicle age, 2009



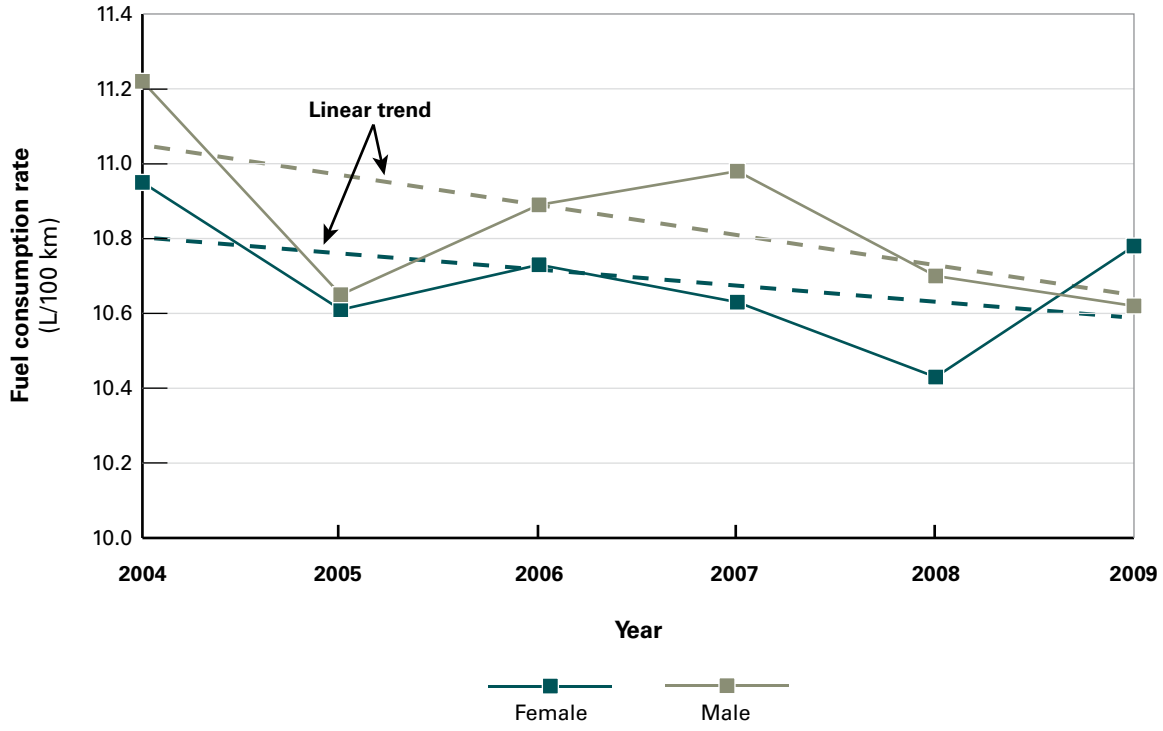
2009
19 755 945 vehicles

3.5 Light vehicle fuel consumption rate by gender of driver

Figure 27 shows the split in the FCR between male and female drivers. It looks as though men have adjusted their driving habits over the years and are now closer in line with women's driving habits. Although there is considerable fluctuation from year to year, there is a general downward trend in the FCR for both male and female drivers.

The FCR for male drivers decreased more rapidly than for female drivers such that there was very little difference between them in 2009. Other factors that may affect FCR by gender include type of vehicle driven by each gender and the type of driving (city versus highway). Note that the data quality for these statistics is only acceptable at best and should be used with caution, which makes any final statement inconclusive.

Figure 27 — Fuel consumption rate of light vehicles by driver gender, 2004 to 2009



CHAPTER 4

Medium and heavy trucks

This chapter examines medium and heavy trucks, which are defined as follows:

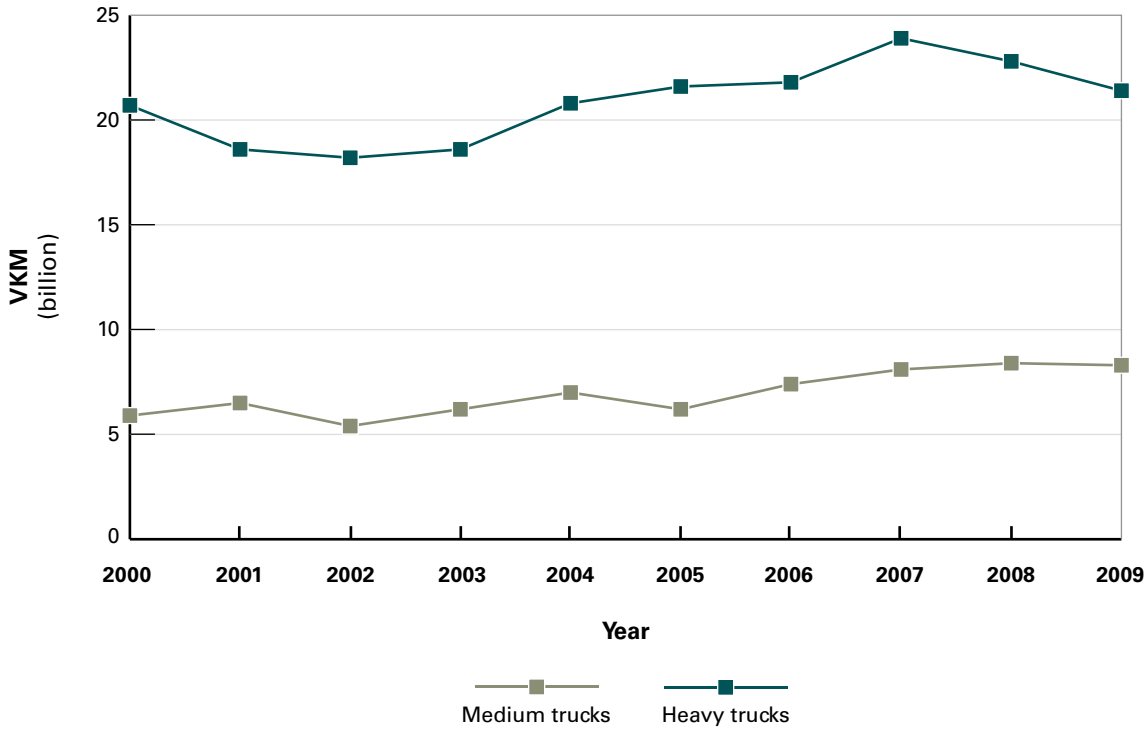
- medium trucks — gross vehicle weight between 4.5 and 15 tonnes (t)
- heavy trucks — gross vehicle weight of 15 t or more

4.1 Medium and heavy truck distance travelled

As seen in Section 1.2, medium and heavy trucks accounted for 8.9 percent of vehicle kilometres (VKM), even though they comprised less than 4 percent of the vehicle stock. These statistics imply that medium and heavy trucks were driven further than light vehicles, on average.

Over 2000 to 2009, the compound annual growth rate of VKM was 3.8 percent for medium trucks (from 5.930 billion kilometres [km] in 2000 to 8.295 billion km in 2009). The compound annual growth rate of VKM for heavy trucks was much more modest at 0.4 percent (from 20.716 billion km in 2000 to 21.416 billion km in 2009).

Figure 28 — Vehicle-kilometres travelled by medium and heavy trucks, 2000 to 2009



4.2 Medium and heavy truck configuration

Medium and heavy trucks can be configured in different ways. A straight truck is a complete unit (i.e. a power unit and a box or flatbed that cannot be detached). A tractor, on the other hand, is the front part of a tractor-trailer combination and can be accompanied by one or more detachable trailers. Tractor-trailer combinations are typically used for long-distance hauls.

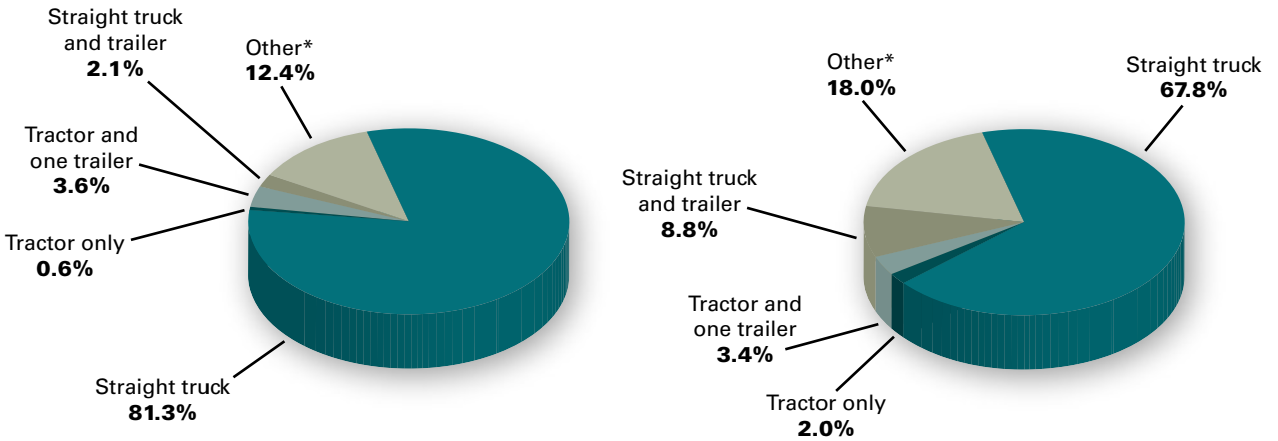
In the medium truck fleet, the majority of VKM (67.8 percent) were travelled by straight trucks in 2009 (see Figure 29). This share of distance is a decrease from 81.3 percent in 2000, which indicates increased utilization of medium trucks with configurations other than straight trucks. Over the same period, the share of straight trucks and trailers increased 6.7 percentage points, and other configurations increased 5.6 percentage points.

Figure 30 illustrates the heavy truck share of VKM by configuration in 2000 and 2009.

In 2009, the majority of VKM (66.4 percent) were travelled by tractors with one trailer. The second most driven configuration was straight trucks, which had 16.0 percent of the distance travelled. The remaining 17.5 percent was travelled by all other configurations, which include configurations such as tractors with more than one trailer and straight trucks with trailers.

The share of distance travelled for each configuration of heavy truck has changed moderately since 2000. Between 2000 and 2009, the share of VKM by the tractor and one trailer configuration dropped by 8.2 percentage points. Conversely, both the straight truck and the tractor and two or more trailers configurations increased their share of VKM over the same period (3.4 and 4.4 percentage points, respectively).

Figure 29 — Distance travelled by medium trucks by configuration, 2000 and 2009

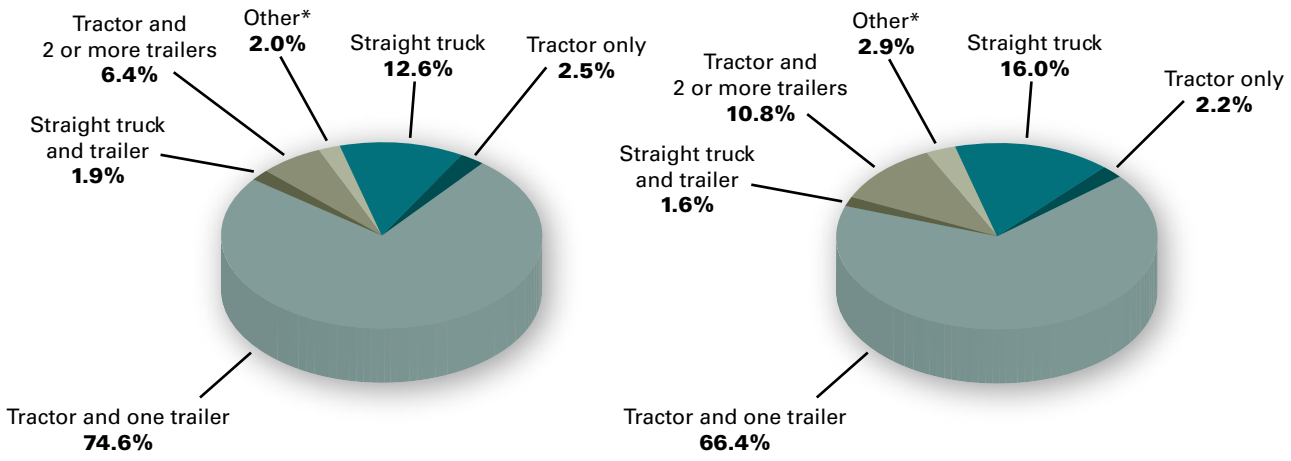


2000: Medium trucks
5.9 billion VKM

2009: Medium trucks
8.3 billion VKM

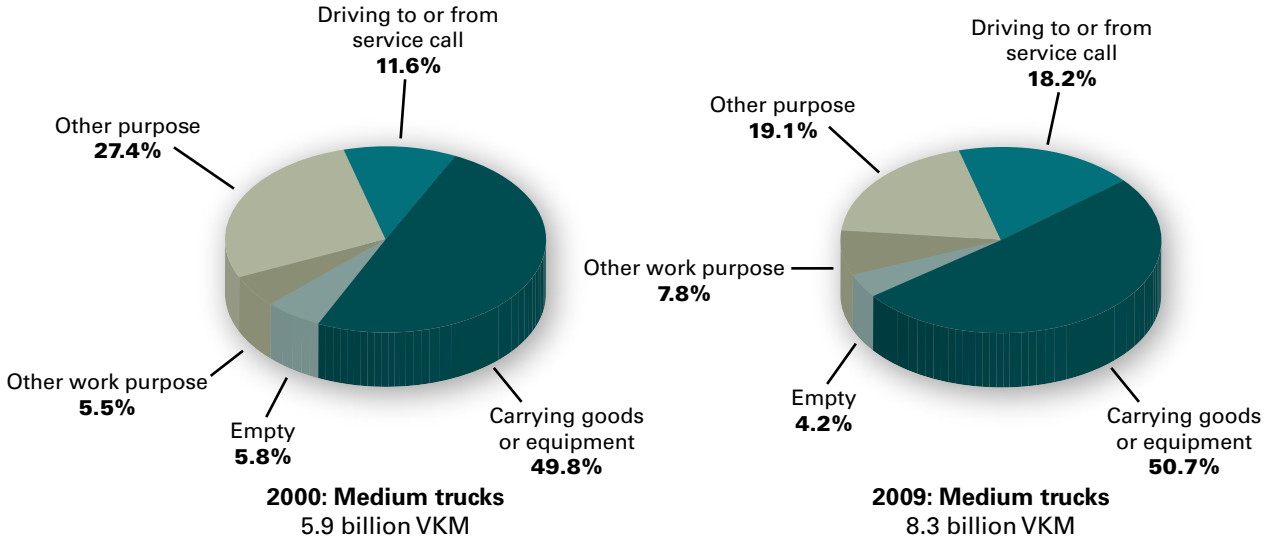
* "Other" configuration includes tractor and 2 trailers, tractor and 3 trailers and everything else not classified.

Figure 30 — Distance travelled by heavy trucks by configuration, 2000 and 2009



* "Other" configuration includes everything else not classified.

Figure 31 — Distance travelled by medium trucks by trip purpose, 2000 and 2009



4.3 Medium and heavy truck trip purpose

The distance travelled by medium and heavy trucks for different purposes is illustrated in Figures 31 and 32. Medium trucks were generally used for a greater variety of purposes than heavy trucks. For medium trucks, carrying goods or equipment accounted for 50.7 percent of all VKM in 2009, up from 49.8 percent in 2000. Travel for other purposes decreased significantly from 27.4 percent of VKM in 2000 to 19.1 percent in 2009, and driving to or from service calls accounted for 18.2 percent of distance travelled, up from 11.6 percent in 2000.

Figure 32 — Distance travelled by heavy trucks by trip purpose, 2000 and 2009

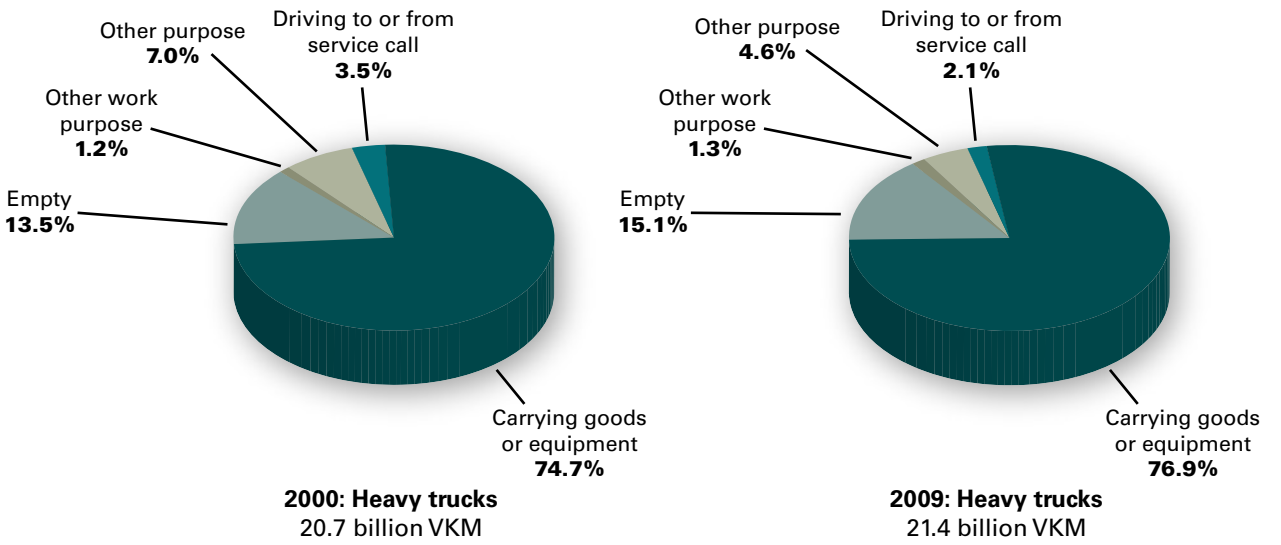


Figure 32 shows that the main purpose for travel by heavy trucks in 2009 was to carry goods or equipment (76.9 percent), up from 74.7 percent in 2000. Another 15.1 percent of distance was travelled by empty vehicles, up slightly from 2000 (13.5 percent).

Trucks travel empty for various reasons, including the inability to find cargo on the way to or from a haul. For-hire companies have business tools and cargo logistics that can help minimize empty trips. However, Figure 34 shows that the for-hire truck share of distance travelled is decreasing, and the owner-operator share is increasing. This change may help to explain why heavy-truck empty trips are continuing to rise.

4.4 Medium and heavy truck activity

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

- for-hire trucking — a company transports goods as its principal activity
- private trucking — a company transports goods as a secondary activity that is part of the distribution process of its primary output
- owner-operators — individuals transport goods either independently or for a for-hire or for private companies

Table 4 displays the number of medium and heavy trucks, as defined by the Canadian Vehicle Survey scope, in 2009 based on their type of activity. As the numbers indicate, most of the medium trucks are privately owned, while the majority of heavy trucks are involved in the for-hire business.

Figures 33 and 34 show the distance travelled by medium and heavy trucks by activity type in 2000 and 2009. Even though nearly half (47.4 percent) of VKM travelled by medium trucks in 2009 were by private operators, there has been a shift away from private operators toward owner-operators. Within the medium truck fleet, privately operated vehicles decreased from 52.4 percent to 47.4 percent between 2000 and 2009. During the same period, medium trucks increased in the owner-operator activity type from 16.0 percent to 22.2 percent.

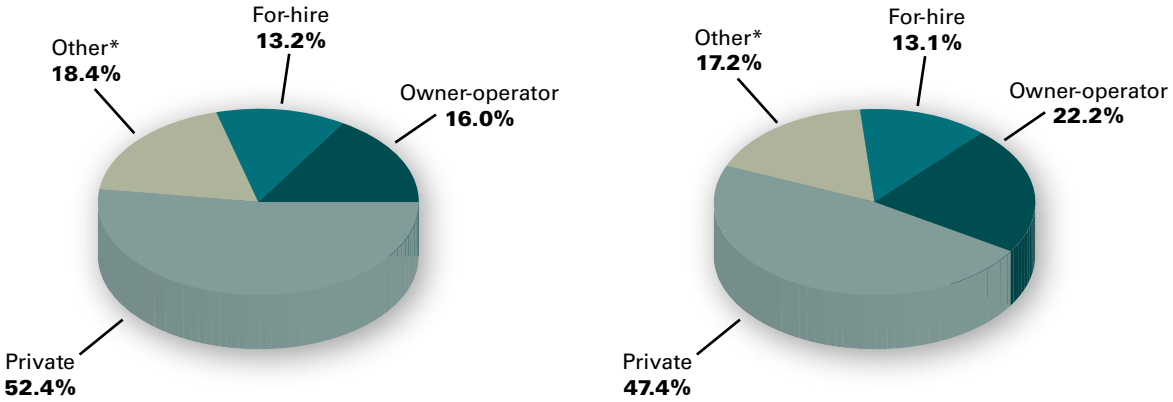
Table 4 — In-scope vehicles for medium and heavy trucks by activity type, 2009

Activity type	Vehicles		Total
	Medium trucks	Heavy trucks	
For-hire	51 793 E	142 494 D	194 287
Owner-operator	63 344 E	64 231 E	127 575
Private	240 045 C	78 967 E	319 013
Other	82 815 E	31 528 E	114 343
Total	**437 997 B**	**317 219 B**	**755 217**

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 33 — Distance travelled by medium trucks by activity type, 2000 and 2009



2000: Medium trucks
5.9 billion VKM

2009: Medium trucks
8.3 billion VKM

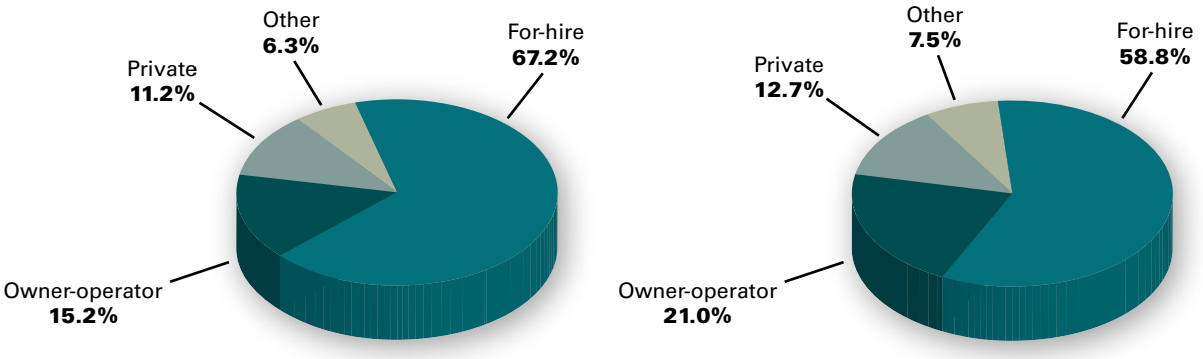
* "Other" is defined by Statistics Canada as when a respondent doesn't consider his or her operation to be related to for-hire, owner-operator or private activities. We also added the information related to missing activity with "Other."

Figure 34 shows that the majority of distance travelled by heavy trucks was by for-hire truckers (58.8 percent), followed by owner-operators (21.0 percent) and private truckers (12.7 percent). As with medium trucks, the trend in the activity type of heavy trucks was a shift from for-hire (67.2 percent to 58.8 percent) to more owner-operator (15.2 percent to 21.0 percent) between 2000 and 2009.

4.5 Age of medium and heavy trucks

Figure 35 illustrates the age distribution of medium and heavy trucks in 2005 and 2009. In general, the average medium truck was slightly older than the average heavy truck.

Figure 34 — Distance travelled by heavy trucks by activity type, 2000 and 2009



2000: Heavy trucks
20.7 billion VKM

2009: Heavy trucks
21.4 billion VKM

Figure 35 — Distribution of medium and heavy trucks by vehicle age, 2005 and 2009

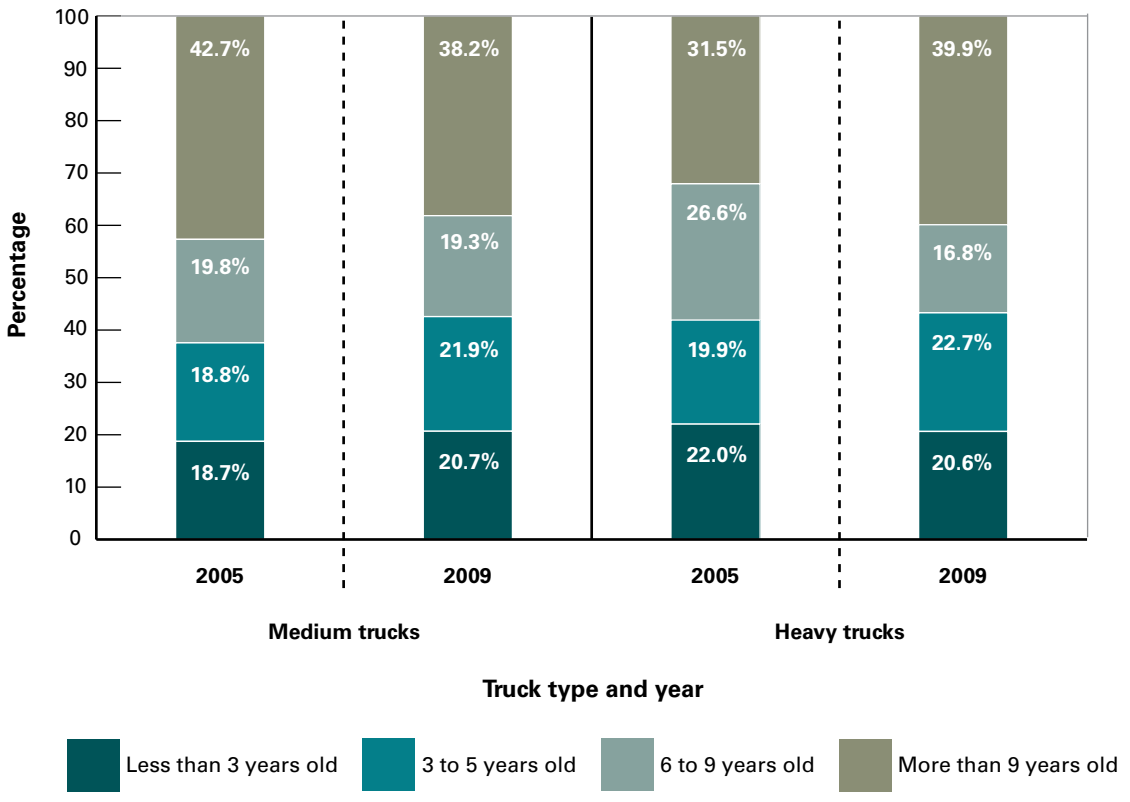


Figure 36 — Average distance travelled by medium and heavy trucks by vehicle age, 2009

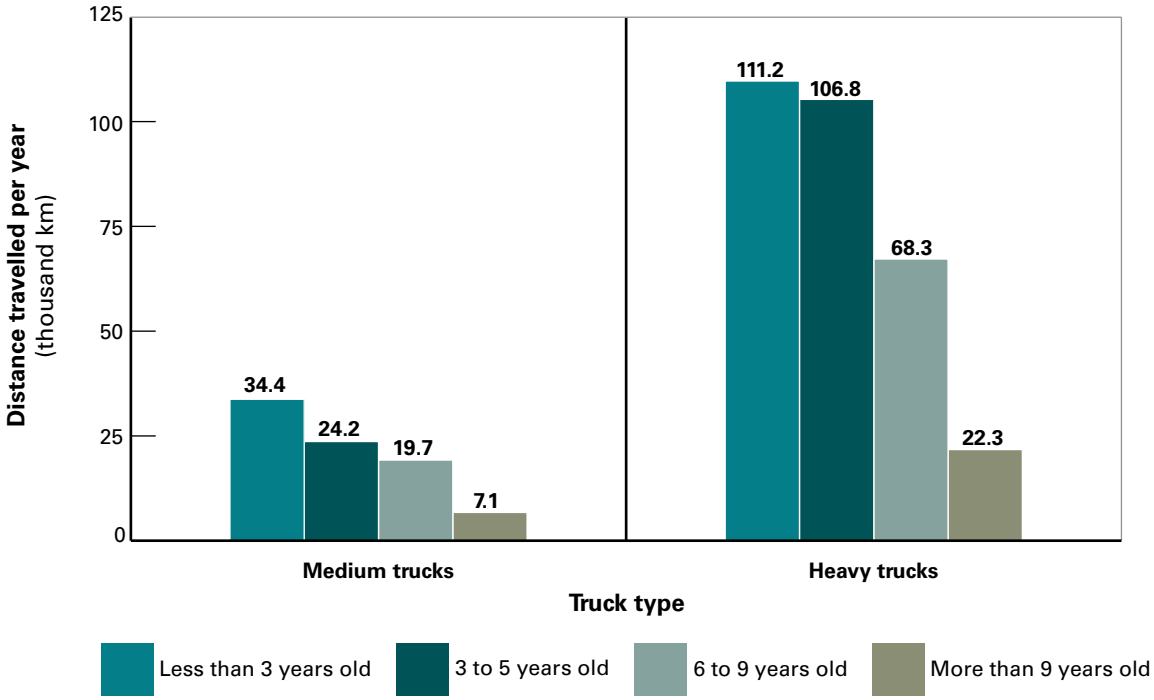


Figure 37 — Fuel consumption rate of medium trucks by configuration and fuel type, 2005 and 2009

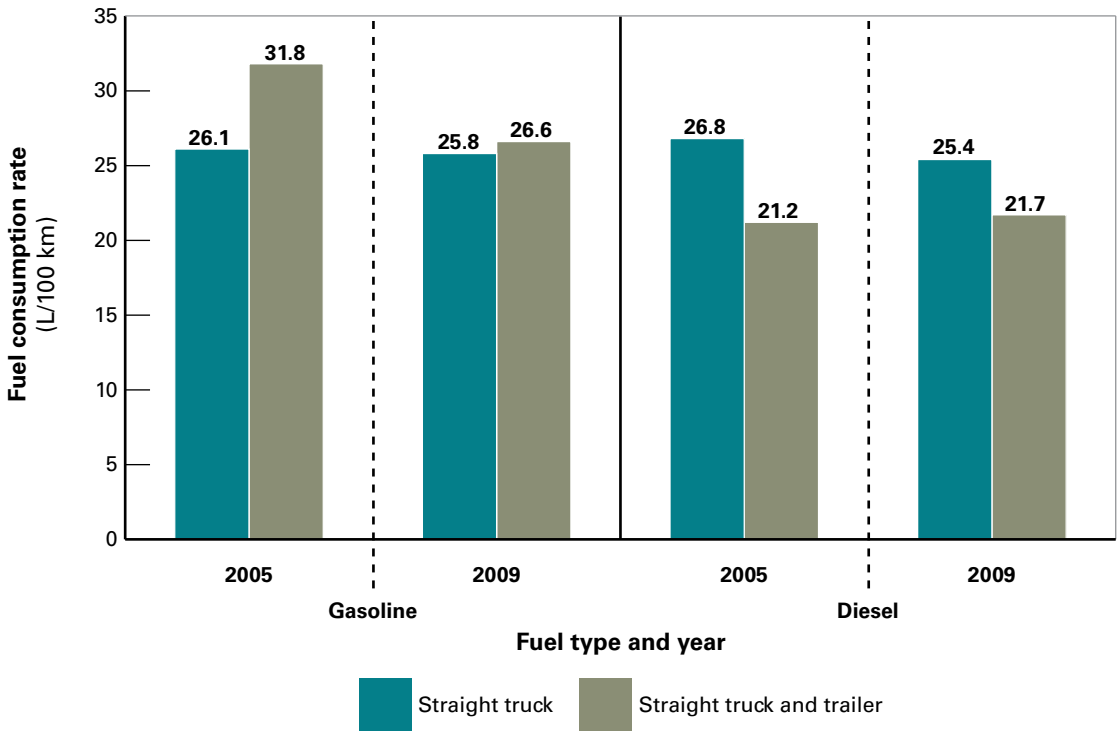
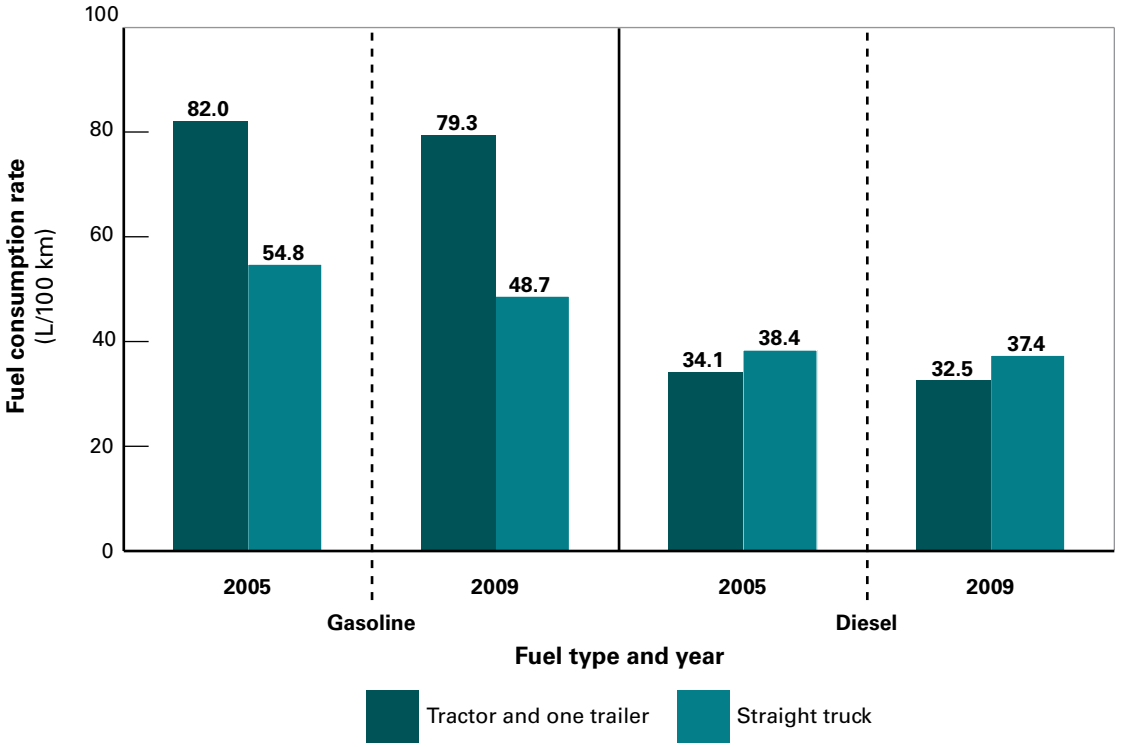


Figure 38 — Fuel consumption rate of heavy trucks by configuration and fuel type, 2005 and 2009



In 2009, less than one quarter of medium and heavy trucks was less than 3 years old, and a third was more than 9 years old. Overall, the medium and heavy truck fleet contains a greater proportion of both newer and older vehicles than the light vehicle fleet.

As a medium or heavy truck gets older, it is widely believed that they are used less. Figure 36 confirms this statement. Indeed, the average distance travelled by medium and heavy trucks that are more than 9 years old is roughly one third of the distance travelled by those that are between 6 and 9 years old.

4.6 Medium and heavy truck fuel consumption rate

Medium trucks vary in composition, utility and size. For example, a medium truck could be used for local mail delivery or as a fire truck. It makes sense for medium trucks to be gasoline-powered for some purposes and diesel-powered for others.

Figure 37 illustrates that diesel-powered medium trucks are generally slightly more fuel-efficient than the gasoline-powered trucks. Due to the varied usage of medium trucks, changes in fuel consumption rate (FCR) from year to year are hard to associate solely with improvements in fuel consumption. Adding more classifications to the medium truck fleet would enable better tracking of their fuel efficiency by fuel type.

Figure 38 illustrates the gasoline and diesel FCRs by heavy truck configuration. Within the heavy truck fleet, diesel trucks are considerably more fuel-efficient than their gasoline-powered counterparts. In fact, in 2009, the average diesel-powered tractor and one trailer heavy truck was more than twice as fuel-efficient as the corresponding gasoline-powered truck. This fact may help explain why more than 97 percent of the heavy truck fleet comprises diesel-powered trucks.

Figure 39 — Fuel consumption rates of medium and heavy trucks by activity type and fuel type, 2009

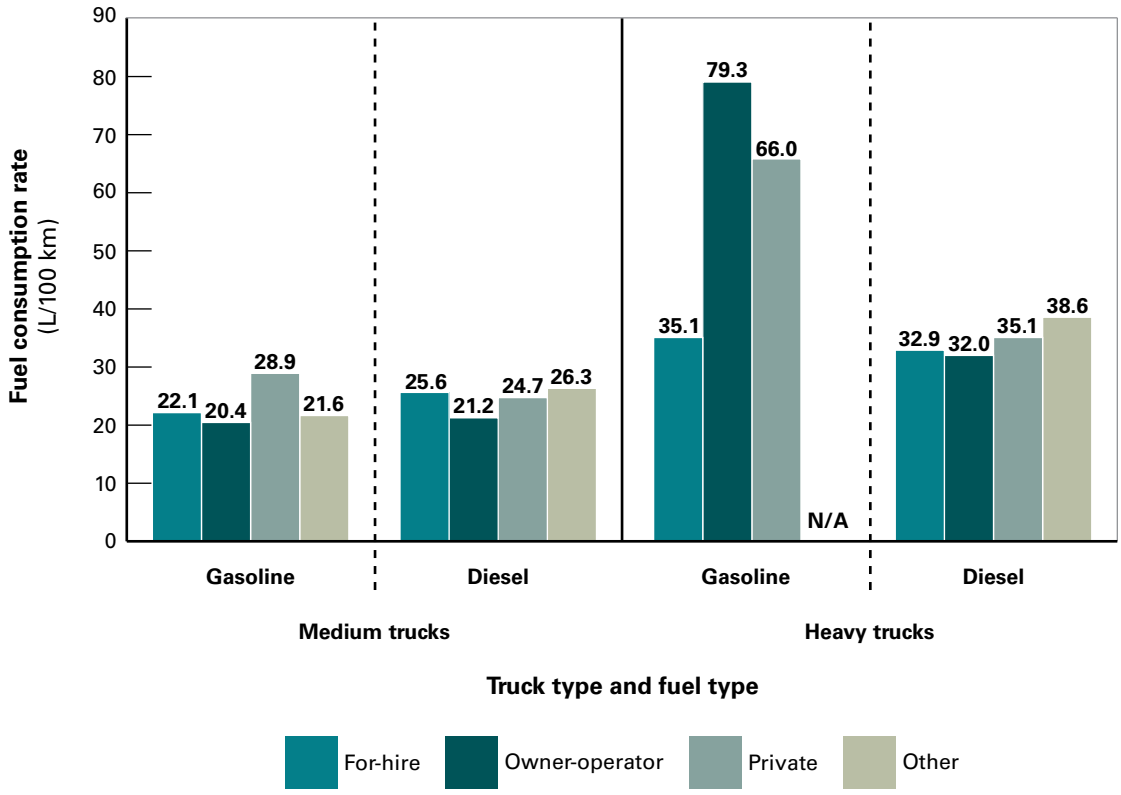


Figure 39 illustrates FCRs for gasoline- and diesel-powered medium trucks by activity type and shows that gasoline-powered medium trucks tend to be slightly more fuel-efficient than their diesel-powered counterparts. The only exception appears to be for gasoline-powered, private medium trucks whose FCR is nearly 15 percent higher than their diesel-powered counterparts.

These trucks account for the majority of VKM in this fleet, which has the effect of increasing the FCR for the entire gasoline-powered medium truck fleet. For-hire and owner-operator trucks are the most fuel-efficient.

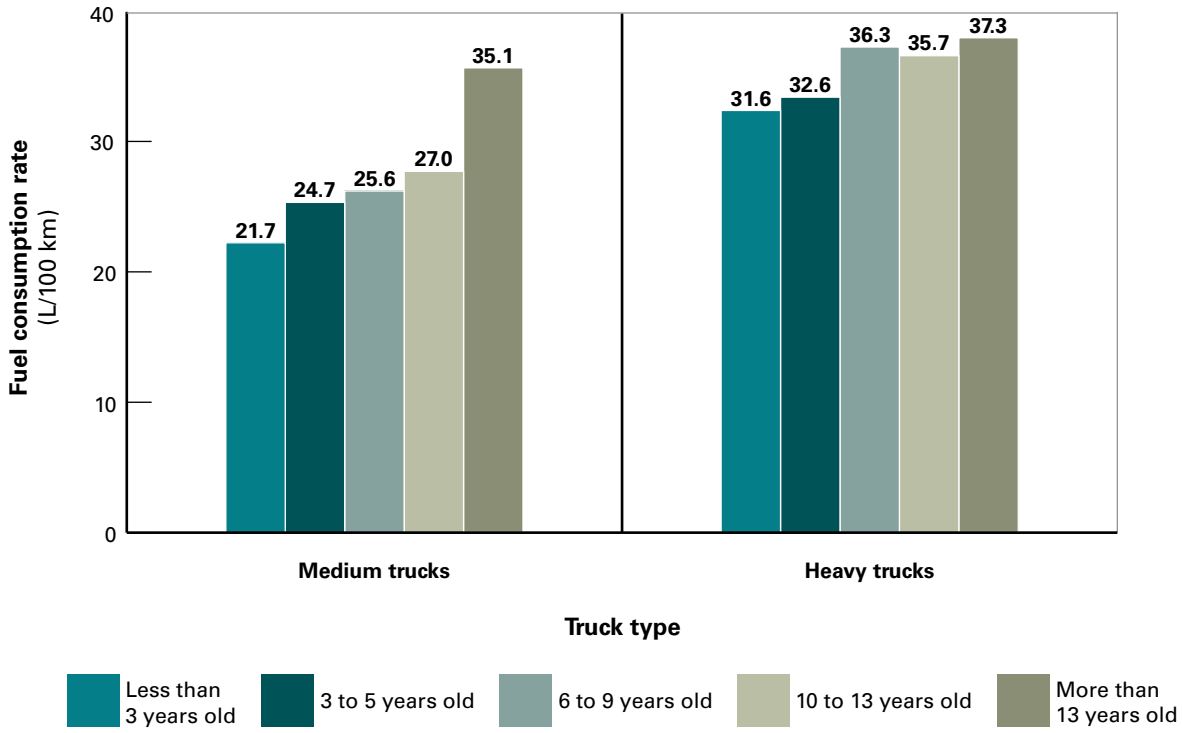
Figure 39 also confirms that heavy trucks that are diesel-powered are more efficient than their gasoline-powered counterparts. In fact, few heavy trucks are gasoline-powered.

For-hire companies that have multiple activities can more closely match the truck type to the activity, thus maximizing fuel efficiency. Activity type does not affect the fuel efficiency of diesel-powered heavy trucks as much as it does for other trucks.

Figure 40 illustrates diesel truck FCRs by age of the vehicle in 2009. The data show that medium trucks that are more than 13 years old were significantly less fuel-efficient than the newer medium trucks.

For medium trucks, the newer the truck is, the more efficient it is. In heavy trucks, the same holds true except for the 10 to 13 years old category, which is slightly more fuel-efficient than the 6 to 9 years old category. Overall, a marked improvement was noticed in the FCRs for both newer medium and newer heavy trucks.

Figure 40 — Fuel consumption rates of diesel-powered medium and heavy trucks by vehicle age, 2009



ANNEX A

Notes about 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.[16] In 2009, there were 26 995 vehicles in the sample from the provinces and 16 488 in the sample from the territories. Because participation is voluntary, a percentage of these samples included non-respondents. The response rate was just above 50 percent for the provinces and 12 percent for the territories.

Although 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 examines only a segment of the population, rather than the entire population. Factors such as sample size, sample design and estimation method affect the sampling error.

If the population is heterogeneous, which 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.

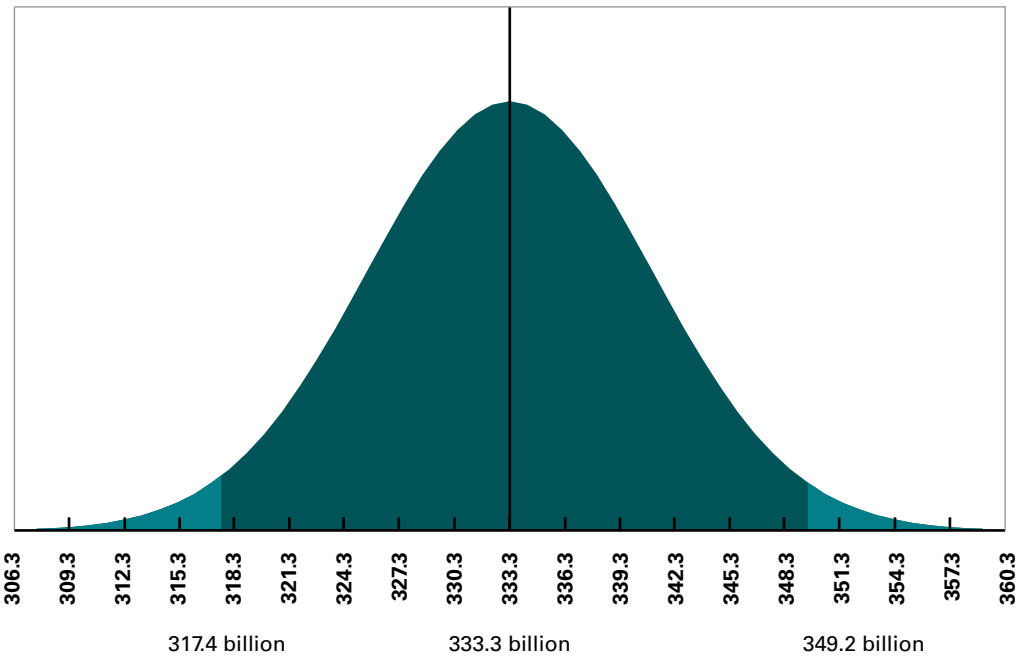
Each estimate in the report is associated with a coefficient of variation (CV), which is the basis for determining an all-encompassing quality indicator. A CV measures the sampling error of the estimates and takes into account variability due to non-response and imputation.

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 that the true value of a characteristic 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.[17]

[16] Annex B in this report provides more information on the scope and methodology of the CVS.

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

Figure A–1 — 95 percent confidence interval for the CVS estimate of VKM travelled in Canada, 2009



To illustrate how all these concepts are linked, take as an example a CVS estimate stating that on-road vehicles travelled 333.3 billion vehicle-kilometres (VKM) in Canada in 2009. This is an excellent estimate because it has a CV of 0.024 and, therefore, a quality indicator of "A." To determine the *I* of 95 percent attributed to this estimate, the following calculation is performed:[18]

$I(0.95)$ = [333.3 billion × (1 – 1.96 × CV), 333.3 billion × (1 + 1.96 × CV)]

$I(0.95)$ = [333.3 billion × (1 – 1.96 × 0.024), 333.3 billion × (1 + 1.96 × 0.024)]

$I(0.95)$[19] = [317.4 billion, 349.2 billion]

Based on Figure A-1, it can be stated with a 95 percent degree of confidence that the distance travelled in Canada in 2009 was between 317.4 billion and 349.2 billion VKM. 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.

[18] If a normal distribution is assumed, the *I* of 95 percent corresponds to the estimate plus or minus approximately 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.

[19] Final values are calculated with full precision. Using rounded values would yield $I(0.95)$ = [317.3 billion, 349.0 billion].

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, consequently, 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.

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%	Estimate ±0% to 9.9%
B	Very good	5% – 9.9%	Estimate ±10% to 19.9%
C	Good	10% – 14.9%	Estimate ±20% to 29.9%
D	Acceptable	15% – 19.9%	Estimate ±30% to 39.9%
E	Use with caution	20% – 34.9%	Estimate ±40% to 69.9%
F	Too unreliable to be published	35% or more	Estimate ±70% and over

ANNEX B

Scope and methodology of the Canadian Vehicle Survey

This section summarizes the methodology used in the Canadian Vehicle Survey (CVS), which was conducted by Statistics Canada on behalf of Transport Canada and Natural Resources Canada (NRCan) in 2009. More information is available in the *Canadian Vehicle Survey: Annual 2009*, produced by the Transport Division of Statistics Canada.[20]

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 2009 that have not been scrapped or salvaged. Buses (since 2004), motorcycles, off-road vehicles (e.g. snowmobiles) and special equipment (e.g. cranes and 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 3 territories to Statistics Canada three months before the reference period. This population differs slightly from the population of interest because 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.

[20] Statistics Canada, 2010, *Canadian Vehicle Survey: Annual 2009*, Cat. No. 53-223-X, www.statcan.ca/bsolc/english/bsolc?catno=53-223-X.

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, the first reporting day is spread evenly 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.[21]

The sample consisted of 43 485 vehicles for the four quarters of 2009, using 26 997 vehicles from the provinces and 16 488 from the territories.[22] Table B-1 shows the number of vehicles sampled in the provinces and territories in 2009 by type of vehicle.

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 who receive 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
- a passenger enters or exits the vehicle[23]

Respondents who receive a heavy-vehicle log (medium and heavy trucks) are asked 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 more than 30 minutes
- the driver changes
- the reason for the trip or the use of the vehicle changes
- the truck configuration is modified
- the truck cargo area changes 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 posted speed limit of 80 kilometres per hour (km/h) or higher
- truck configuration (heavy vehicles)
- dangerous goods (heavy vehicles)

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

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

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

Table B–1 — Number of vehicles in the sample by region and vehicle type

Region	Light vehicles	Medium trucks	Heavy trucks	Total
Newfoundland and Labrador	893	222	207	1 322
Prince Edward Island	544	143	179	866
Nova Scotia	1 081	275	266	1 622
New Brunswick	1 206	270	231	1 707
Quebec	3 337	532	458	4 327
Ontario	5 920	623	643	7 186
Manitoba	1 114	295	332	1 741
Saskatchewan	1 249	399	367	2 015
Alberta	1 748	604	534	2 886
British Columbia	2 343	649	333	3 325
Total for the provinces	**19 435**	**4 012**	**3 550**	**26 997**
Yukon	1 860	1 692	1 325	4 877
Northwest Territories	7 144	953	1 027	9 124
Nunavut	2 018	260	209	2 487
Total for the territories	**11 022**	**2 905**	**2 561**	**16 488**
Total for Canada	**30 457**	**6 917**	**6 111**	**43 485**

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.

Data edit and imputation

After 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 that uses 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 VKM only, divided by the total number of vehicles in the sample. Table B-2a and Table 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. Therefore, the data on fuel consumption have a high imputation rate, which helps explain the lower quality of fuel consumption estimates in this report.

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 2009 presented in this report were produced by 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 that have a CV of more than 35 percent are not reliable enough to be published.

Table A-1 in Annex A describes the indicators used in this report to describe the quality of estimates.

For more information on the methodology used in the CVS, contact the Transport Division, Statistics Canada, at

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

Table B–2a — Response rate for the CVS — all provinces (%)

Quarter	Light vehicles	Medium trucks	Heavy trucks
Quarter 1	55.4	58.8	58.4
Quarter 2	44.0	46.0	49.1
Quarter 3	49.3	50.0	50.8
Quarter 4	58.6	62.8	64.6
Annual	**51.9**	**54.2**	**55.7**

Table B–2b — Response rate for the CVS — all territories (%)

Quarter	Light vehicles	Medium trucks	Heavy trucks
Quarter 1	13.9	11.2	12.8
Quarter 2	13.2	14.1	12.8
Quarter 3	14.9	11.5	9.2
Quarter 4	13.7	13.1	13.1
Annual	**13.9**	**12.5**	**12.0**

ANNEX C

Data tables of figures from the 2009 Canadian Vehicle Survey

The following figures have been converted to data tables for statistical purposes. 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
- 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 1 — Share of households in Canada by number of owned/leased vehicles, 2007

Vehicle ownership/lease	Vehicles
No vehicle	1 577 152 (A*)
One vehicle	5 382 252 (A*)
At least two vehicles	5 532 466 (A*)
Don't know / refusal / not stated	440 479 (A*)

* 2007 Survey of Household Energy Use; uses three quality indicators: A— Acceptable, M — Use with caution, and U — Too unreliable to be published.

Figure 2 — Share of vehicles in Canada by vehicle type, 2000 and 2009

Year	Vehicles in Canada			Total
	Light vehicles	Medium trucks	Heavy trucks	
2000	16 642 140 (A)	319 500 (A)	255 503 (A)	17 217 143 (A)
2009	19 755 945 (A)	437 997 (B)	317 219 (B)	20 511 161 (A)

Figure 3 — Age of vehicle fleets by vehicle type, 2009

Age	Vehicle fleet	
	Light vehicles	Trucks
Less than 3 years old	3 688 609 (B)	156 013 (NA*)
3 to 9 years old	9 910 847 (NA*)	305 585 (NA*)
More than 9 years old	6 156 488 (NA*)	293 619 (NA*)

* NA stands for not applicable. The medium and heavy trucks were aggregated, as were several age groupings. Consequently, it is impossible to determine the quality indicator of these data points.

Figures 4 and 28 — Vehicle-kilometres travelled by vehicle type, 2000 to 2009

Year	VKM travelled (million)			Total
	Light vehicles	Medium trucks	Heavy trucks	
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	286 618 (A)	6 173 (A)	18 606 (A)	311 397 (A)
2004	285 164 (A)	7 001 (A)	20 829 (B)	312 994 (A)
2005	289 717 (A)	6 195 (A)	21 601 (B)	317 512 (A)
2006	296 871 (A)	7 438 (A)	21 836 (B)	326 145 (A)
2007	300 203 (A)	8 150 (A)	23 922 (B)	332 275 (A)
2008	294 361 (A)	8 416 (A)	22 834 (B)	325 611 (A)
2009	303 576 (A)	8 295 (A)	21 416 (B)	333 287 (A)

Figure 5 — Canadian average weekly retail price of regular gasoline, 2007 to 2009

	2007	2008	2009
Week 1	88.9	107.5	78.7
Week 2	87.1	105.8	79.9
Week 3	83.7	104.5	85.3
Week 4	84.1	104.1	82.9
Week 5	86.8	103.9	85.9
Week 6	87.0	104.2	86.1
Week 7	92.2	108.8	87.3
Week 8	98.1	110.8	82.5
Week 9	101.6	108.9	86.3
Week 10	103.0	111.5	87.4
Week 11	103.8	109.8	88.0

Figure 5 — Canadian average weekly retail price of regular gasoline, 2007 to 2009 (continued)

	2007	2008	2009
Week 12	103.9	110.9	89.3
Week 13	105.1	114.1	88.4
Week 14	106.2	116.2	88.7
Week 15	105.3	118.5	88.7
Week 16	105.3	123.0	89.0
Week 17	110.2	125.2	88.7
Week 18	108.4	125.1	90.7
Week 19	113.0	129.0	95.9
Week 20	115.6	127.1	96.9
Week 21	113.5	132.6	100.2
Week 22	108.2	131.1	100.2
Week 23	105.2	137.2	101.6
Week 24	107.1	136.0	104.3
Week 25	105.9	138.4	103.2
Week 26	105.8	139.5	101.8
Week 27	109.4	139.5	98.7
Week 28	106.5	140.1	95.8
Week 29	103.9	132.9	96.9
Week 30	103.3	129.2	98.0
Week 31	100.7	130.2	99.8
Week 32	99.0	128.7	101.3
Week 33	100.8	127.2	101.3
Week 34	102.1	127.8	102.0
Week 35	103.4	131.8	102.0
Week 36	103.3	130.0	99.4
Week 37	100.5	137.7	99.2
Week 38	100.0	121.5	98.4
Week 39	99.4	118.5	94.9
Week 40	97.2	113.6	94.8
Week 41	99.7	107.9	94.6
Week 42	99.2	105.4	98.3
Week 43	101.6	98.8	101.5
Week 44	102.4	92.7	102.1
Week 45	103.6	88.7	100.7
Week 46	104.7	85.4	99.8
Week 47	107.8	83.4	100.4
Week 48	103.6	80.7	98.2
Week 49	103.2	76.8	97.3
Week 50	104.4	76.4	94.7
Week 51	105.8	74.9	95.2
Week 52	107.0	71.7	97.0

Figure 6 — Quarterly vehicle-kilometres travelled by light vehicles, 2007 to 2009

Quarter	Light vehicles (VKM)
2007Q1	67 633 003 186 (B)
2007Q2	80 620 898 075 (B)
2007Q3	79 619 504 321 (A)
2007Q4	72 329 855 748 (A)
2008Q1	65 303 652 175 (B)
2008Q2	74 497 437 379 (B)
2008Q3	80 140 054 188 (B)
2008Q4	74 419 897 811 (B)
2009Q1	64 246 266 121 (B)
2009Q2	80 216 619 583 (B)
2009Q3	88 175 260 347 (A)
2009Q4	70 937 936 805 (A)

Figure 7 — Fuel consumption rate by vehicle type and fuel type, 2005 and 2009

Year	Fuel consumption rate (L/100 km)		
	Light vehicles	Medium trucks	Heavy trucks
	Gasoline consumption rate		
2005	10.6 (B)	26.6 (C)	– (F)
2009	10.7 (B)	25.1 (C)	– (F)
	Diesel consumption rate		
2005	11.4 (D)	26.4 (A)	35.1 (A)
2009	10.6 (D)	24.4 (A)	33.4 (A)

Figure 8 — When last motor vehicle was purchased/leased, importance of fuel efficiency in decision, by number of motor vehicles owned/leased, 2007

Importance level	Fuel efficiency in choice of vehicle			
	All (Canada)	One motor vehicle	Two motor vehicles	More than two motor vehicles
Very important	4 871 203 (A*)	2 417 586 (A*)	1 877 319 (A*)	436 319 (A*)
Somewhat important	4 263 786 (A*)	2 027 996 (A*)	1 733 512 (A*)	345 347 (A*)
Somewhat/very unimportant	1 610 772 (A*)	812 342 (A*)	564 923 (A*)	169 410 (A*)

* 2007 Survey of Household Energy Use; uses three quality indicators: A— acceptable, M— use with caution, and U— too unreliable to be published.

Figure 9 — Number of vehicles in Canada by region, 2000 and 2009

Province/territory	Vehicles in Canada	
	2000	2009
Newfoundland and Labrador	246 674 (A)	296 974 (B)
Prince Edward Island	75 920 (A)	85 493 (B)
Nova Scotia	516 296 (A)	553 594 (B)
New Brunswick	434 605 (A)	491 680 (B)
Quebec	3 856 820 (A)	4 679 516 (A)
Ontario	6 435 278 (A)	7 362 689 (A)
Manitoba	601 515 (A)	698 617 (B)
Saskatchewan	682 228 (A)	787 348 (B)
Alberta	2 052 922 (A)	2 800 022 (B)
British Columbia	2 269 107 (A)	2 696 877 (B)
Yukon	23 410 (A)	30 256 (A)
Northwest Territories	19 518 (A)	23 725 (A)
Nunavut	2 851 (A)	4 370 (A)
Canada	**17 217 143 (A)**	**20 511 161 (A)**

This figure excludes the territories because their vehicle fleets are small, accounting for 58 000 vehicles in 2009.

Figure 10 — Number of light vehicles per household by jurisdiction, 2009

Jurisdiction	Vehicles per household
Newfoundland and Labrador	1.40
Prince Edward Island	1.44
Nova Scotia	1.37
New Brunswick	1.55
Quebec	1.35
Ontario	1.45
Manitoba	1.42
Saskatchewan	1.79
Alberta	1.87
British Columbia	1.43
Territories	1.49
Canada	**1.47**

Figures 11, 14 and 15 — Average distance travelled by light vehicles, medium trucks and heavy trucks by jurisdiction, 2000 and 2009

Province	Average distance travelled (km)					
	Light vehicles		Medium trucks		Heavy trucks	
	2000	2009	2000	2009	2000	2009
Newfoundland and Labrador	19 965 (N/A*)	15 056 (C)	16 305 (N/A*)	11 878 (E)	47 041 (N/A*)	65 840 (E)
Prince Edward Island	16 475 (N/A*)	15 091 (C)	10 379 (N/A*)	8 390 (E)	27 394 (N/A*)	14 448 (E)
Nova Scotia	17 005 (N/A*)	17 427 (C)	22 539 (N/A*)	22 779 (E)	73 240 (N/A*)	62 888 (E)
New Brunswick	19 301 (N/A*)	16 118 (C)	19 539 (N/A*)	11 435 (E)	36 691 (N/A*)	29 610 (E)
Quebec	16 633 (N/A*)	14 834 (B)	29 817 (N/A*)	21 254 (E)	111 061 (N/A*)	94 174 (D)
Ontario	16 996 (N/A*)	16 196 (B)	24 087 (N/A*)	19 029 (E)	91 460 (N/A*)	75 888 (D)
Manitoba	16 044 (N/A*)	14 963 (C)	20 425 (N/A*)	14 259 (E)	95 136 (N/A*)	88 615 (E)
Saskatchewan	17 103 (N/A*)	15 338 (C)	7 103 (N/A*)	13 619 (E)	45 799 (N/A*)	39 678 (E)
Alberta	18 940 (N/A*)	16 144 (B)	14 024 (N/A*)	19 916 (E)	73 115 (N/A*)	62 059 (D)
British Columbia	15 077 (N/A*)	12 892 (C)	18 382 (N/A*)	19 641 (E)	55 286 (N/A*)	35 015 (E)
Canada	**16 944 (N/A*)**	**15 366 (A)**	**18 561 (N/A*)**	**18 938 (C)**	**81 079 (N/A*)**	**67 513 (B)**

* N/A stands for not available. The data by province did not include quality indicators in years prior to 2004 in the Natural Resources Canada data set.

Figure 12 — Occupancy rate of light vehicles by jurisdiction, 2009

Province	2009
Newfoundland and Labrador	1.69 (A)
Prince Edward Island	1.58 (B)
Nova Scotia	1.61 (A)
New Brunswick	1.71 (A)
Quebec	1.63 (A)
Ontario	1.60 (A)
Manitoba	1.65 (A)
Saskatchewan	1.65 (A)
Alberta	1.68 (A)
British Columbia	1.61 (A)
Canada	**1.62 (A)**

Figure 13 — Share of body type of light vehicles by jurisdiction, 2009

Province	Light vehicles	
	Cars and station wagons	Vans, SUVs and pickup trucks
Newfoundland and Labrador	149 423 (E)	140 675 (E)
Prince Edward Island	44 805 (E)	36 694 (E)
Nova Scotia	337 434 (D)	200 260 (E)
New Brunswick	282 056 (D)	199 704 (E)
Quebec	3 283 083 (B)	1 310 086 (D)
Ontario	4 262 945 (B)	2 903 889 (C)
Manitoba	357 978 (D)	312 155 (D)
Saskatchewan	345 704 (E)	371 934 (D)
Alberta	1 123 643 (D)	1 457 619 (C)
British Columbia	1 434 655 (D)	1 149 206 (D)
Canada	**11 639 156 (A)**	**8 116 789 (B)**

Figure 14 — See Annex C, Figure 11.

Figure 15 — See Annex C, Figure 11.

Figures 16, 17 and 18 — Fuel consumption rate of gasoline-powered light vehicles and diesel consumption rates of medium and heavy trucks, by jurisdiction, 2009

Province	Fuel consumption rate (L/100 km)		
	Light vehicles (gasoline)	Medium trucks (diesel)	Heavy trucks (diesel)
Newfoundland and Labrador	10.5 (E)	26.7 (D)	32.8 (B)
Prince Edward Island	10.4 (E)	30.1 (E)	39.1 (B)
Nova Scotia	9.6 (E)	23.4 (C)	35.6 (A)
New Brunswick	10.7 (E)	27.1 (C)	33.6 (B)
Quebec	9.9 (D)	28.1 (B)	33.0 (A)
Ontario	10.6 (C)	27.3 (B)	33.2 (A)
Manitoba	11.2 (D)	25.7 (B)	32.4 (B)
Saskatchewan	11.5 (E)	21.4 (C)	35.7 (B)
Alberta	11.3 (D)	22.0 (B)	33.1 (A)
British Columbia	11.6 (E)	23.5 (B)	36.6 (B)
Canada	**10.7 (B)**	**24.4 (A)**	**33.4 (A)**

Figure 19 — Light vehicles by body type, 2000 and 2009

Body type	Vehicles	
	2000*	2009
Car	10 073 131 (N/A**)	10 952 468 (A)
Station wagon	412 544 (N/A**)	686 687 (E)
Van	2 190 945 (N/A**)	2 536 198 (C)
SUV	1 145 389 (N/A**)	2 531 946 (C)
Pickup truck	2 687 213 (N/A**)	2 993 480 (C)
Other	132 919 (N/A**)	55 165 (NA***)

* Data quality estimates are not provided because the data are based on Statistics Canada, 2010, *Canadian Vehicle Survey: Annual 2009*, Cat. No. 53-223-X, www.statcan.ca/bsolc/english/bsolc?catno=53-223-X. Total are weighted to match the 2000 light vehicle total reported in Table 1.

** N/A stands for not available. The data by body type did not include quality indicators in years prior to 2004 in the Natural Resources Canada data set.

*** NA stands for not applicable. "Other" was derived from the difference in light vehicle total and the body available. Consequently, it is impossible to determine the quality indicator of this data point.

Figure 20 — Distribution of light vehicles by body type, 2000 to 2009

Year	Light vehicles	
	Cars and station wagons	Vans, SUVs and pickup trucks
2000	10 037 783 (N/A*)	6 604 357 (N/A*)
2001	10 544 046 (N/A*)	6 246 488 (N/A*)
2002	10 422 701 (N/A*)	6 876 723 (N/A*)
2003	11 073 500 (N/A*)	6 473 999 (N/A*)
2004	10 096 717 (B)	7 686 001 (B)
2005	10 399 220 (B)	7 735 519 (B)
2006	10 200 893 (B)	8 336 062 (B)
2007	10 458 909 (A)	8 548 663 (B)
2008	10 986 266 (A)	8 440 239 (B)
2009	11 639 156 (A)	8 116 789 (B)

* N/A stands for not available. The data by body type did not include quality indicators in years prior to 2004 in the Natural Resources Canada data set.

Figure 21 — Passenger-kilometres travelled in Canada by light vehicles by body type, 2000 to 2009

Year	PKM (million)	
	Cars and station wagons	Vans, SUVs and pickup trucks
2000	282 608 (A)	192 466 (A)
2001	258 405 (B)	202 219 (B)
2002	264 511 (B)	206 068 (B)
2003	270 513 (B)	192 643 (E)
2004	243 012 (A)	228 152 (A)
2005	259 216 (A)	237 746 (B)
2006	251 057 (A)	240 699 (A)
2007	231 313 (A)	255 619 (A)
2008	251 091 (A)	225 706 (A)
2009	266 094 (A)	226 957 (A)

Figure 22 — Average distance travelled by and number of light vehicles per household, 2000 to 2009

Year	Average distance travelled by light vehicles (km)	Light vehicles per household*
2000	16 944 (A)	1.43
2001	16 877 (A)	1.42
2002	16 782 (A)	1.44
2003	16 334 (A)	1.44
2004	16 036 (A)	1.44
2005	15 976 (A)	1.44
2006	16 015 (A)	1.45
2007	15 794 (A)	1.46
2008	15 153 (A)	1.48
2009	15 366 (A)	1.47

* Data quality estimates are not provided because the CVS data were combined with Statistics Canada data on households (*Dwelling Characteristics and Household Equipment for Canada, Provinces/Territories and Selected Metropolitan Areas*, Cat. No. 62F0041XDB).

Figure 23 — Average distance travelled by light vehicles by body type, 2000 to 2009

Year	Average distance travelled (km)	
	Cars and station wagons	Vans, SUVs and pickup trucks
2000	16 691 (N/A*)	19 477 (N/A*)
2001	15 592 (N/A*)	19 306 (N/A*)
2002	15 783 (N/A*)	18 569 (N/A*)
2003	15 434 (N/A*)	17 999 (N/A*)
2004	15 320 (B)	16 976 (B)
2005	15 428 (B)	16 712 (B)
2006	15 410 (B)	16 756 (B)
2007	14 188 (B)	17 759 (B)
2008	14 408 (B)	16 121 (B)
2009	14 602 (B)	16 462 (B)

* N/A stands for not available. The data by body type did not include quality indicators in years prior to 2004 in the Natural Resources Canada data set.

Figure 24 — Canadian vehicle occupancy rate of light vehicles by body type, 2000 to 2009

Year	Occupancy rate (people/vehicle)	
	Cars and station wagons	Vans, SUVs and pickup trucks
2000	1.67 (A)	1.71 (A)
2001	1.57 (A)	1.70 (A)
2002	1.61 (A)	1.64 (A)
2003	1.57 (A)	1.67 (A)
2004	1.57 (A)	1.75 (A)
2005	1.62 (A)	1.84 (A)
2006	1.60 (A)	1.72 (A)
2007	1.56 (A)	1.68 (A)
2008	1.59 (A)	1.66 (A)
2009	1.57 (A)	1.70 (A)

Figures 25 and 26 — Number of light vehicles by vehicle age, 2005 and 2009

Age	Light vehicles	
	2005	2009
Less than 3 years old	3 302 281 (C)	3 688 609 (B)
3 to 5 years old	4 288 089 (B)	4 380 595 (B)
6 to 9 years old	4 656 862 (B)	5 530 252 (B)
10 to 13 years old	3 221 021 (C)	3 297 185 (C)
More than 13 years old	2 666 485 (C)	2 859 303 (C)

Figure 27 — Fuel consumption rate of light vehicles by driver gender, 2004 to 2009

Year	Male	Female
2004	11.22 (D)	10.95 (E)
2005	10.65 (D)	10.61 (E)
2006	10.89 (C)	10.73 (E)
2007	10.98 (C)	10.63 (D)
2008	10.70 (D)	10.43 (E)
2009	10.62 (C)	10.78 (E)

Figure 28 — See Annex C, Figure 4.

Figures 29 and 30 — Distance travelled by medium and heavy trucks by configuration, 2000 and 2009

Configuration	VKM (billion)			
	Medium trucks		Heavy trucks	
	2000	2009	2000	2009
Straight truck	4.819 (E)	5.620 (C)	2.620 (A)	3.432 (C)
Tractor only	0.035 (E)	0.169 (E)	0.517 (B)	0.462 (E)
Tractor and 1 trailer	0.214 (E)	0.284 (E)	15.455 (E)	14.228 (B)
Straight truck and trailer	0.124 (E)	0.727 (E)	0.388 (A)	0.353 (E)
Tractor and 2 trailers	0.005 (E)	– (–)	1.250 (E)	2.176 (C)
Tractor and 3 trailers	– (–)	0.018 (E)	0.080 (E)	0.136 (E)
Other	0.734 (E)	1.423 (E)	0.407 (E)	0.444 (E)

Figures 31 and 32 — Distance travelled by medium and heavy trucks by trip purpose, 2000 and 2009

Trip purpose	VKM (billion)			
	Medium trucks		Heavy trucks	
	2000	2009	2000	2009
Driving to or from service call	0.686 (C)	1.506 (E)	0.731 (E)	0.454 (E)
Carrying goods or equipment	2.952 (B)	4.205 (C)	15.474 (A)	16.471 (B)
Empty	0.344 (D)	0.350 (E)	2.803 (B)	3.225 (C)
Other work purpose	0.324 (C)	0.646 (E)	0.258 (E)	0.283 (E)
Non-work purpose	1.624 (B)	1.588 (E)	1.449 (D)	0.983 (E)

Figures 33 and 34 — Distance travelled by medium and heavy trucks by activity type, 2000 and 2009

Activity type	VKM (billion)			
	Medium trucks		Heavy trucks	
	2000	2009	2000	2009
For-hire	0.782 (D)	1.089 (E)	13.928 (A)	12.598 (B)
Owner-operator	0.949 (C)	1.843 (D)	3.158 (B)	4.488 (C)
Private	3.109 (B)	3.934 (C)	2.325 (C)	2.719 (C)
Other	1.091 (D)	1.430 (D)	1.305 (D)	1.611 (D)

Figure 35 — Distribution of medium and heavy trucks by vehicle age, 2005 and 2009

Age	Vehicles			
	Medium trucks		Heavy trucks	
	2005	2009	2005	2009
Less than 3 years old	61 087 (E)	90 551 (E)	65 104 (D)	65 462 (E)
3 to 5 years old	61 314 (E)	95 897 (E)	58 717 (D)	71 857 (E)
6 to 9 years old	64 444 (E)	84 445 (E)	78 450 (E)	53 386 (E)
10 to 13 years old	45 872 (E)	Too unreliable (F)	43 431 (E)	46 997 (E)
More than 13 years old	93 222 (E)	118 929 (E)	49 761 (E)	79 517 (E)

Figure 36 — Average distance travelled by medium and heavy trucks by vehicle age, 2009

Age	Average distance travelled (km)	
	Medium trucks	Heavy trucks
Less than 3 years old	34 418 (E)	111 211 (E)
3 to 5 years old	24 217 (E)	106 788 (E)
6 to 9 years old	19 744 (E)	68 259 (E)
10 to 13 years old	Too unreliable (F)	Too unreliable (F)
More than 13 years old	Too unreliable (F)	12 156 (E)

Figures 37 and 38 — Fuel consumption rates of medium and heavy trucks by configuration and fuel type, 2005 and 2009

Configuration	FCR (L/100 km)							
	Medium trucks				Heavy trucks			
	Gasoline		Diesel		Gasoline		Diesel	
	2005	2009	2005	2009	2005	2009	2005	2009
Straight truck	26.1 (D)	25.8 (E)	26.8 (B)	25.4 (C)	54.8 (E)	48.7 (E)	38.4 (B)	37.4 (B)
Tractor only	– (–)	22.0 (E)	25.9 (E)	23.0 (E)	71.6 (E)	– (–)	34.0 (B)	33.6 (E)
Tractor and 1 trailer	28.5 (E)	19.9 (E)	25.7 (E)	24.3 (E)	82.0 (E)	79.3 (E)	34.1 (A)	32.5 (A)
Straight truck and trailer	31.8 (E)	26.6 (E)	21.2 (E)	21.7 (E)	79.9 (E)	– (–)	36.8 (C)	35.8 (E)
Tractor and 2 trailers	– (–)	– (–)	– (–)	– (–)	– (–)	– (–)	36.5 (B)	30.2 (C)
Tractor and 3 trailers	– (–)	35.0 (E)	22.9 (E)	19.3 (E)	– (–)	– (–)	33.7 (B)	37.6 (E)
Other	28.2 (E)	23.0 (E)	25.1 (D)	21.7 (C)	– (–)	35.1 (E)	41.1 (D)	42.0 (C)

Figure 39 — Fuel consumption rates of medium and heavy trucks by activity type and fuel type, 2009

Activity type	FCR (L/100 km)							
	Medium trucks				Heavy trucks			
	Gasoline		Diesel		Gasoline		Diesel	
	2005	2009	2005	2009	2005	2009	2005	2009
For-hire	22.2 (E)	22.1 (E)	26.5 (B)	25.6 (C)	53.9 (E)	35.1 (C)	34 (A)	32.9 (A)
Owner-operator	24.8 (E)	20.4 (E)	28.3 (B)	21.2 (C)	81.9 (E)	79.3 (E)	35.8 (A)	32.0 (B)
Private	28.0 (E)	28.9 (E)	25.9 (B)	24.7 (B)	59.9 (E)	66.0 (E)	37.3 (A)	35.1 (A)
Other	26.7 (E)	21.6 (E)	26.3 (B)	26.3 (C)	75.4 (E)	– (–)	38.5 (C)	38.6 (B)

Figure 40 — Fuel consumption rates of diesel-powered medium and heavy trucks by vehicle age, 2009

Age	FCR (L/100 km)	
	Medium trucks	Heavy trucks
Less than 3 years old	21.7 (B)	31.6 (A)
3 to 5 years old	24.7 (B)	32.6 (A)
6 to 9 years old	25.6 (B)	36.3 (A)
10 to 13 years old	27.0 (C)	35.7 (B)
More than 13 years old	35.1 (D)	37.3 (B)

ANNEX D

Glossary

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 Canadian Vehicle Survey (CVS), the heavy truck category includes all heavy vehicles with a gross vehicle weight of 15 tonnes or more.

In-scope vehicles

In-scope vehicles includes all motor vehicles — except buses, motorcycles, off-road vehicles (e.g. snowmobiles, dune buggies and 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. For more details, visit **http://www.statcan.ca/bsolc/english/bsolc?catno=53-223-X**.

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 vehicles used on the roads and those not used during the reference period.

Occupancy rate

The occupancy rate is the number of people, including the driver and passenger(s), in a vehicle. Occupancy rates are generally calculated as passenger-kilometres divided by vehicle-kilometres.

Passenger-kilometres

Passenger-kilometres (PKM) are the sum of the distances travelled by individual passengers, the driver being considered to be one of the passengers (e.g. total PKM 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. PKM can also be abbreviated PKT for passenger-kilometres *travelled*.

Renewable fuels

Renewable fuels are fuels produced by renewable resources. They include alternative energy sources, such as biodiesel and ethanol.

Straight truck

A straight truck is a complete unit, comprising a power unit and a box that cannot be detached.

Tractor

The tractor is the front part of a tractor-trailer combination and can be accompanied by one or more detachable trailers. A road tractor is designed to pull a trailer containing freight. If a truck comes apart, the road tractor is the front end (the cab and the power unit).

Vehicle-kilometres

Vehicle-kilometres (VKM) are the distance travelled by vehicles on roads (e.g. total VKM for a specific vehicle would be the distance *travelled* by that vehicle on the road). VKM can also be abbreviated VKT for vehicle-kilometres travelled.

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 that have gross vehicle weights of less than 4.5 tonnes, medium vehicles that have gross vehicle weights between 4.5 and 15 tonnes, and heavy vehicles that have gross vehicle weights of 15 tonnes or more.