Ministry of Transport
TE MANATŪ WAKA

The New Zealand Vehicle Fleet

ANNUAL FLEET STATISTICS 2010

MARCH 2011

ISBN 978-0-478-07228-0

STATISTICAL REPORT

TABLE OF CONTENTS

FOREWORD

The annual vehicle fleets statistics report adds to our understanding of the New Zealand vehicle fleet and its travel.

This year's report shows that New Zealand's vehicle fleet is continuing to age.

New Zealand is not alone in this trend. One possible influence of the increasing average vehicle age is improved rust prevention and mechanical reliability leading to vehicles lasting longer.

The average age of the vehicles in New Zealand's light fleet, however, is high by international standards. The average age of our light vehicles is 12.8 years old. In 2000, 23.8 percent of the light fleet was 15 or more years old, but by 2010 this had increased to 33.2 percent. What's more, the average age of used imported vehicles — which make up almost half of the light vehicle fleet — has reached 14.4 years old.

Vehicle replacement volumes have dropped significantly over the last three years. The rate of scrappage was very low in 2010, signalling that more people are holding on to their vehicles instead of replacing them with newer models. The effect of this can be seen in the levelling off of the light fleet size and increased proportion of older vehicles. Only these low scrappage levels have prevented the fleet size from dropping.

As a result of this trend, more vehicles will require replacement in the next five years. However, given the reduced numbers of vehicle registrations in recent years, it is likely that the fleet size could drop.

This report provides is based on information from the Motor Vehicle Register. The report and accompanying spreadsheet is available on the research tab on the Ministry of Transport website http://www.transport.govt.nz/research. A series of brief quarterly updates are also available there.

The Ministry has developed a set of Transport Monitoring Indicators, which also include information on the vehicle fleet. The indicators provide national, and where possible regional, data for robust and consistent performance monitoring of the New Zealand transport sector. The Transport Monitoring Indicator Framework and the data sets are also available at www.transport.govt.nz.

Martin Matthews
Chief Executive, Ministry of Transport

DESCRIBING THE VEHICLE FLEET

The statistics presented in this publication have been categorised differently to the traditional motor vehicle statistics produced by the Transport Registry Centre of the New Zealand Transport Agency (NZTA)[1]. The objective was to produce a categorisation better suited to estimation of fuel use and levels of emissions.

There are two significant differences:

1) VEHICLE CATEGORISATION

The vehicle categories used in this report are:

- Light passenger
- Light commercial
- Truck
- Bus
- Motorcycle

NZTA categorisation	Fleet statistics categorisation
Passenger car/van	Light passenger
Goods vans/trucks/utilities	Light commercial if under 3500kg Truck if over 3500kg
Buses	Light commercial if under 3500kg Bus if over 3500kg
Motor caravans	Light commercial if under 3500kg Truck if over 3500kg
Motorcycles	Motorcycles
Mopeds	Motorcycles

2) SCRAPPED VEHICLES

The second difference is in judging when a vehicle has been scrapped. Unless a vehicle owner actively de-registers it, or the vehicle has not been re-licensed for 12 months, then the practice of NZTA has been to include those vehicles in fleet statistics. This is likely to over-estimate the size of the active fleet, as some vehicles will become inactive well within the 12 months.

An alternative approach has been taken in this analysis when vehicle WoF/CoF[2] renewal is more than six months overdue. This is considered more realistic.

Appendix A elaborates on the reasons for these approaches.

[1] http://www.nzta.govt.nz/statistics/motor-vehicle-registration/index.html
[2] Warrant of Fitness (WoF) is a 6 or 12 monthly vehicle inspection for private light vehicles (under 3500kg), and Certificate of Fitness (CoF) is a 6 monthly vehicle inspection of commercial and heavy vehicles (over 3500kg).

1. SETTING THE SCENE – THE VEHICLE FLEET IN CONTEXT

HOW MUCH IS THE FLEET GROWING?

Figure 1.1 shows the light fleet (shown as light passenger and light commercial vehicles) makes up over 90 percent of the fleet. The light fleet is made up of cars, vans, utes, four wheel drives, sports utility vehicles (SUVs), buses and motor caravans under 3.5 tonnes. Figure 1.2 shows the light fleet grew by 22 percent between December 2000 and December 2010.

However, the light fleet is not the fastest growing segment of the fleet. Figure 1.2 shows that motorcycle and moped numbers grew by almost 60 percent in the same period. Truck and bus numbers have also been growing faster than the light fleet, although from far smaller bases.

Figure 1.1 : Fleet composition

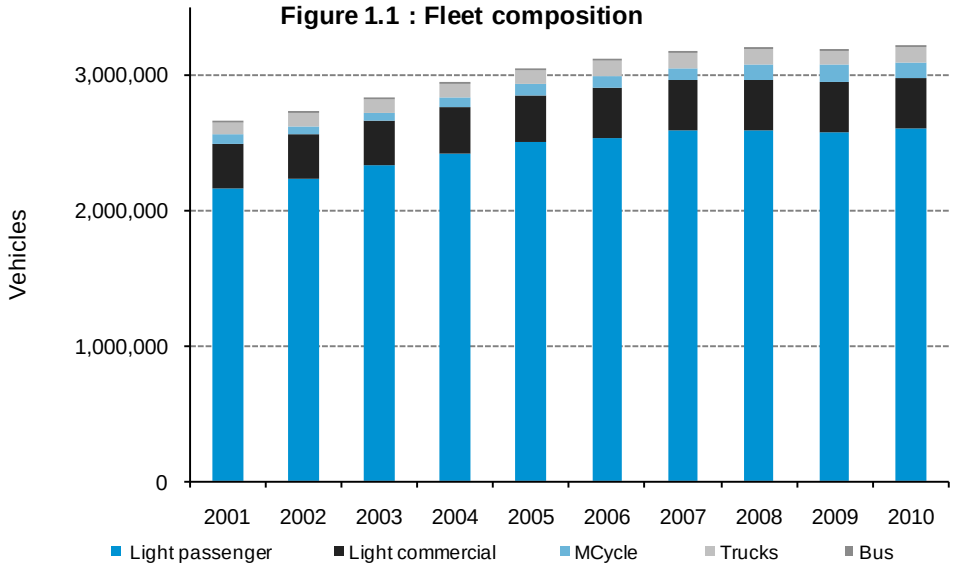
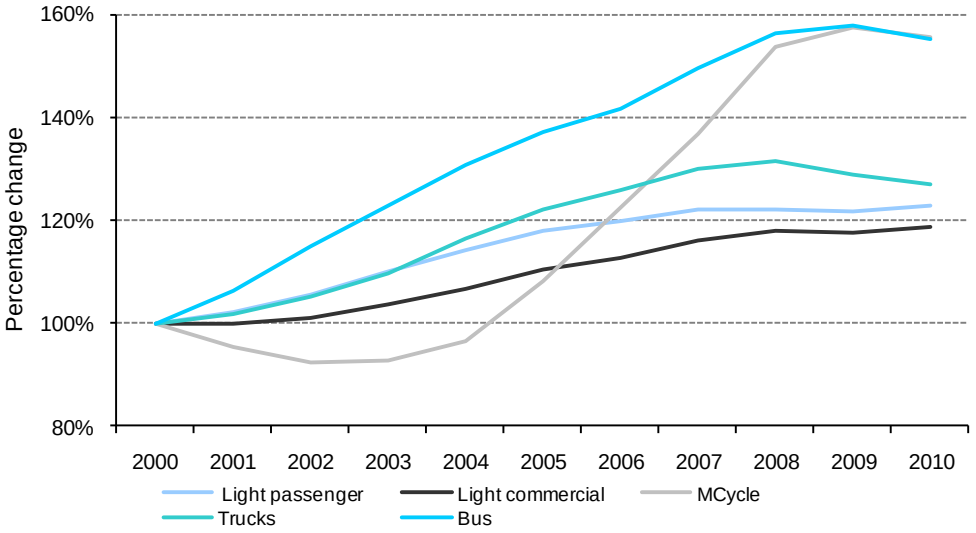


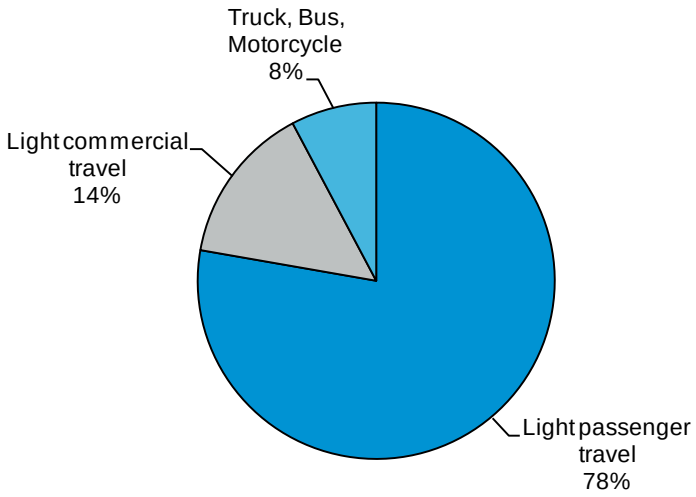
Figure 1.2 : Fleet composition relative to Jan 2000



WHAT PART OF THE FLEET TRAVELS THE MOST?

Travel on New Zealand roads is dominated by the light fleet. Light passenger vehicles contributed to 78 percent of road travel in 2010, and light commercial vehicles a further 14 percent. Only eight percent of road travel was by other vehicles (motorcycles, heavy trucks and buses).

Figure 1.3a : Travel in 2010

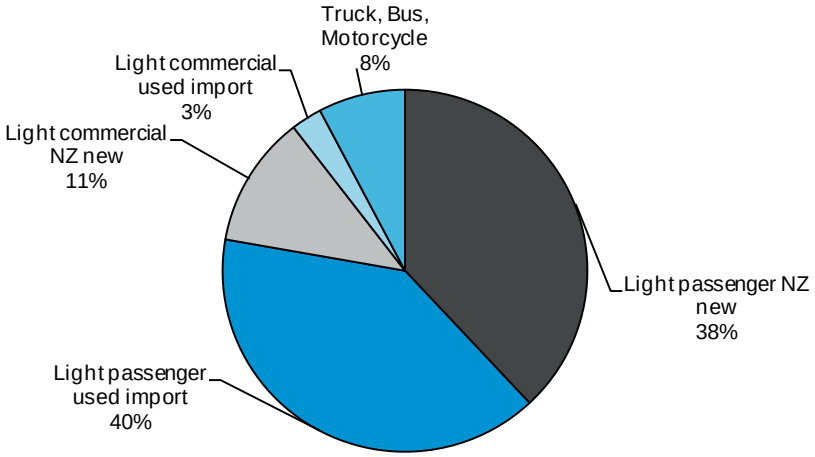


IS THE LIGHT FLEET TRAVEL DONE BY NEW ZEALAND NEW OR USED IMPORTED VEHICLES?

The light passenger and commercial fleets are significantly different. Light passenger travel[3] is almost equally split between vehicles imported new into New Zealand, and vehicles imported second-hand. Light commercial travel is dominated by New Zealand-new vehicles. This split is very similar to the new/used split within the light fleet (See Figure 2.1).

Also see Section 8.2, which provides a diesel/petrol breakdown.

Figure 1.3b : Travel in 2010, new/used import



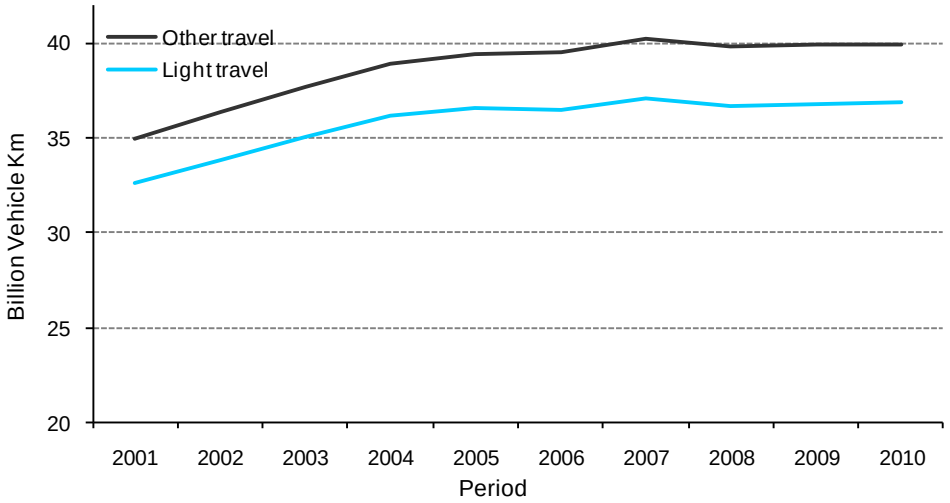
[3] Travel has been estimated using the odometer readings from the vehicle inspection (WoF, CoF) system.

WHAT ARE THE TRENDS IN MOBILITY?

Total annual travel in New Zealand was increasing until 2006, but since then two oil price shocks and the economic downturn have resulted in minimal growth.

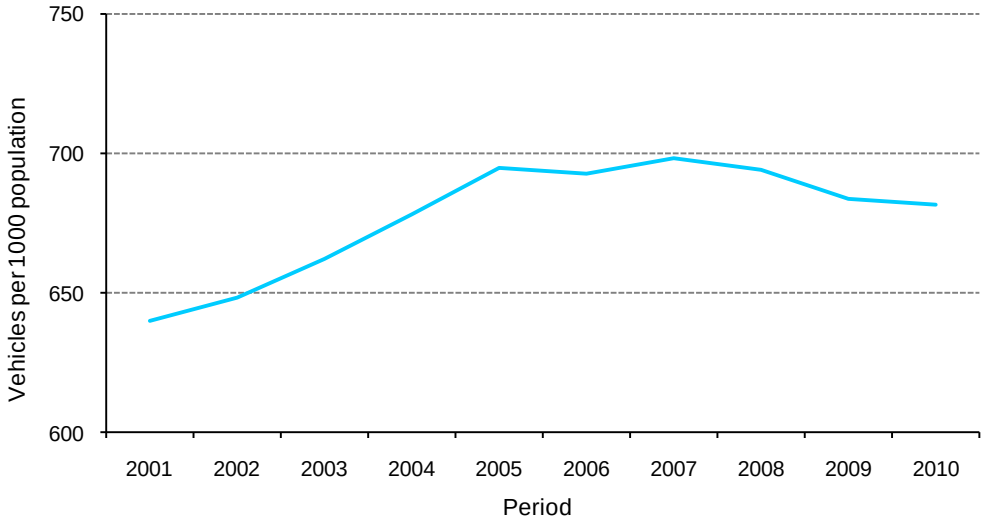
The growth in travel by the light fleet of 14.2 percent from 2001 to 2010 is less than the 24.3 percent growth in truck, bus and motorcycle travel during the same period.

Figure 1.4 : Light fleet total travel



Ownership per capita[4] of light vehicles increased significantly between 2000 and 2005. The increase reflected a number of factors, including the high value of the New Zealand dollar (which made vehicles cheaper), high employment and positive economic outlook that typified that time. Light vehicle ownership per capita has been declining in recent years. Figure 1.8a shows some international comparisons of ownership rates.

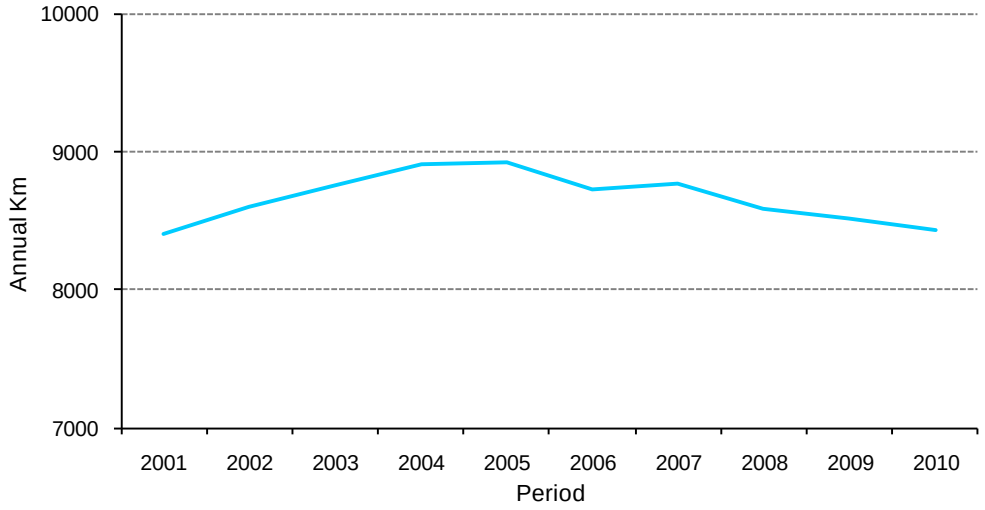
Figure 1.5 : Light fleet ownership per 1000 population



[4] Population data obtained from the Statistics New Zealand website www.stats.govt.nz.

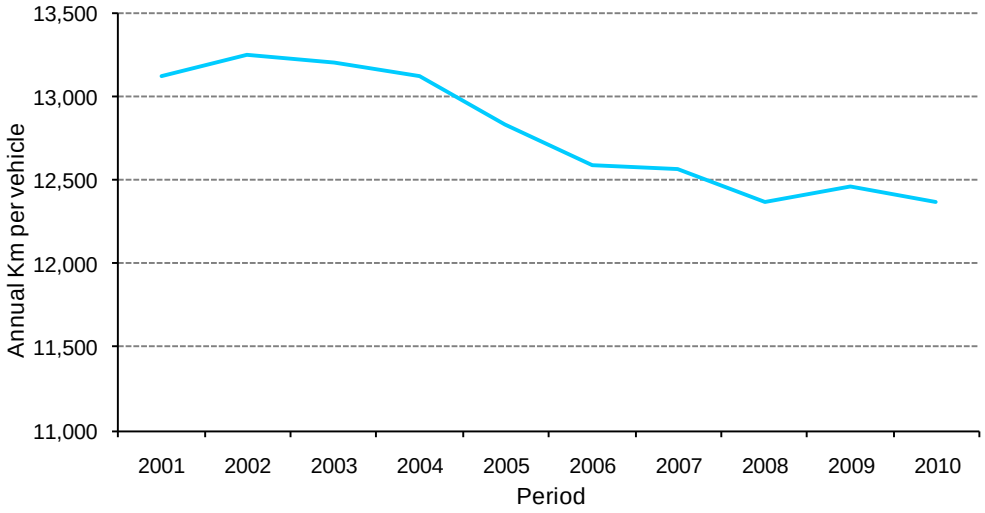
The increased ownership rate has been accompanied by increased travel per capita. Travel per capita (and fleet travel) dropped in response to the fuel price surges in 2006, rose again in 2007, and has continued to drop since then.

Figure 1.6 : Light fleet travel per capita



The very high (and growing) level of vehicle ownership does not translate proportionately into increased travel. The amount of travel per light vehicle has been declining, and the amount of travel per capita has been relatively constant despite the increased size of the vehicle fleet. (Also see figure 1.6.)

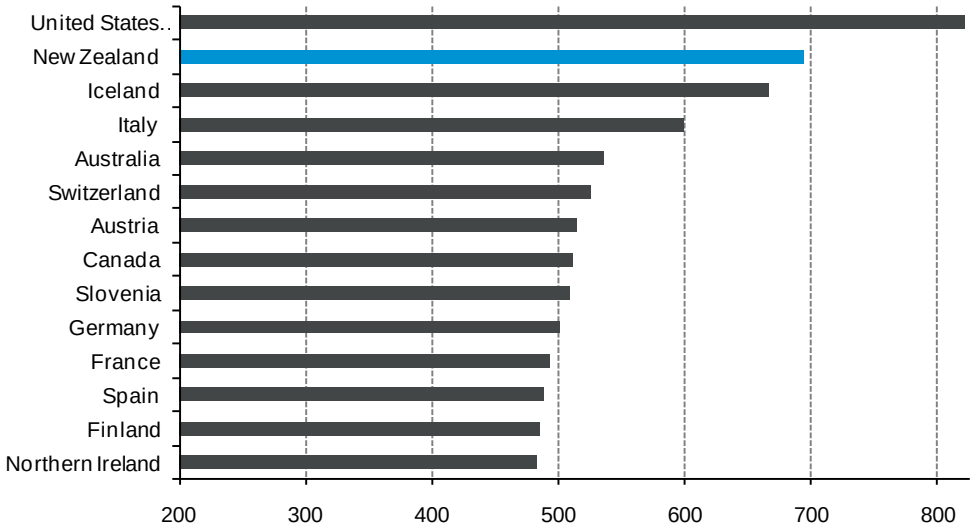
Figure 1.7 : Light fleet average annual travel per vehicle



HOW DOES NEW ZEALAND'S LEVEL OF MOTORISATION COMPARE INTERNATIONALLY?

The New Zealand data in Figure 1.8a is based on all light vehicles. This allows the New Zealand fleet to be compared with its international counterparts[5]. This is to sidestep issues with jurisdictions such as the United States of America, for example (while United States car ownership figures per capita seem modest, it is because the United States SUV fleet is registered as trucks).

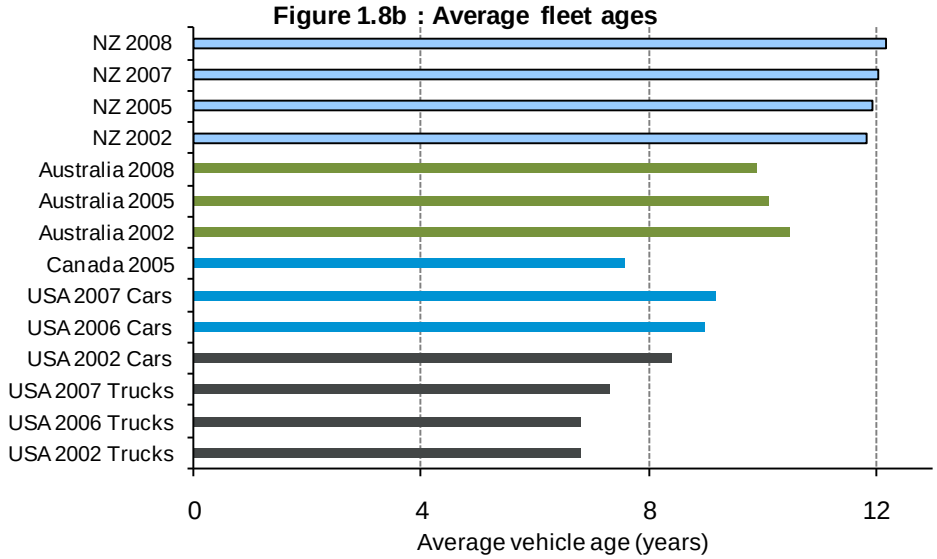
Figure 1.8a : Vehicles per 1000 population, 2008



HOW DOES THE AGE OF THE NEW ZEALAND FLEET COMPARE INTERNATIONALLY?

This comparison has been confined to countries with high levels of motorisation, and with similar patterns of development to New Zealand. The United Kingdom has not been included as its motorisation level is comparatively low.

Figure 1.8b : Average fleet ages



[5] Data sourced from UNECE passenger car numbers 2006 http://www.unece.org/stats/trends2006/transport.htm

LIGHT PETROL FLEET FUEL ECONOMY

The economy of the light petrol fleet has been established by comparing the travel of the light petrol fleet with petrol deliveries, less estimated other uses of petrol.

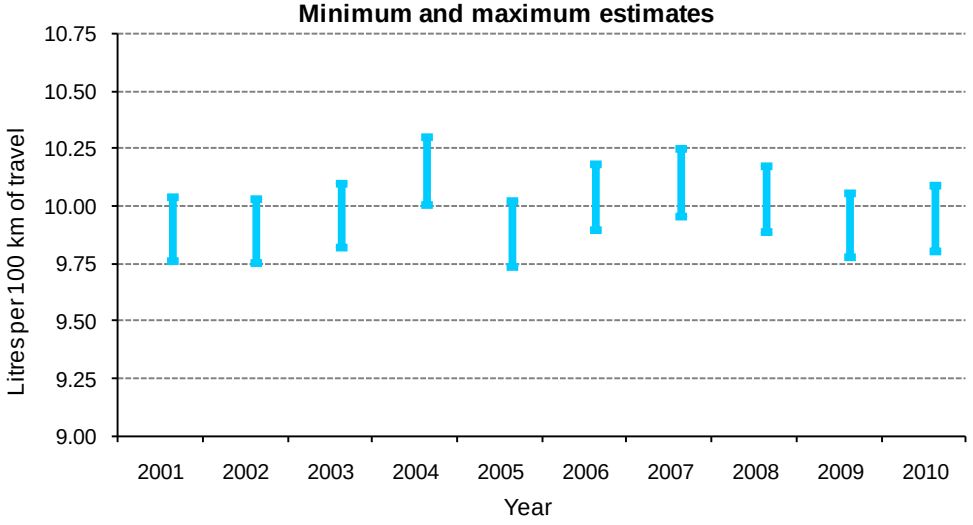
The fuel that has been removed from the calculation is:

- fuel used on-road by other parts of the fleet (motorcycles, heavy goods and buses) which is estimated as 1.0 percent of petrol deliveries[6]
- fuel used off-road (boats and jet skis, lawnmowers, circuit racing, rallying, speedway, motocross and other off-road motorcycling and agricultural quad bikes) which is estimated as 4.9-7.5 percent of petrol deliveries[7].

The bars on the chart in Figure 1.9 show the petrol economy estimates, which are based on the minimum non-light fleet estimate (5.9 percent of petrol) and maximum non-light fleet estimate (8.5 percent of petrol).

The resulting rates are indicative of what happens on New Zealand roads in New Zealand driving conditions. These values are higher than the vehicle fuel test cycle values shown in Section 9, which are based on European and Japanese laboratory test cycles.

Figure 1.9 : Light petrol fleet fuel economy 2001-2010
Minimum and maximum estimates



[6] Ministry of Transport Vehicle Fleet Emissions Model.

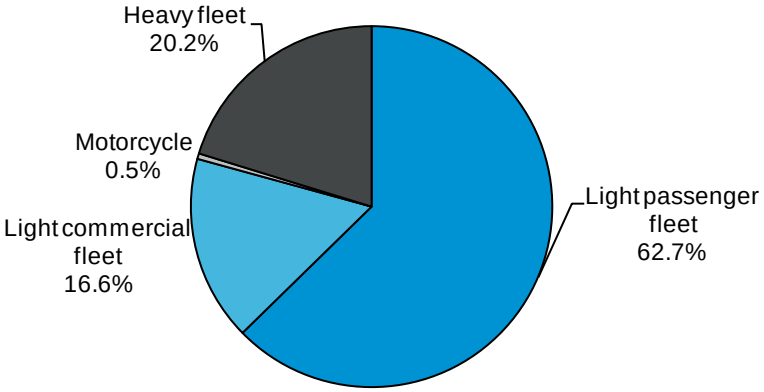
[7] Detailed in the accompanying data spreadsheet, see the research tab at www.transport.govt.nz.

VEHICLE FLEET CO_2 EMISSIONS

This page will be updated in August 2011 when emissions estimates for 2010 are available.

Vehicles produce CO_2 in direct proportion to the amount of fuel used. Modern vehicles are typically engineered to reduce their harmful emissions, and sometimes this is confused with their CO_2 emissions. CO_2 emissions are purely a product of the fuel consumed, and are not affected by any controls a vehicle has to reduce harmful emissions (such as diesel particulates, volatile organics and hydrocarbons).

Figure 1.10 : 2009 CO_2 emissions



Source : Vehicle Fleet Emissions Model

2. COMPOSITION OF THE FLEET

NEW ZEALAND NEW AND USED IMPORTED VEHICLES

Used imported vehicles make up a large proportion of the light vehicle fleet. Figure 2.1 shows their share has reached almost 50 percent. The share peaked in 2006, and has declined recently due to the decrease in imports of used vehicles.

Figure 2.2 shows the used import segment of the bus fleet is now similar to that of the light fleet, but the truck fleet has a lower proportion of used imported vehicles. The used imported segment of the bus and truck fleets was growing faster than the used imported segment of the light fleet. This growth has ceased since the 2007 Vehicle Exhaust Emissions Rule prevented the import of older used diesel vehicles.

Figure 2.1 : Light fleet composition

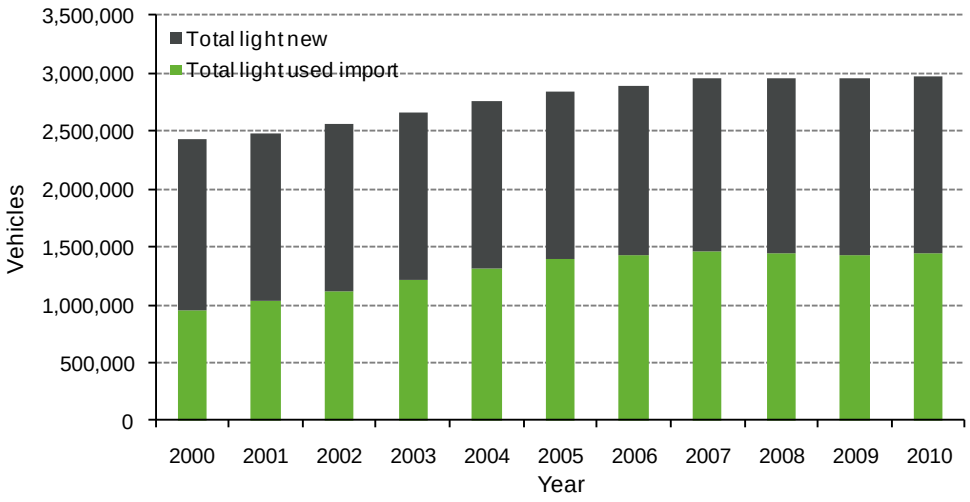
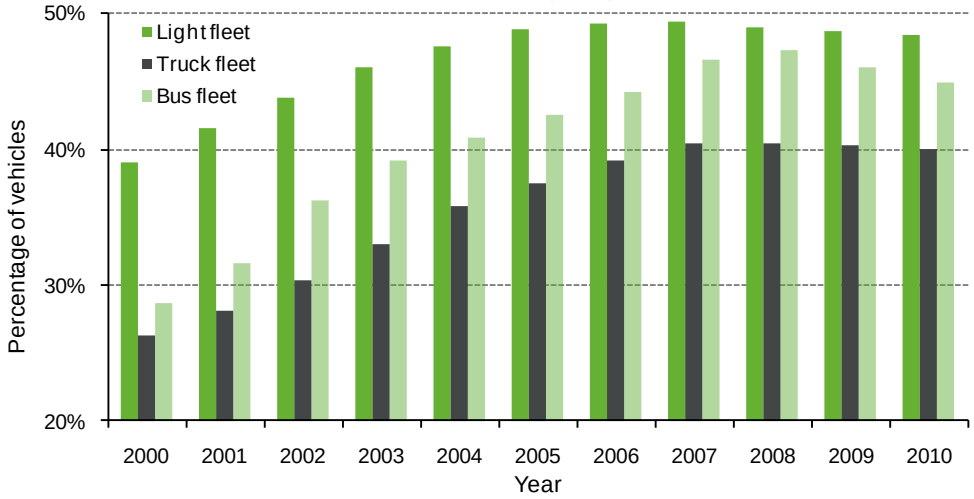


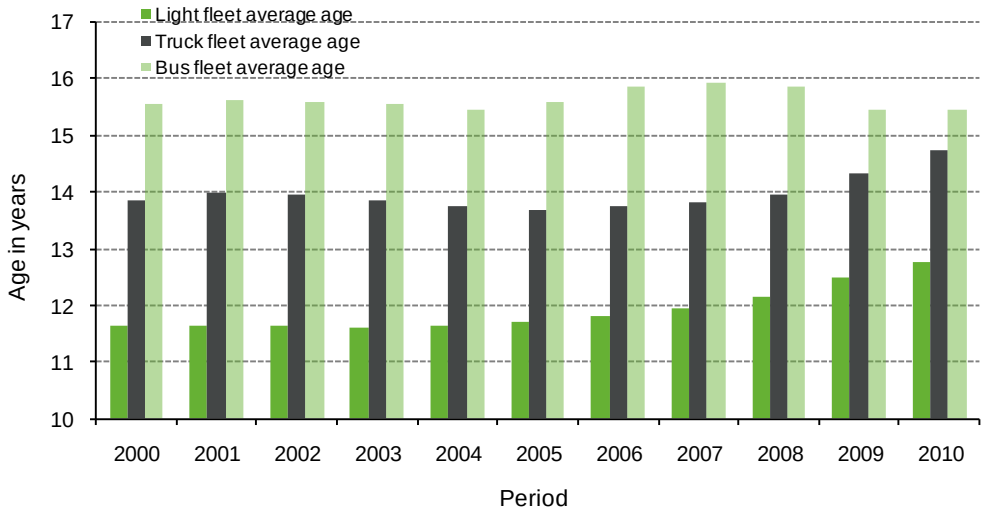
Figure 2.2 : Fleet used import percentage



AVERAGE VEHICLE AGE

The average age of the light fleet and the truck fleet have been increasing in recent years. This is not isolated to New Zealand and one possible influence is improved mechanical reliability leading to vehicles lasting longer. The average age of the bus fleet has dropped slightly in recent years, in response to increased purchasing (see Figure 2.8a).

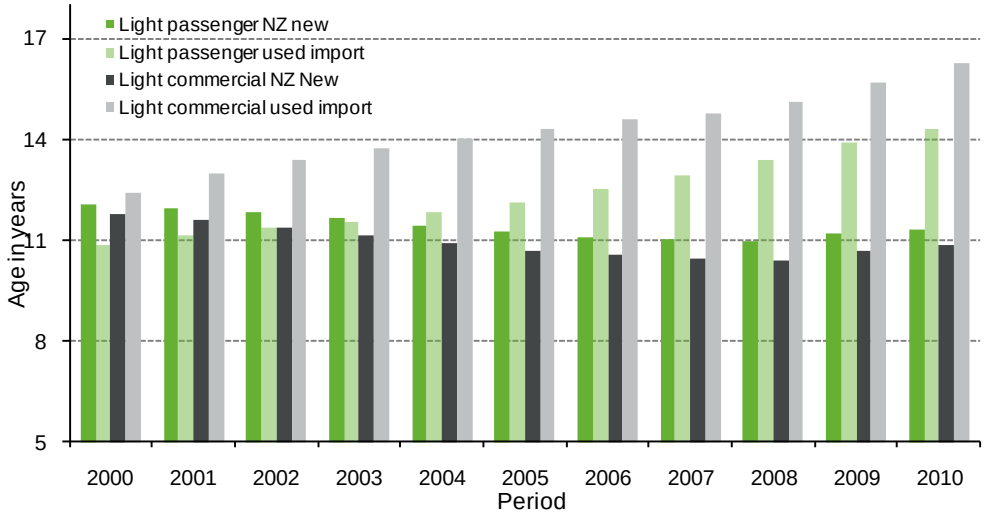
Figure 2.3 : Fleet average age



The average age of the vehicles in the light fleet is high by international standards (see Figure 1.8b). The average age of the used imported vehicles in the fleet is increasing.

The New Zealand Frontal Impact Standard was introduced in 2002 and had the effect of restricting used car imports to those vehicles manufactured during or after 1996 (and some older vehicles that met the standard). This reduced the typical age of used imports arriving in New Zealand earlier this decade, but the effect of this restriction has now largely worn off (see Figure 5.2a). The reduction in used registrations in recent years means the average age of the used light passenger fleet is over 14 years old.

Figure 2.4 : Light fleet average age



LIGHT FLEET YEAR OF MANUFACTURE

The light vehicle fleet age mix includes a significant number of used imports manufactured in the 1990s.

The 1996 year of manufacture peak in the New Zealand fleet is a direct consequence of the Frontal Impact Standard[8], which had the effect of restricting used car imports to those vehicles manufactured during or after 1996 (and some older vehicles that met the standard).

As these mid-1990s vehicles age, there will be a significant effect on the age of the fleet. The actual effect will depend on future vehicle import and scrappage patterns (also see Figure 2.5b, 2.11a and 2.11b).

Figure 2.5a : Light fleet vehicle year of manufacture Dec 2010

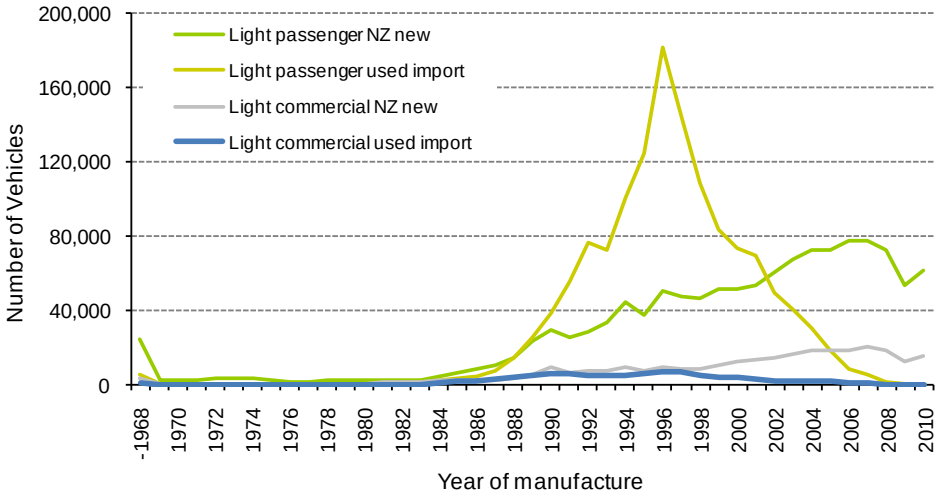
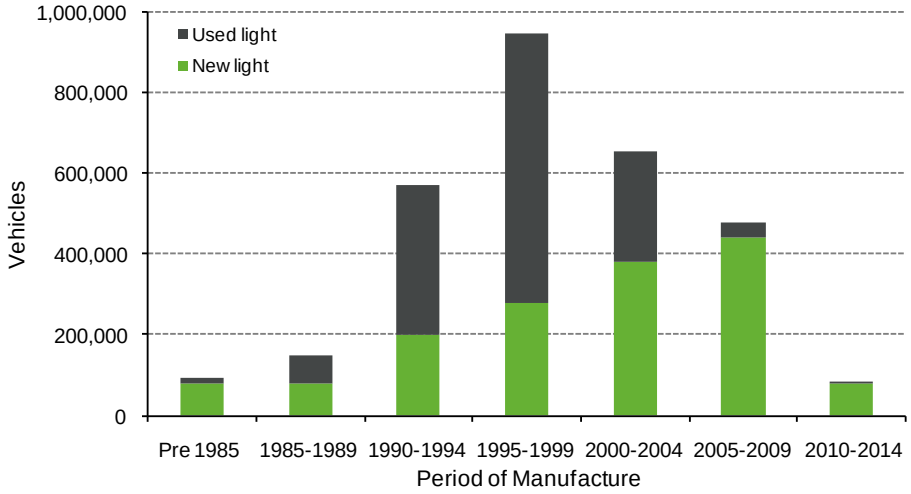


Figure 2.5b shows the relative numbers and ages of the vehicles in the light fleet in December 2010. There are many vehicles manufactured in the mid 1990s in the light fleet (also see Figure 2.5a, 2.11a and 2.11b).

Figure 2.5b : Light fleet composition Dec 2010



[8] http://www.nzta.govt.nz/resources/rules/frontal-impact-2001-index.html

There is a significant difference between the make-up of the light passenger and light commercial fleets. Light commercial vehicles are typically relatively young New Zealand-new vehicles, whereas the passenger fleet is more typically older used imports.

Figure 2.5c : Light passenger fleet compostion Dec 2010

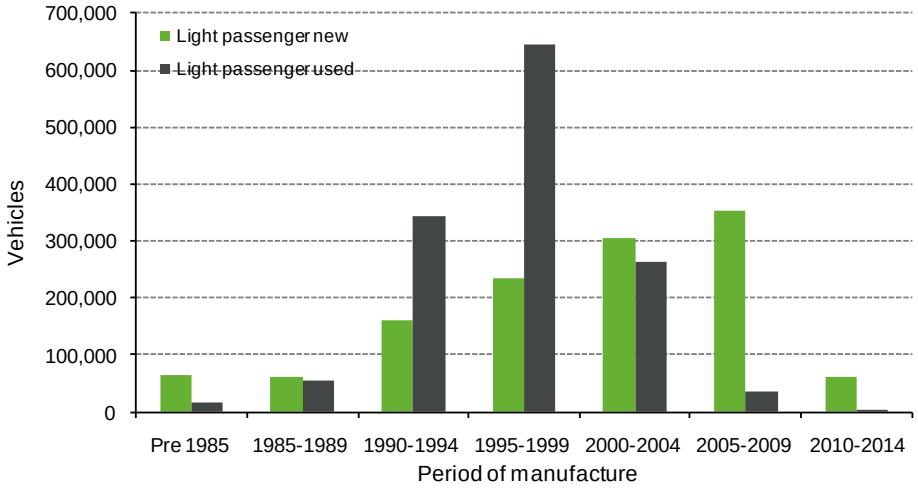
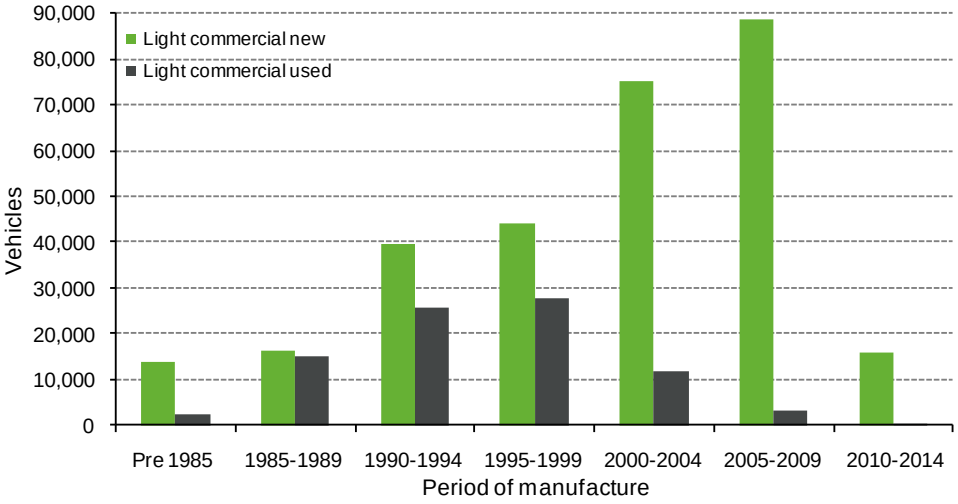


Figure 2.5d : Light commercial fleet compostion Dec 2010

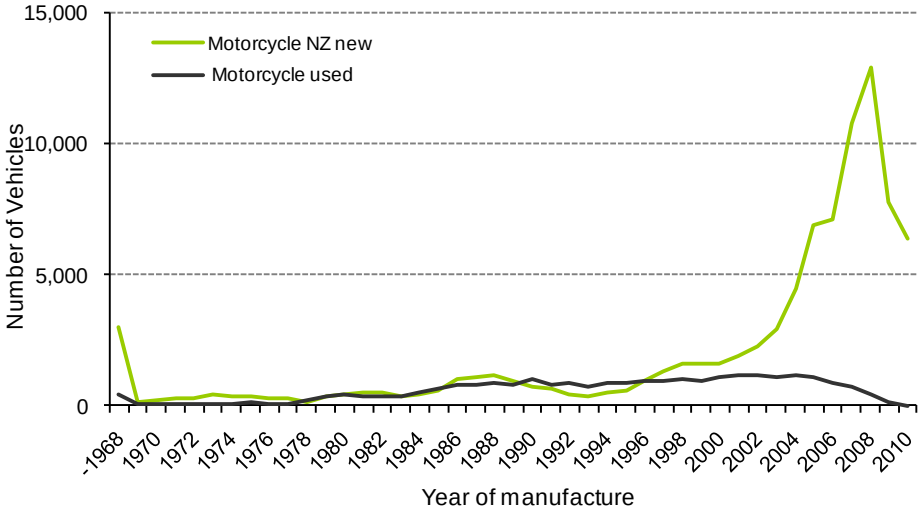


.

MOTORCYCLE AND MOPED YEAR OF MANUFACTURE

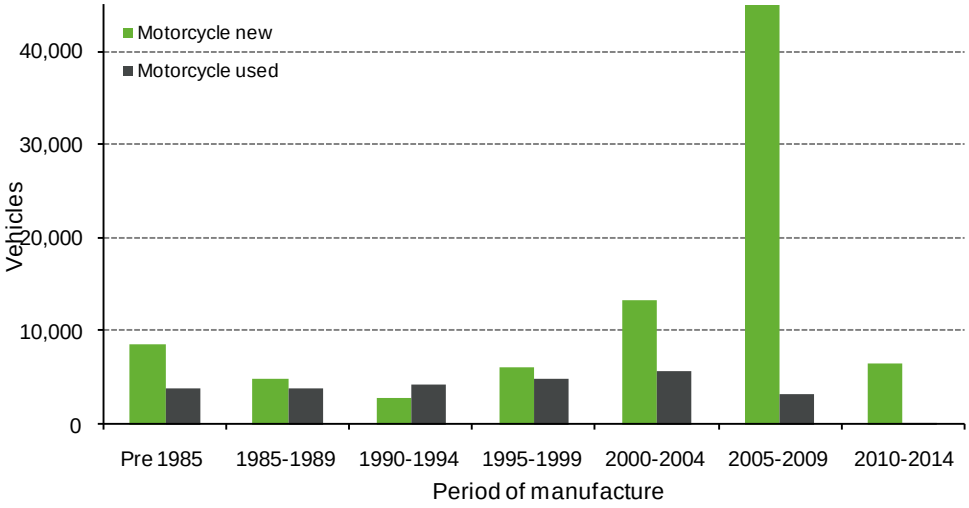
The motorcycle and moped fleet has been growing rapidly since 2004 (see Figure 1.2). The age structure shown in Figure 2.6a shows that registrations peaked in 2008, and that New Zealand-new machines predominated. Also see Figure 2.6b.

Figure 2.6a : Motor cycle year of manufacture Dec 2010



Motorcycles and mopeds have been typically purchased new in recent years, although there is a higher proportion of used imports among the older bikes.

Figure 2.6b : Motorcycle fleet compostion Dec 2010



TRUCK YEAR OF MANUFACTURE

The truck age structure shows the large numbers of 1990s used imports in that fleet. Also see Figure 2.7b.

The peaks in used vehicle models that were made in 1993 and 1996 reflects the effective banning of these vehicles in many Japanese cities for air quality reasons. Many owners chose to export their vehicles at the time of the bans. Imports of used diesel vehicles have been falling since 2005 as supplies in Japan have diminished.

Figure 2.7a : Truck year of manufacture Dec 2010

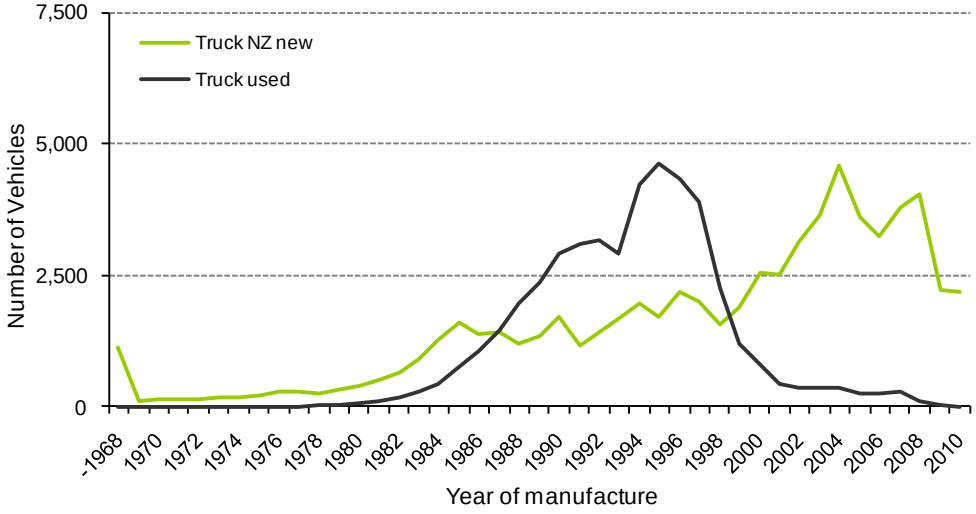
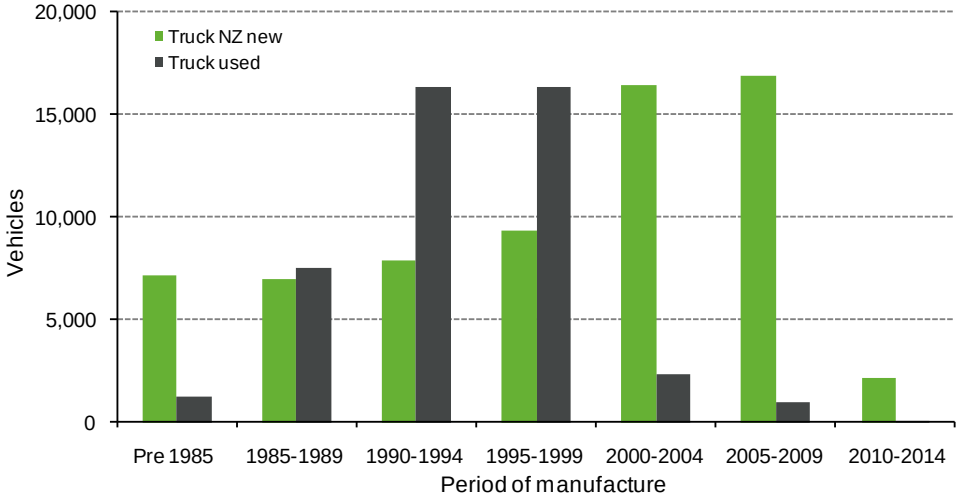


Figure 2.7b : Truck fleet composition Dec 2010



BUS YEAR OF MANUFACTURE

The bus fleet is different to the truck fleet. It has a larger proportion of used imported vehicles manufactured in late 1980s and early 1990s. There have been substantial purchases of new buses in recent years.

Figure 2.8a : Bus year of manufacture Dec 2010

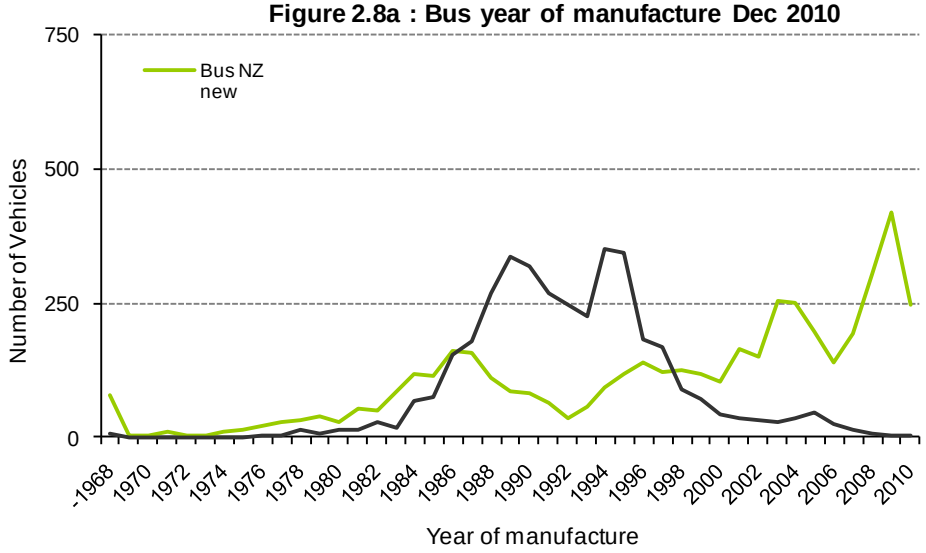
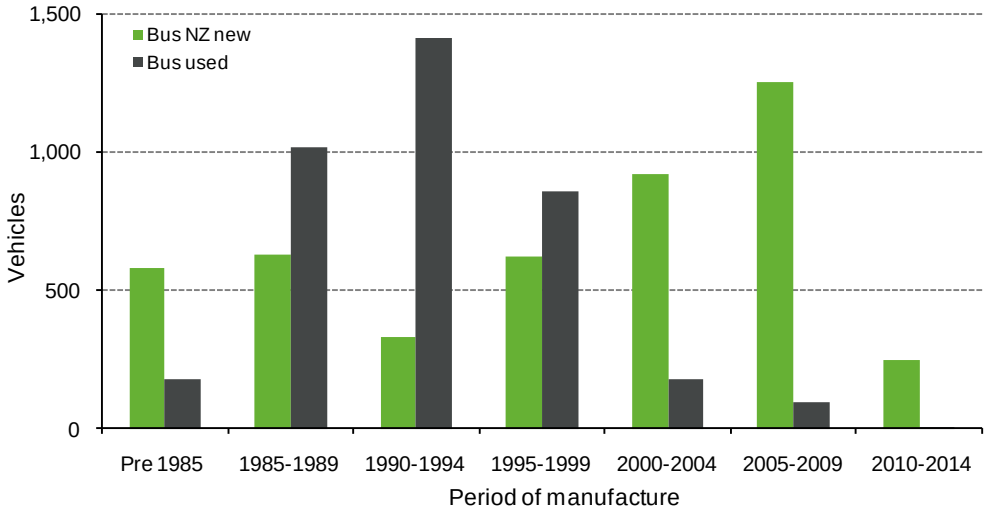


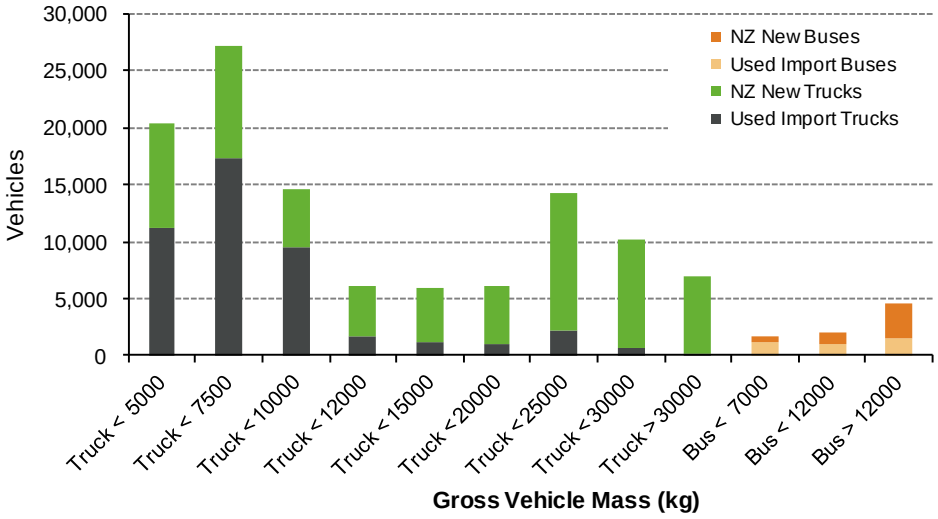
Figure 2.8b : Bus fleet composition Dec 2010



HEAVY FLEET GROSS VEHICLE MASS

The used imported vehicles in the heavy fleet are concentrated in the small to medium mass ranges.

Figure 2.9 : Heavy fleet mass Dec 2010



LIGHT FLEET AGE STRUCTURE

Figures 2.11a and 2.11b show how the age structure of the light fleet has changed since 2000. In 2000, 23.8 percent of the light fleet was 15 or more years old, but by 2010 this had increased to 33.2 percent. Vehicle replacement volumes dropped significantly in 2008, 2009 and 2010 and the effect can be seen in the levelling off of light fleet size (see Figure 2.11a) and increased proportion of older vehicles (see Figure 2.11b).

For this reason more vehicles will require replacement in the next five years than has been typical. Given the economic outlook and tightened availability of credit, it is likely that vehicles per capita will decline and the fleet size could drop.

Figure 2.11a : Light fleet age structure

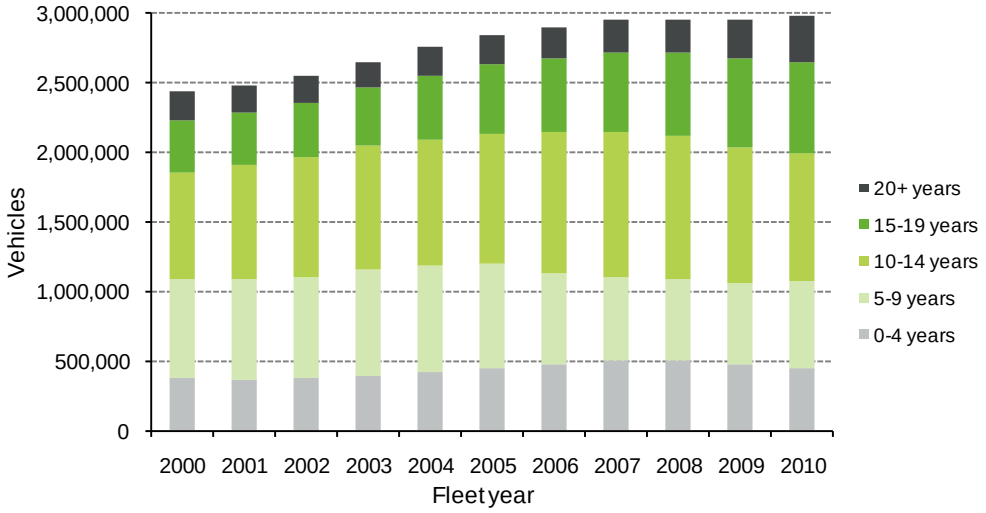
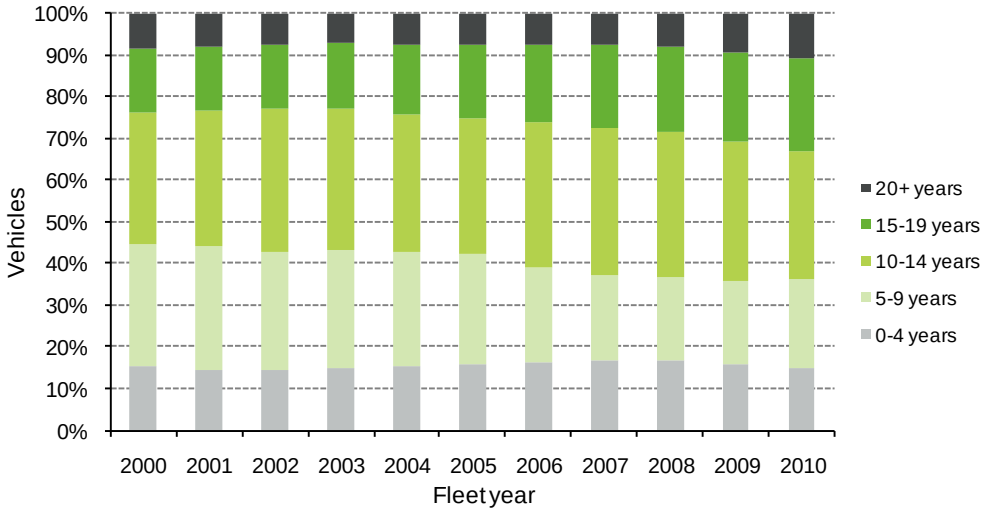


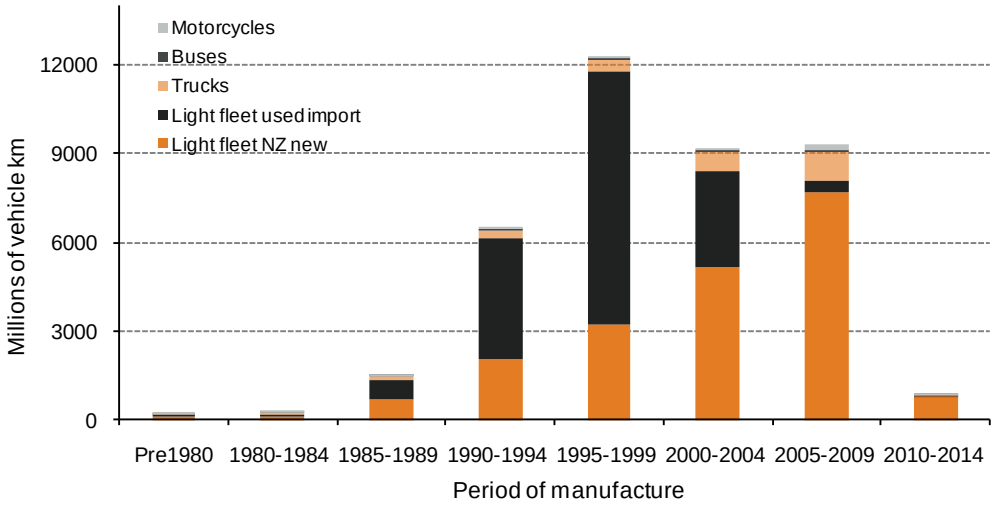
Figure 2.11b : Light fleet age structure



3. VEHICLE TRAVEL AND AGE

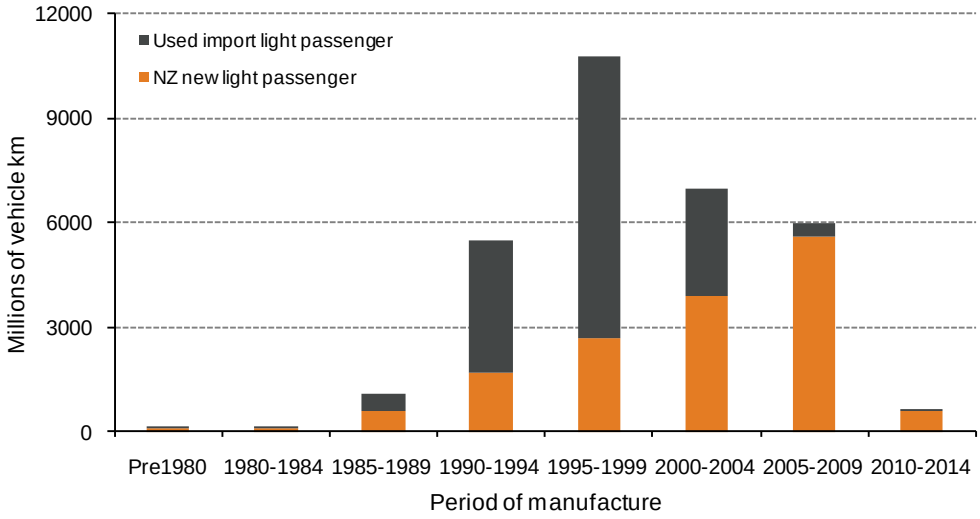
The breakdown of travel is illustrated below (Figure 3.1). A substantial proportion of travel is by light used imported vehicles manufactured during the 1990s (also see Figures 2.5b and 3.2a).

Figure 3.1 : Fleet travel in 2010



Light passenger vehicle travel makes up the majority of travel. A significant component of this travel is done by used imported vehicles manufactured during the 1990s.

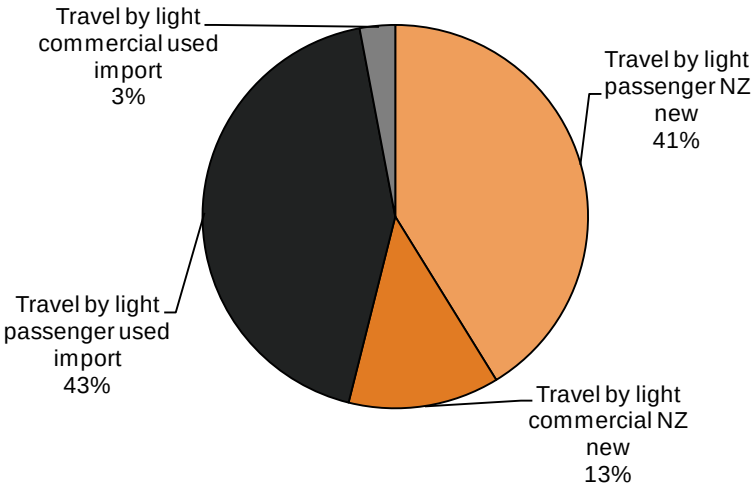
Figure 3.2a : Light passenger fleet travel in 2010



New Zealand-new light vehicles do more travel then the used imported light vehicles.

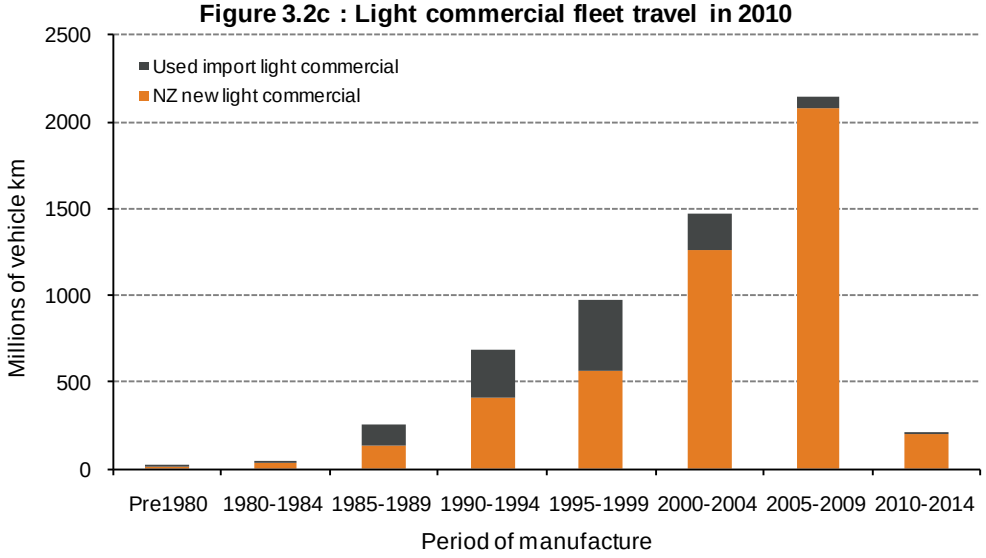
The New Zealand-new light commercials do substantially more travel the used import light commercials, whereas the used imported light passenger vehicles do slightly more travel than the New Zealand-new light passenger vehicles. (See Figure 3.2c for light commercial fleet travel and see Figure 3.1 for a breakdown of total travel by vehicle age).

Figure 3.2b : Light private fleet travel 2010



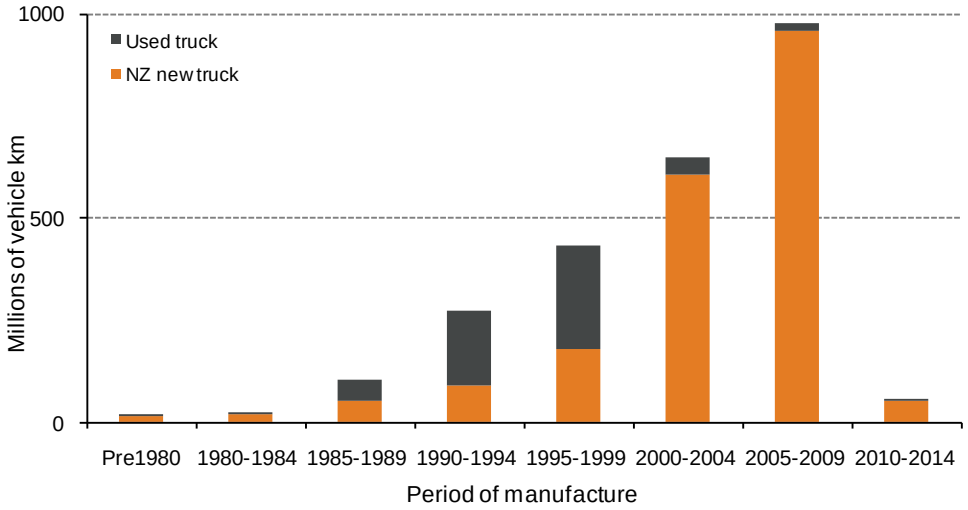
Light commercial travel shows a different pattern – a far higher proportion of travel is done by recently purchased New Zealand-new vehicles (also see Figure 2.5c).

Figure 3.2c : Light commercial fleet travel in 2010



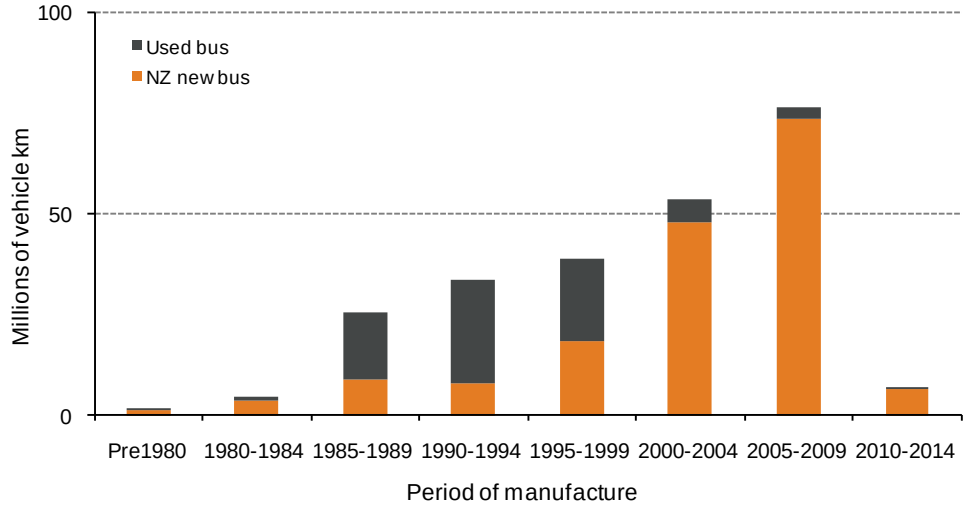
About half of truck travel is by New Zealand-new vehicles that have been recently manufactured.

Figure 3.2d : Truck travel in 2010



There is a substantial amount of bus travel done by vehicles manufactured in the 1980s and 1990s.

Figure 3.2e : Bus travel in 2010



AVERAGE VEHICLE TRAVEL BY VEHICLE AGE

There is a clear relationship between vehicle age and travel — older vehicles travel less. The patterns of used and new light vehicle travel also vary with vehicle age.

There is a difference in travel patterns between light commercial and light passenger vehicles. Light commercial vehicles travel more per vehicle than the passenger vehicles until they reach an age of about 15 years, after which they are similar.

Travel of vehicles manufactured in 2010 appears low, as on average they were only in the fleet for 6 months of 2010.

Figure 3.4a : Light travel per vehicle in 2010

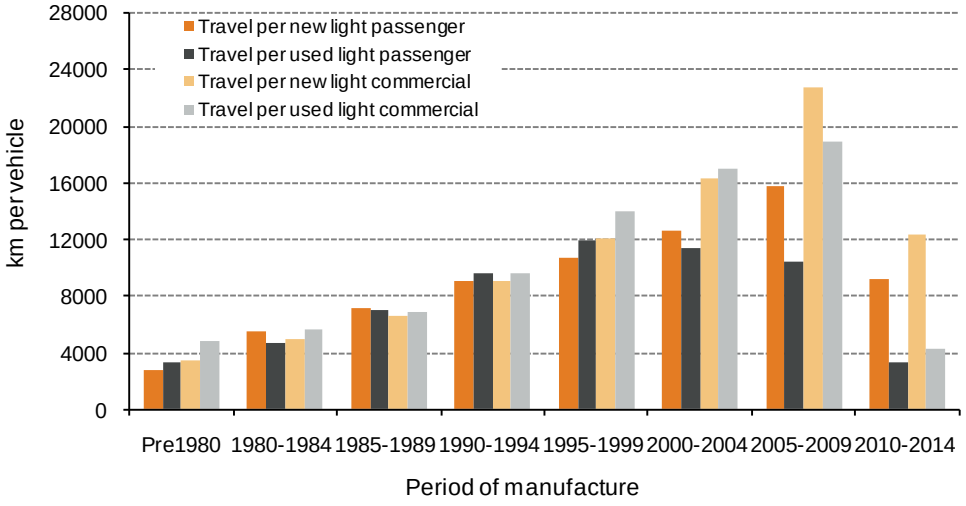
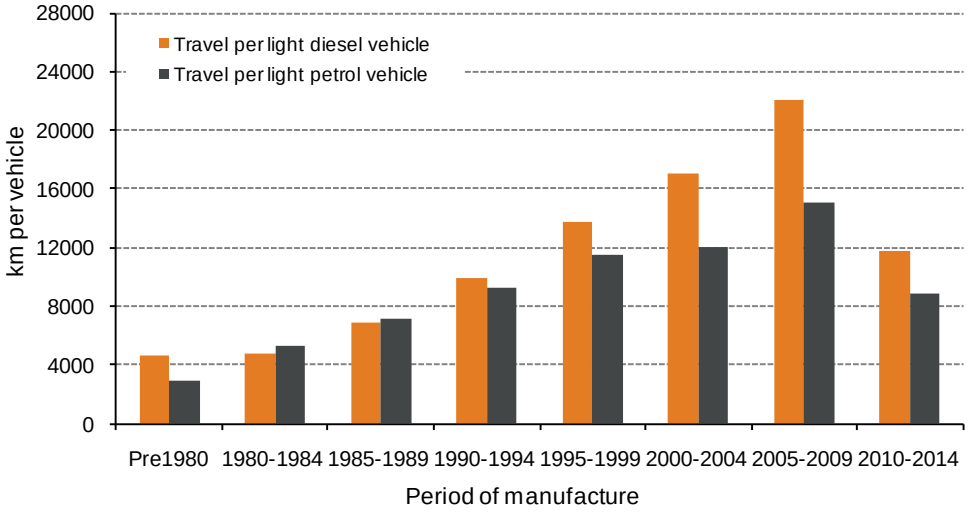


Figure 3.4b : Light petrol and diesel travel per vehicle in 2010



Figures 3.4c and 3.4d show that buses typically travel further than trucks per year, and both travel more than light vehicles. However total travel by heavy vehicles is much less than that by light vehicles (see Figures 3.4c, 3.4d and 3.4e).

Travel of vehicles manufactured in 2010 appears low, as on average they were only in the fleet for 6 months of 2010.

Figure 3.4c : Truck travel per vehicle in 2010

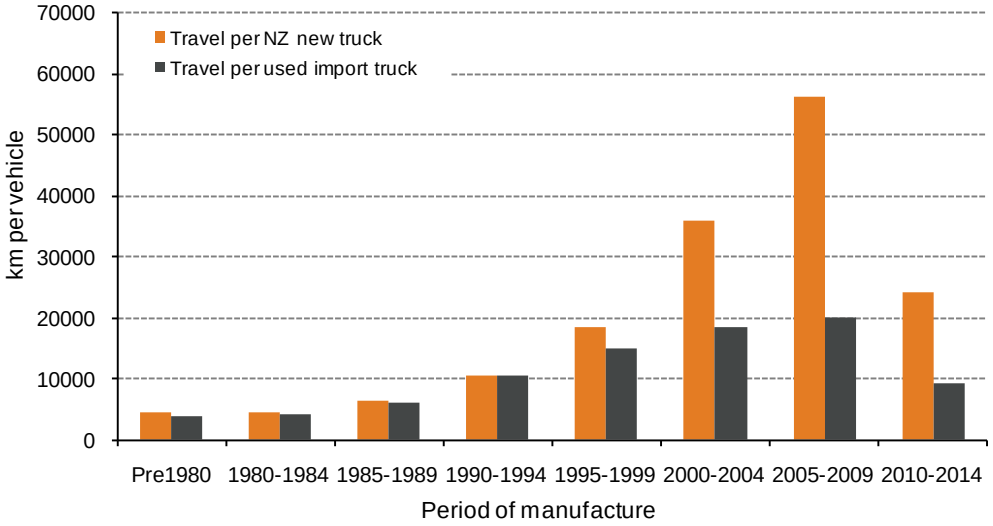
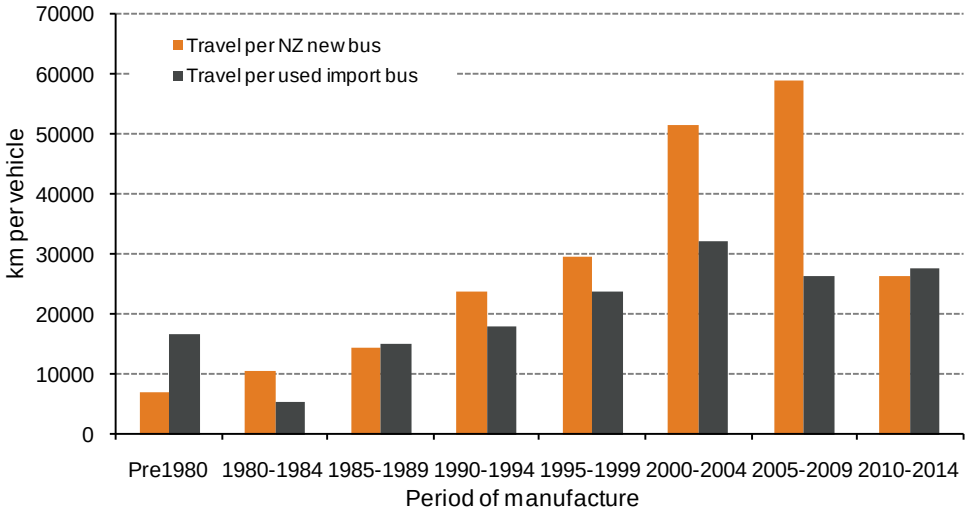
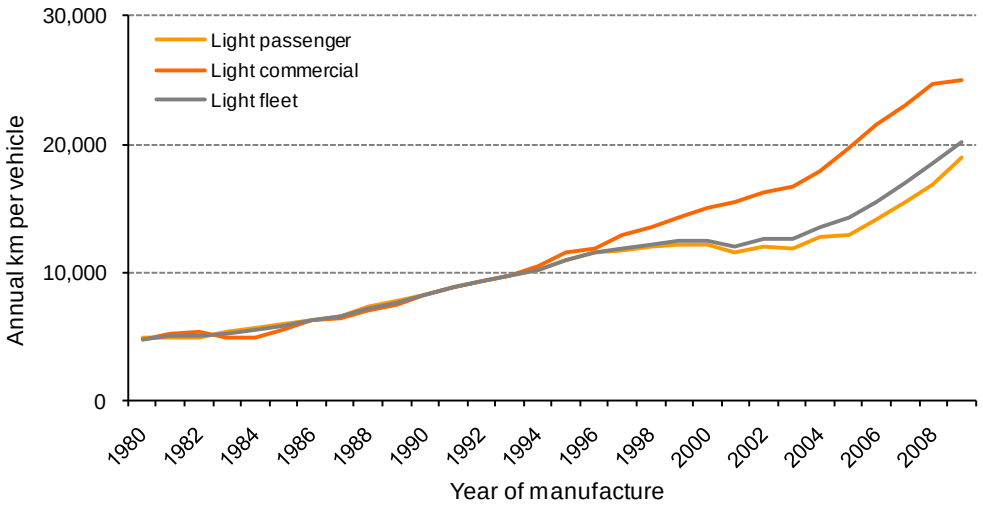


Figure 3.4d : Bus travel per vehicle in 2010



Light commercial vehicles typically travel more than light passenger vehicles early in their life. This effect starts to diminish when the vehicles are about 8 years old, and has largely disappeared by the time they are 15 years old.

Figure 3.5 Light fleet average travel in 2010, by vehicle age



4. LIGHT FLEET ENGINE CAPACITY TRENDS

The steady month-on-month increase in average vehicle engine capacity in the light fleet this decade has slowed in recent years. These graphs show the averages for the vehicles in the fleet, as at January 2000 through to December 2010.

The New Zealand-new component of the fleet has a significantly larger average engine capacity than the used imported component. This is mainly due to Australian-made vehicles imported new into New Zealand. There has been a tailing off in growth since 2006.

The trends in diesel and petrol engine capacities are quite different, as shown in Figure 4.1b. The capacity of New Zealand-new petrol vehicles within the fleet shows the greatest level of increase, and is still maintaining a slight upward trend. The average diesel engine is significantly larger than the average petrol engine, but growth has tailed off.

New Zealand did not record fuel consumption data on the vehicle register before 2005. Therefore, we are forced to use engine capacity as a proxy for fuel consumption, but it does not take improvements in engine efficiency into account, or other factors such as weight gain.

Figure 4.1a : Light fleet average engine capacity

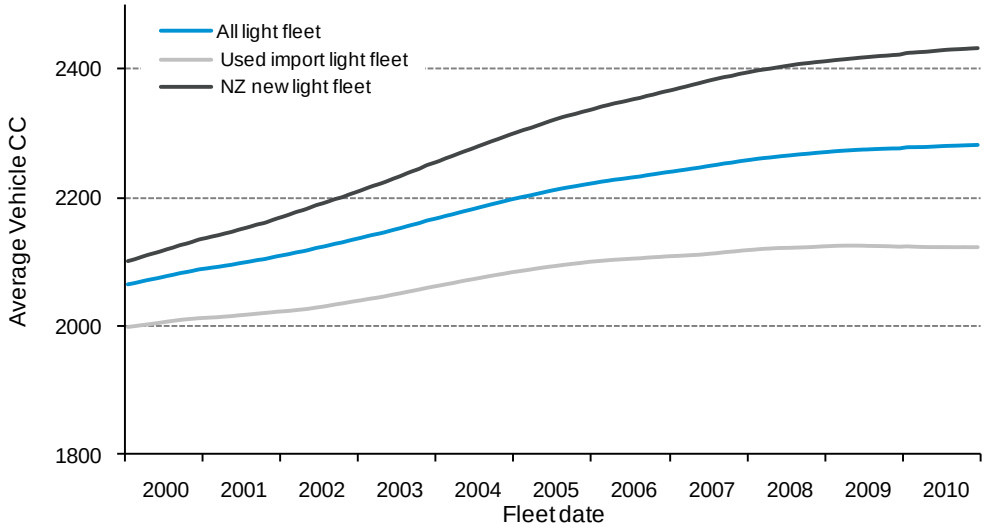
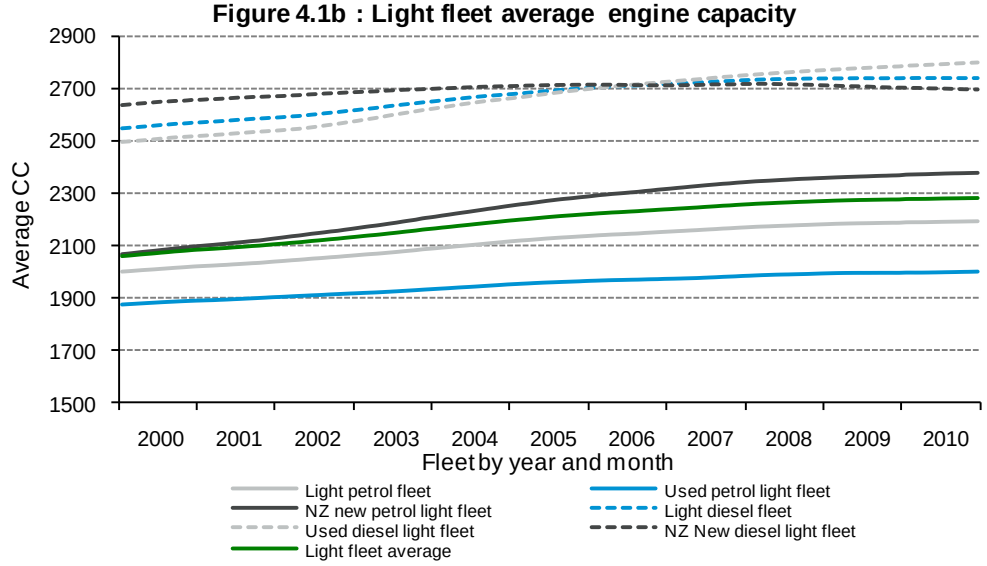
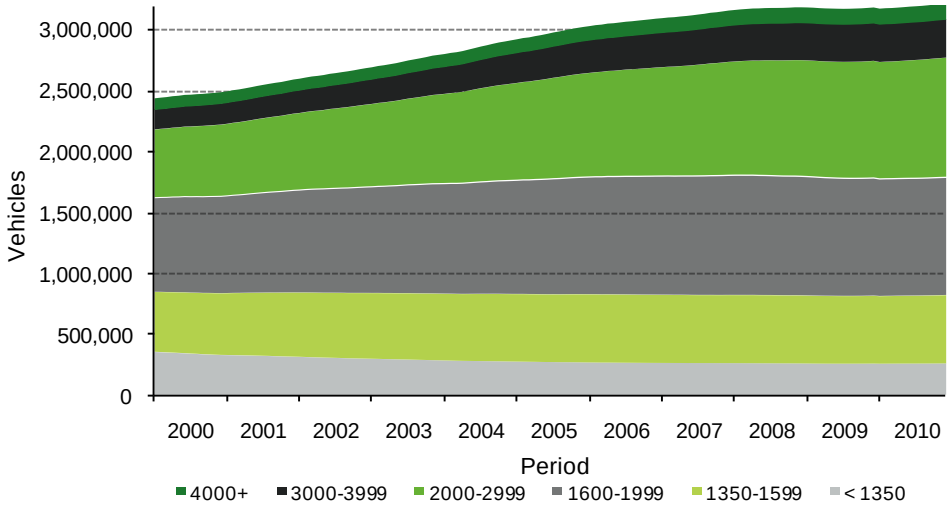


Figure 4.1b : Light fleet average engine capacity



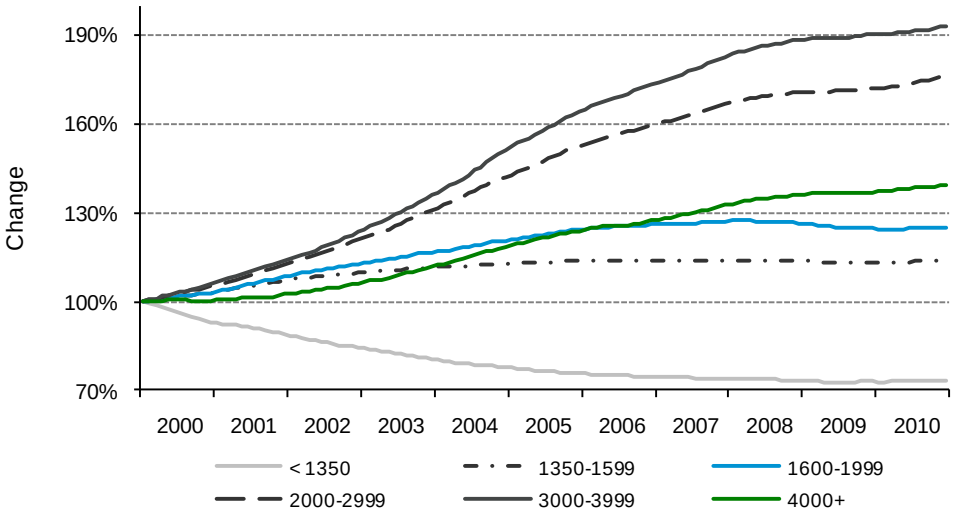
The mix of engine sizes in the light fleet has been changing. The smallest class of vehicles (under 1350cc) has been declining and there has been significant growth in the 1600–1999cc and 2000–2999cc classes.

Figure 4.2a : Light fleet engine size trend



The engine size class showing the greatest rate of growth is 3000–3999cc, but the number of these vehicles is relatively low. The 2000-2999cc class has shown the most growth in terms of numbers of vehicles.

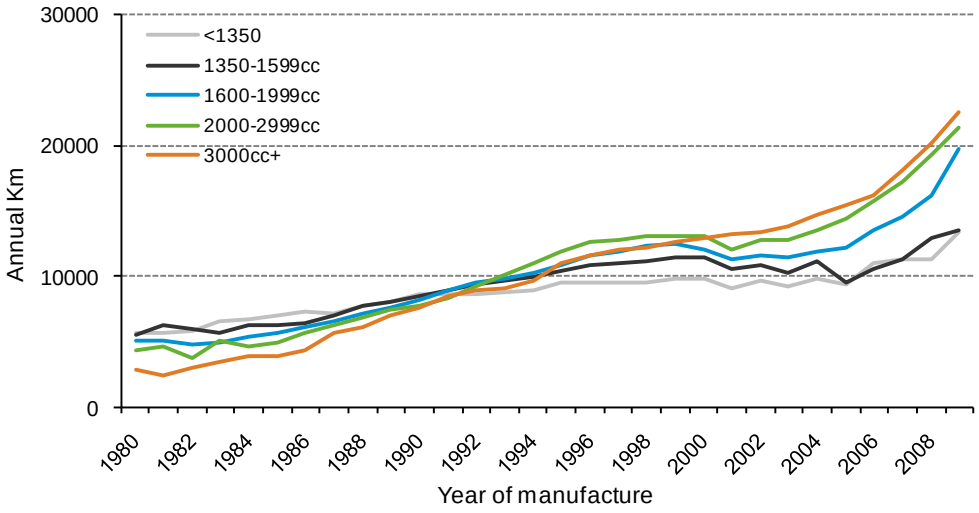
Figure 4.2b : Light fleet engine size trend, relative to Jan 2000



LIGHT FLEET TRAVEL BY ENGINE CAPACITY AND AGE

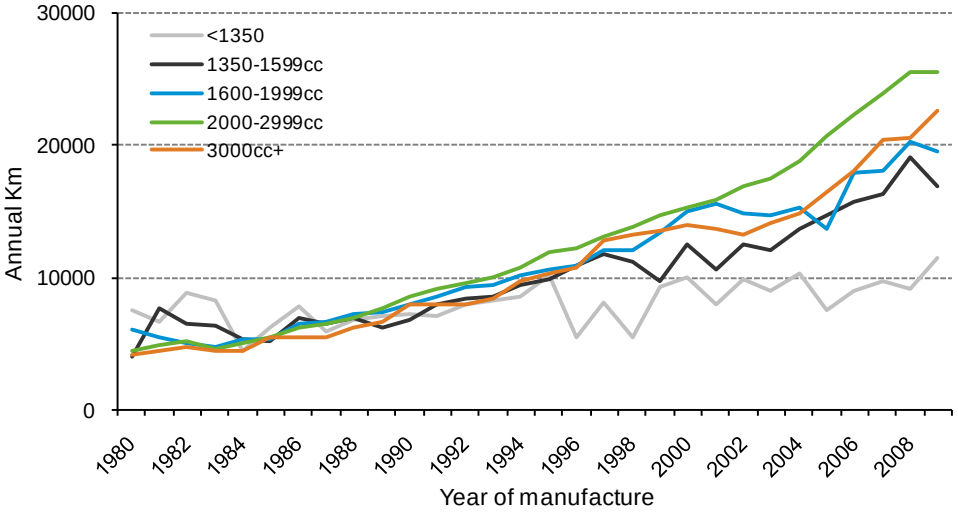
Smaller-engined vehicles do less annual travel than other vehicles, and vehicles with the largest engines travel more than other vehicles early in their life.

Figure 4.3a : Light passenger average travel 2010



The pattern for light commercial vehicles is similar to that for light passenger vehicles, although the amount of travel is far higher. Again, the vehicles with the largest engines do the most travel per vehicle early in their life.

Figure 4.3b : Light commercial average travel 2010



LIGHT FLEET TRAVEL TREND BY ENGINE CAPACITY

Table 1 provides a different view of travel and engine capacity. The proportion of travel done by vehicles with engine sizes of 2000cc or more has been growing significantly, as the typical engine has become larger.

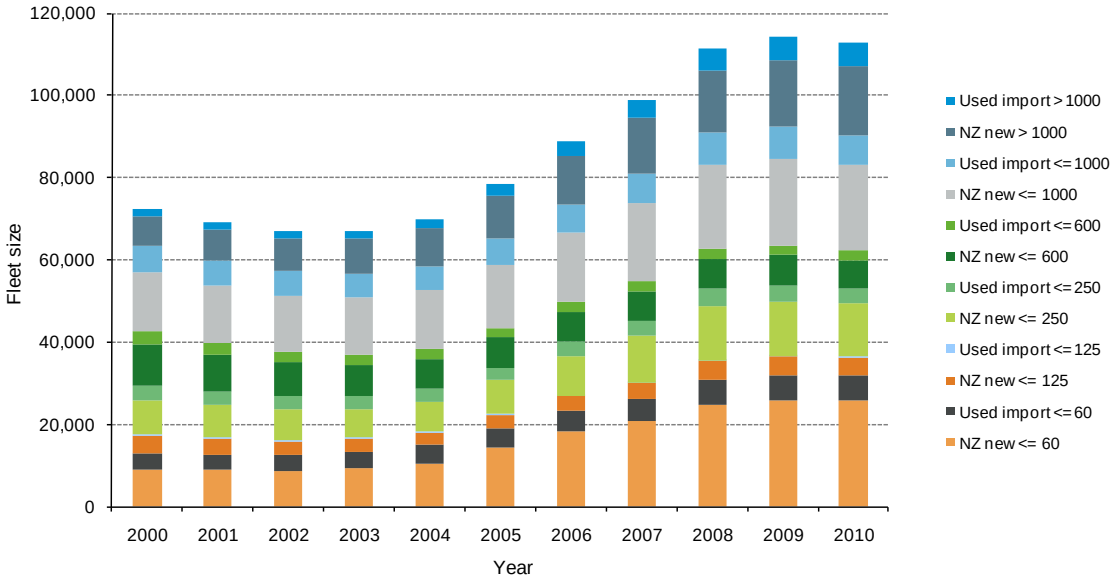
Table 1 Light Fleet travel (millions VKT[9])

Period	Engines under 2000cc	Engines 2000+ cc	Travel by vehicles 2000+ cc
2001	19,937	12,666	39%
2002	20,264	13,587	40%
2003	20,404	14,658	42%
2004	20,293	15,859	44%
2005	19,878	16,636	46%
2006	19,390	17,060	47%
2007	19,260	17,774	48%
2008	18,720	17,793	49%
2009	18,677	17,992	49%
2010	18,761	18,086	49%

MOTORCYCLE AND MOPED FLEET COMPOSITION

The motorcycle and moped fleet has been growing since 2004. The growth categories are concentrated at the extremes of the fleet – the under 60cc, under 250cc and over 1000cc groupings have been growing the most.

Figure 4.4 : Motorcycle fleet composition

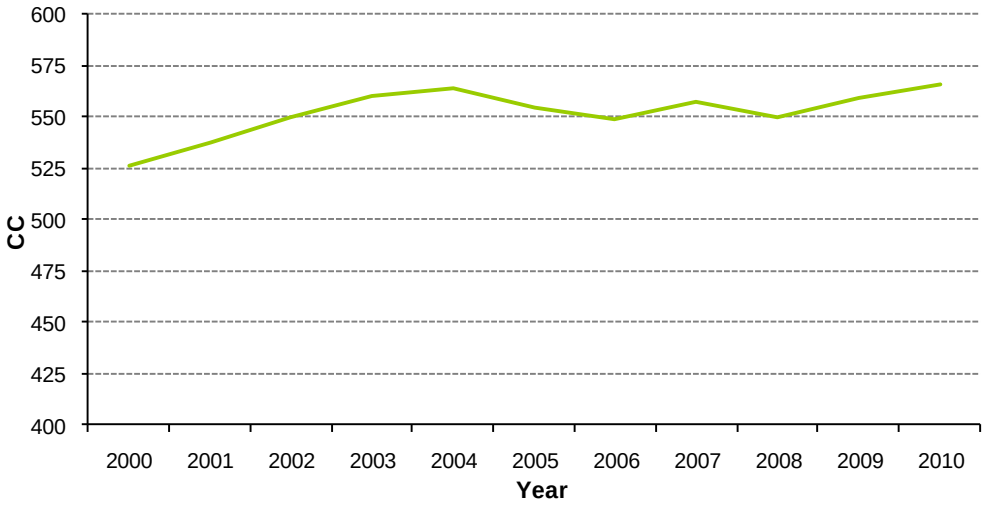


[9] Vehicle Kilometres Travelled.

MOTORCYCLE AND MOPED FLEET AVERAGE ENGINE CAPACITY

The growth in the under 60cc sector could have been expected to reduce the average engine capacity of the fleet, but in fact the impact is quite minor because of the growth in sales of machines with very large engines. Figure 4.5 shows the average engine capacity is still above 550cc (see Figure 4.4 for a detailed breakdown of the fleet composition).

Figure 4.5 : Motorcycle/moped fleet average CC

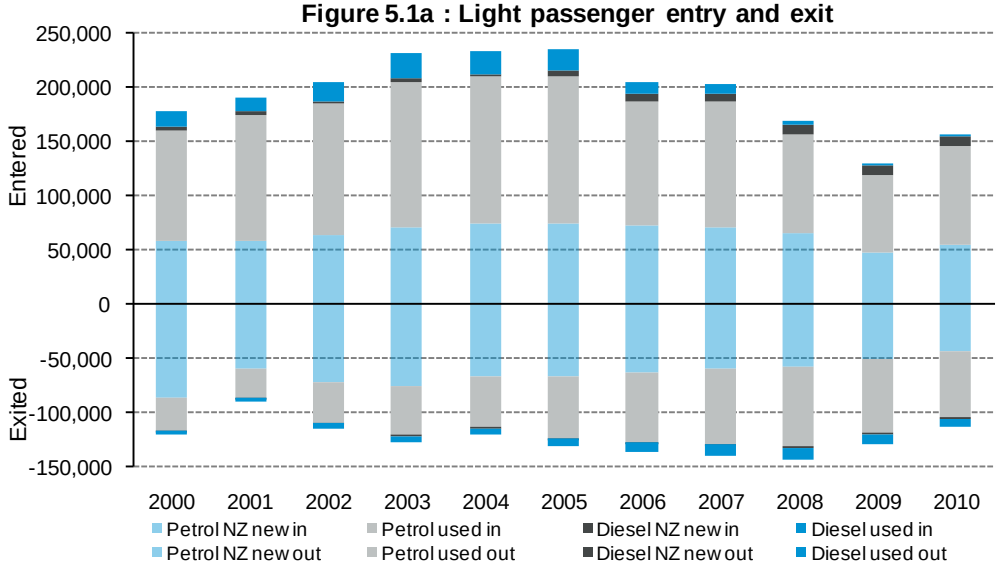


5. VEHICLES ENTERING AND EXITING THE FLEET

Figures 5.1a to 5.1e show the mix of vehicles that entered and exited the fleet between 2000 and 2010. The bars above zero on the vertical axis show vehicles entering the fleet, and the bars below zero show vehicles that exited.

One notable effect is that the number of vehicles entering the light passenger fleet has dropped in recent years, while the number exiting that fleet has increased. In 2009 the fleet shrank slightly as scrappage exceeded new registrations. However, in 2010 registrations were up and scrappage was very low, resulting in a slight increase in the size of the fleet. More used imports are now being scrapped from the light passenger fleet than New Zealand-new vehicles. This reflects the vehicle mix that entered the fleet during the 1990s.

Figure 5.1a : Light passenger entry and exit



Comparing the light commercial fleet with the light passenger fleet highlights that there are very few diesel-powered vehicles entering the passenger fleet. A high proportion of the vehicles entering the light commercial fleet are diesel powered.

Figure 5.1b : Light commercial entry and exit

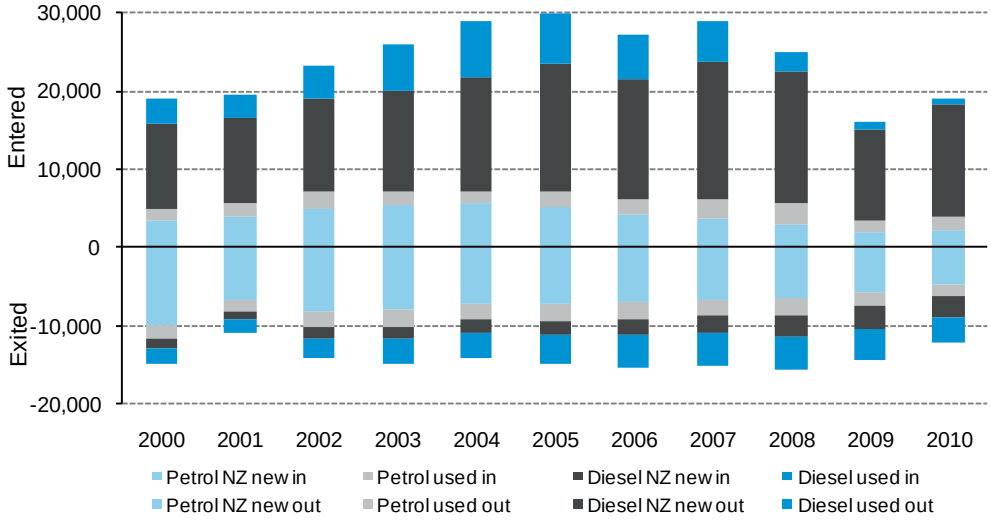
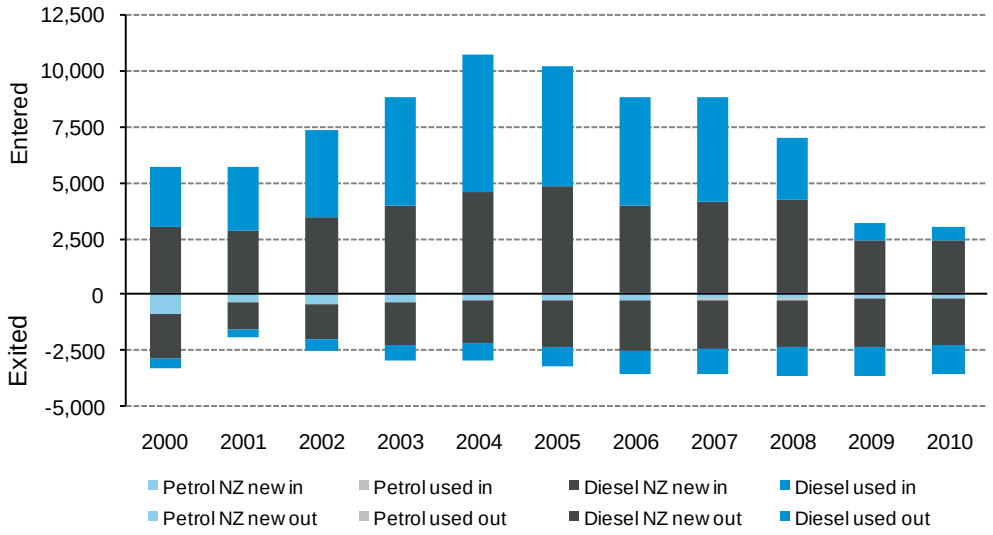


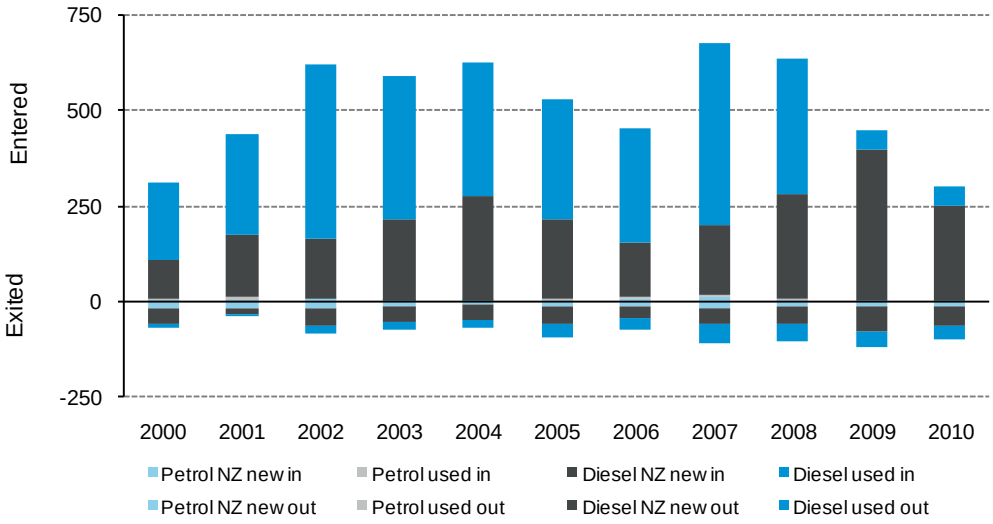
Figure 2.9 showed that truck used imports are typically lighter weight vehicles. Most of the used import trucks shown in Figure 5.1c have a gross vehicle mass under 10 tonnes (also see Figure 2.9).

Figure 5.1c : Truck entry and exit



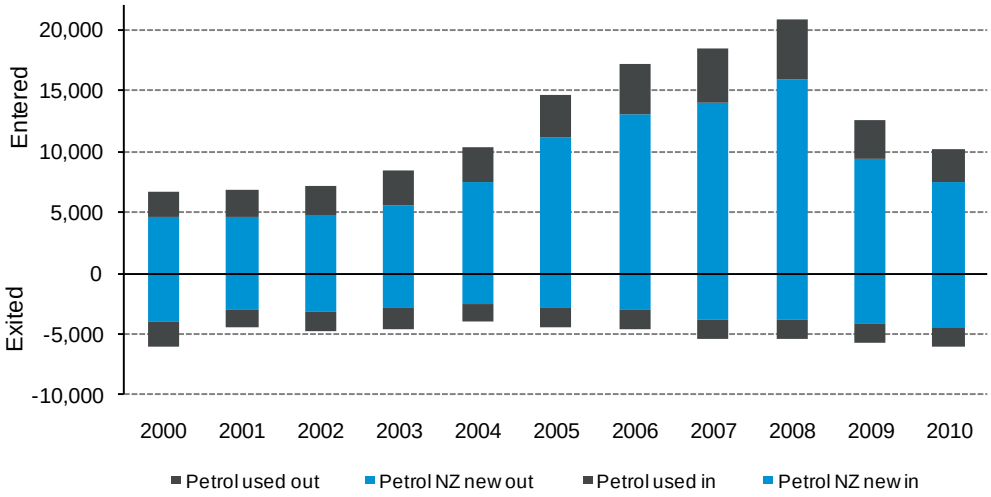
The bus fleet has been expanding (the vehicles entering far exceed the vehicles exiting). The majority of the buses entering the fleet were relatively old used imports until the Vehicle Exhaust Emissions Rule precluded such imports in January 2008.

Figure 5.1d : Bus entry and exit



The motorcycle and moped fleet has also been growing in recent years (also see Figure 1.2). Growth picked up in 2004 but has declined during the economic downturn.

Figure 5.1e : Motorcycle entry and exit

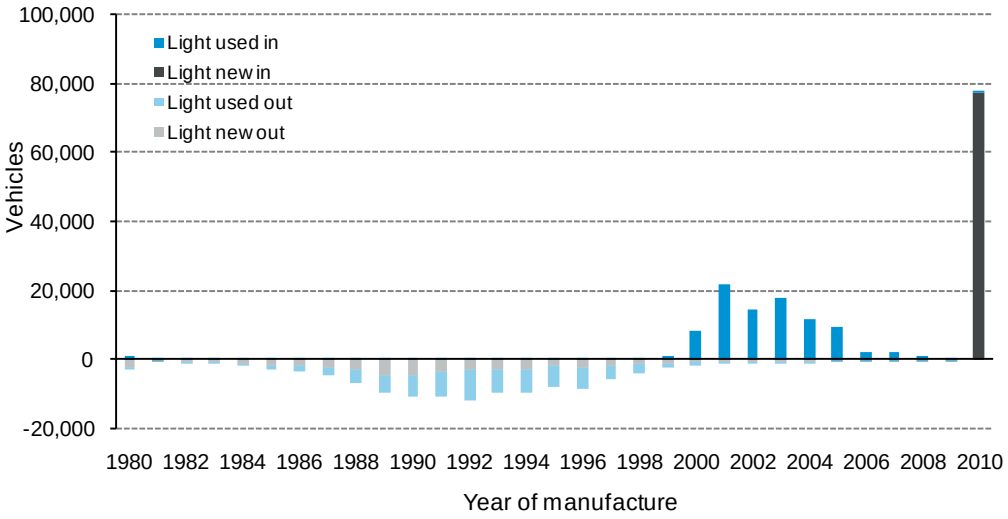


YEAR OF MANUFACTURE OF VEHICLES ENTERING AND LEAVING THE FLEET

Figures 5.2a to 5.2d show the year of manufacture of vehicles that entered and left the New Zealand light fleet in 2010. Virtually all of the new vehicles were manufactured in 2010. Figure 5.2a shows that more used light vehicles manufactured in 2001 entered the light fleet than any other age. Also see Figures 2.4 and 2.5a.

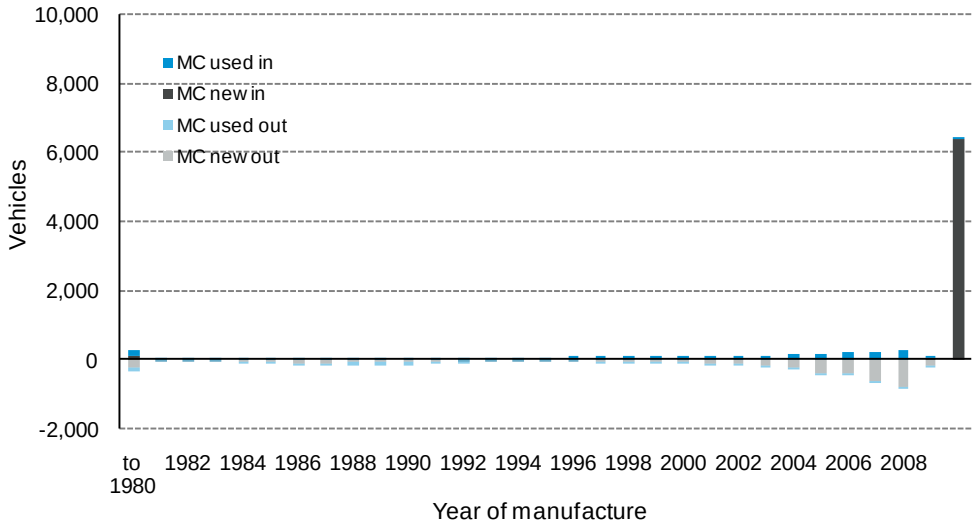
It can also be seen that used vehicles leave the fleet slightly earlier than New Zealand-new vehicles.

Figure 5.2a : Light vehicles entering or leaving the fleet in 2010



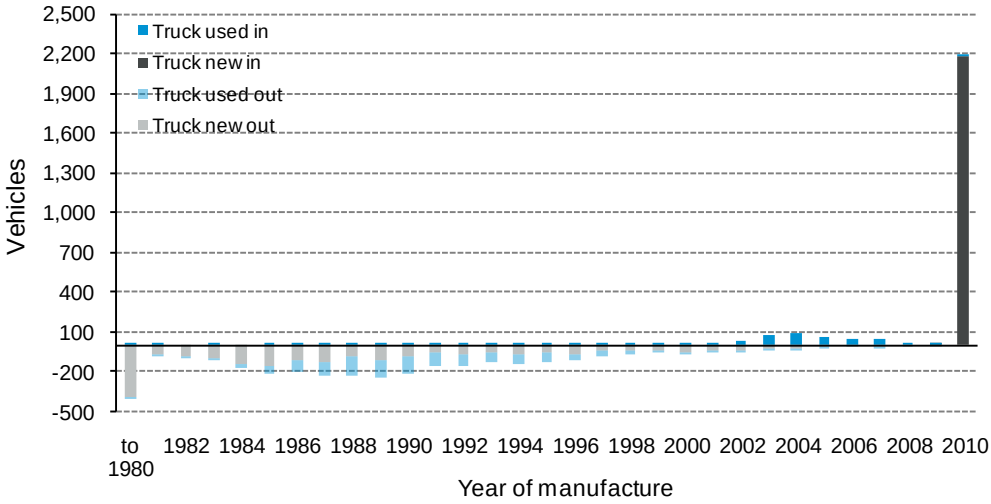
The scrappage of near-new motorcycles reflects the risk and severity of motorcycle crashes.

Figure 5.2b : Motorcycles entering or leaving the fleet in 2010



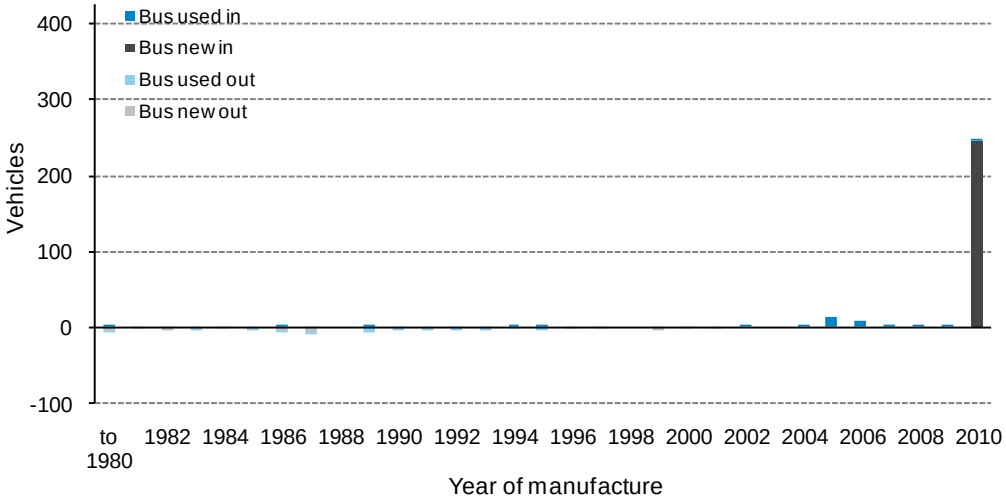
For used truck imports entering the fleet in 2010, the peak year of manufacture was 2004.

Figure 5.2c : Trucks entering or leaving the fleet in 2010



For used bus imports entering the fleet in 2009, the peak year of manufacture was 2005. Bus scrappage is very low, which may be influenced by vehicles eventually being converted into mobile homes.

Figure 5.2d : Buses entering or leaving the fleet in 2010



ENGINE SIZE OF VEHICLES ENTERING AND LEAVING THE LIGHT FLEET

The detailed breakdowns in Figure 5.3 show the patterns of light fleet entry and exit in 2010. There are several trends in vehicle engine size growth:

- The 1500–1749 and 2000–2499 petrol classes are reducing.
- The 1250–1499 and 2250–2499 petrol classes are increasing.
- While there are substantial numbers of 2500–2999cc diesels entering the fleet, there has also been a relative increase in the number of smaller-engined diesels.

Figure 5.3 : Petrol vehicles entering/leaving the light fleet 2010

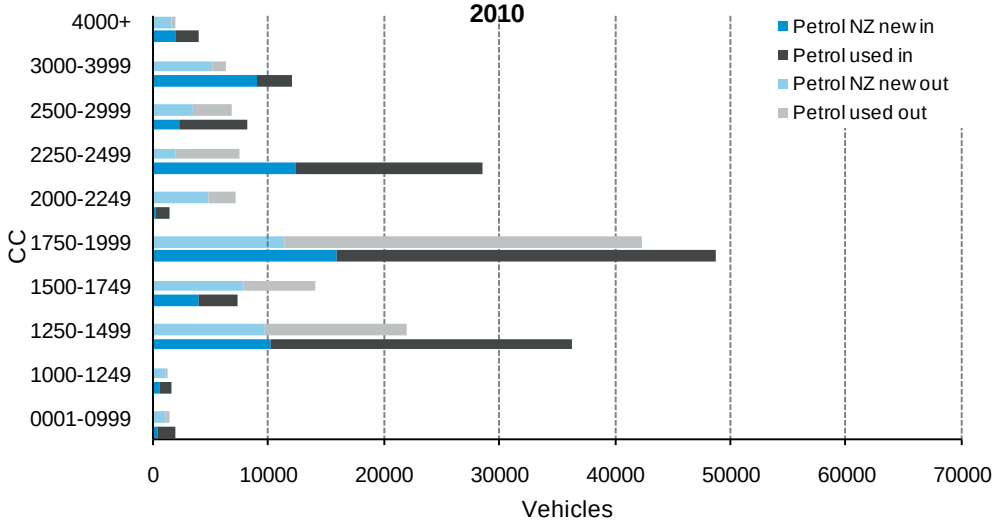
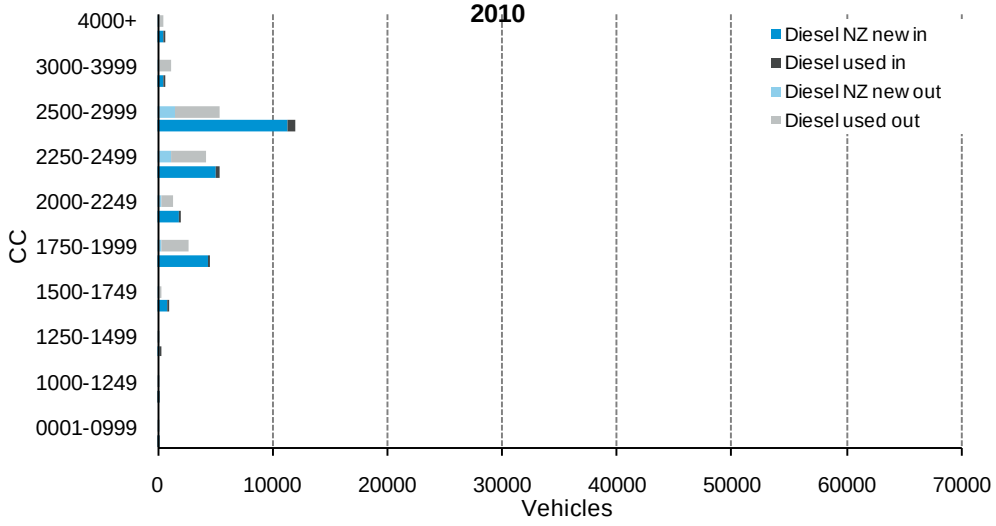


Figure 5.3 : Diesel vehicles entering/leaving the light fleet 2010



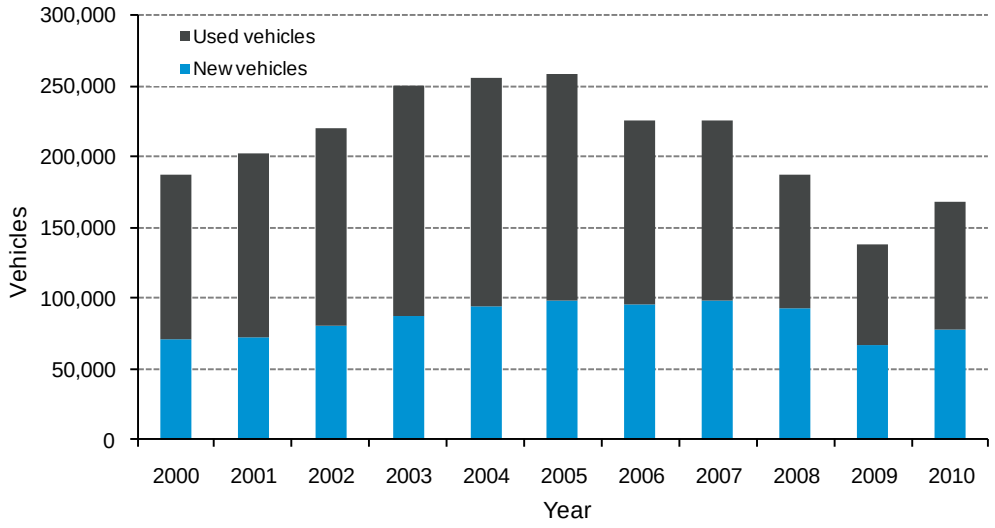
6. VEHICLES ENTERING THE FLEET

The number of light used imports registered peaked in 2003 and 2004, and then continued to drop until 2010.

Only low scrappage levels (see Figure 5.1a) have prevented the fleet size from dropping.

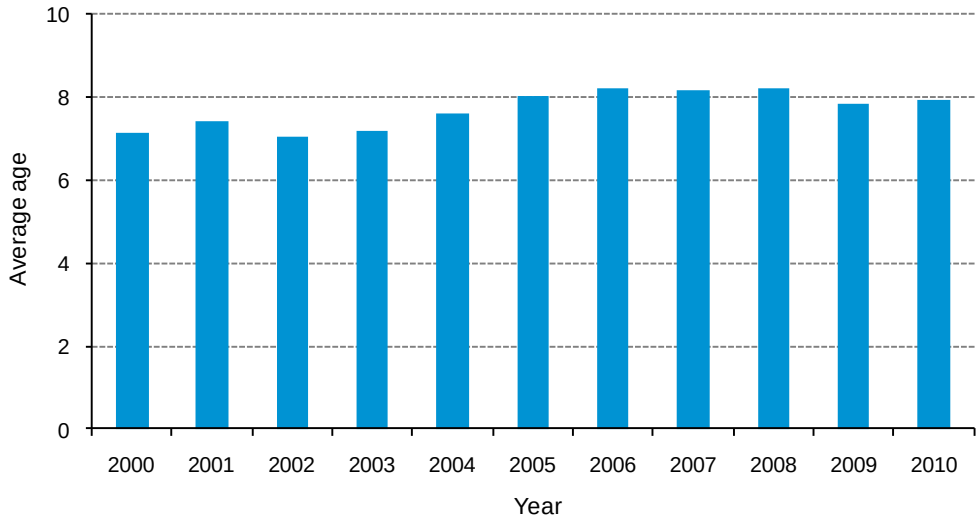
Since 2000, other countries have imported greater volumes of used vehicles from Japan[10]. This increased competition has raised the prices in Japan, and is one of the factors in the reduction in imports. The recent reduction in the number of finance companies is also thought to be affecting the ability of buyers to purchase vehicles.

Figure 6.1 : Number of vehicles entering the light fleet



The average age of used imported vehicles entering the light fleet was rising, but this trend ceased in 2008. The change is a consequence of the Vehicle Exhaust Emissions Rule which took effect in January 2008.

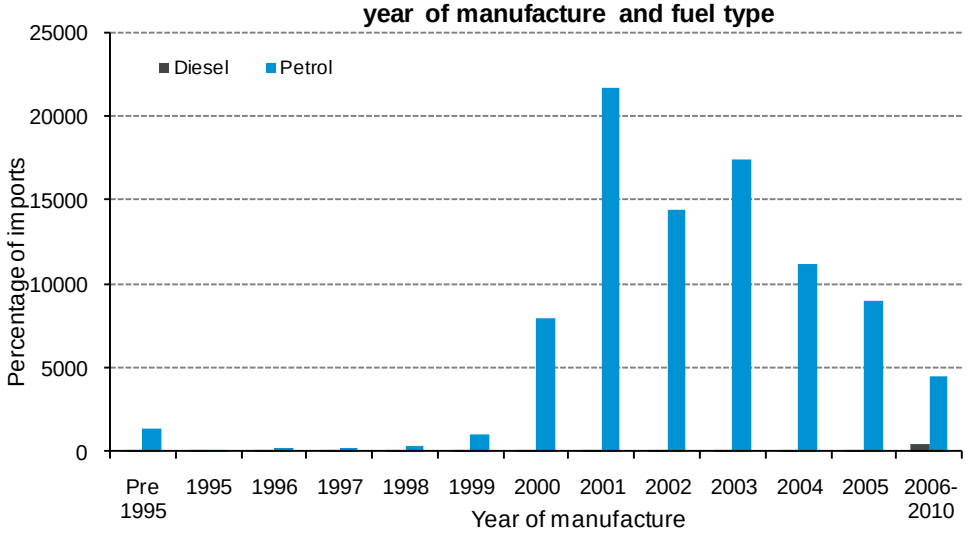
Figure 6.2a : Average age of light used imports entering the fleet



[10] Information sourced from Japanese Customs statistics by JEVIC (Japan Export Vehicle Inspection Center) and translated into English, then supplied to the Ministry of Transport.

A breakdown of the 2010 used light vehicle imports by age and fuel type shows they were overwhelmingly petrol powered, and that very few were 10 or more years old.

Figure 6.2b : Used imports entering the light fleet in 2010, year of manufacture and fuel type



The average age of used trucks and buses entering the fleet has dropped substantially, following the introduction of the Vehicle Exhaust Emissions Rule which took effect in January 2008.

Figure 6.2c : Average age of heavy used imports entering the fleet

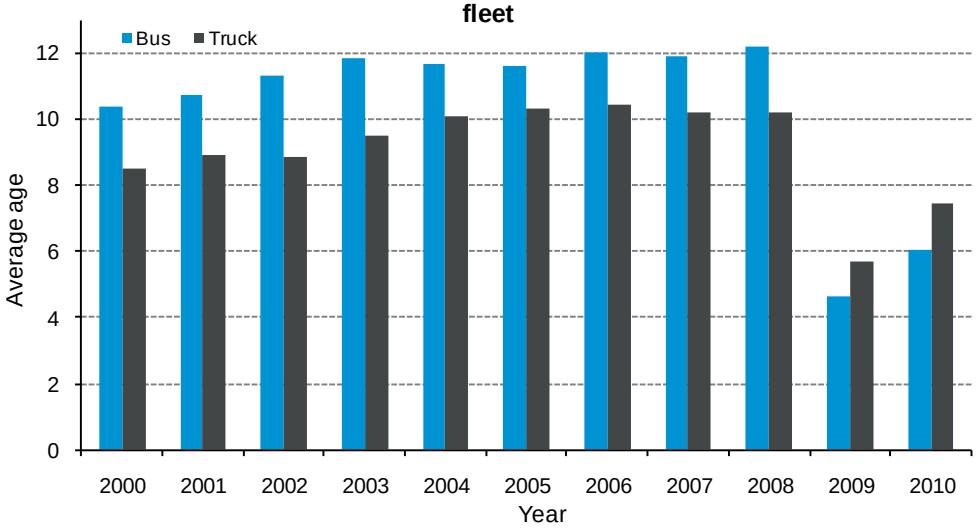
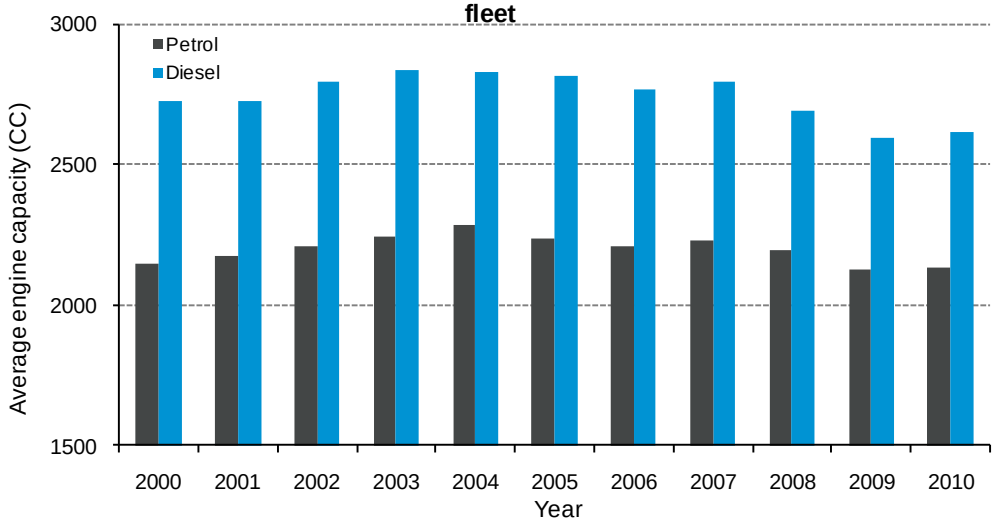


Figure 6.3 shows the average engine capacity of vehicles entering the light fleet was increasing until 2004. Figure 4.1a shows the average of all the vehicles in the light fleet.

The average engine size of entrants has decreased since 2004, however the average engine capacity of the light fleet continues to increase as the vehicles entering the fleet have larger engines than those exiting.

Figure 6.3 : Average engine size of vehicles entering the light fleet



USED IMPORT VERSUS NEW ZEALAND-NEW ENGINE CAPACITY MIX

Figure 6.4a shows the engine size mix of the used imports entering the light fleet is different to that of New Zealand-new vehicles. There are relatively more smaller-engined used imported vehicles than New Zealand-new. Figure 5.3 provides a more detailed breakdown. It shows both entry and exit, and splits petrol and diesel. There are versions of these graphs for each year in the fleet statistics spreadsheet.

Figure 6.4a : Engine size of used imports entering the light fleet

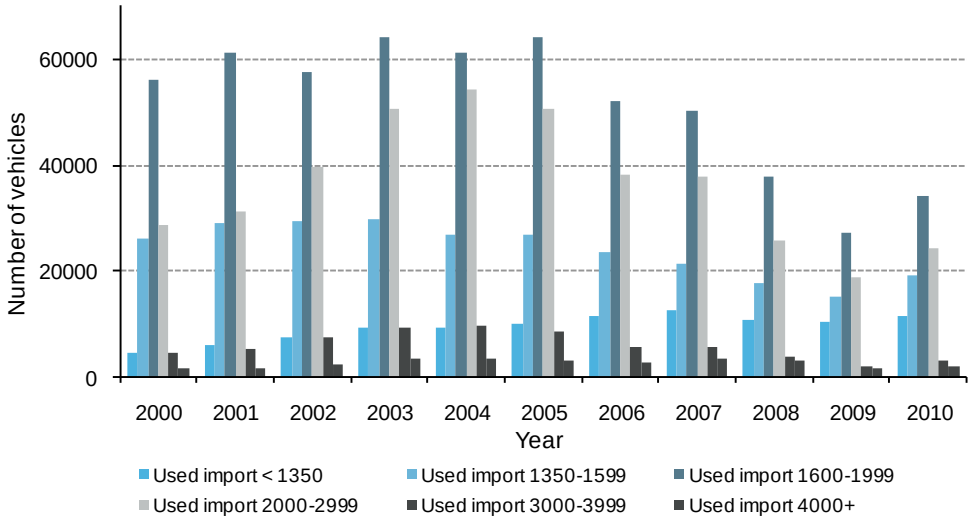
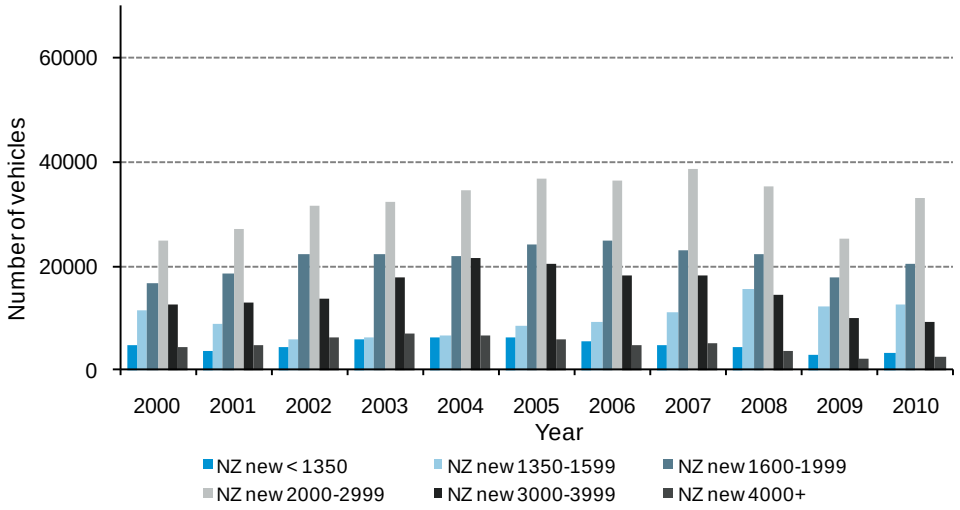
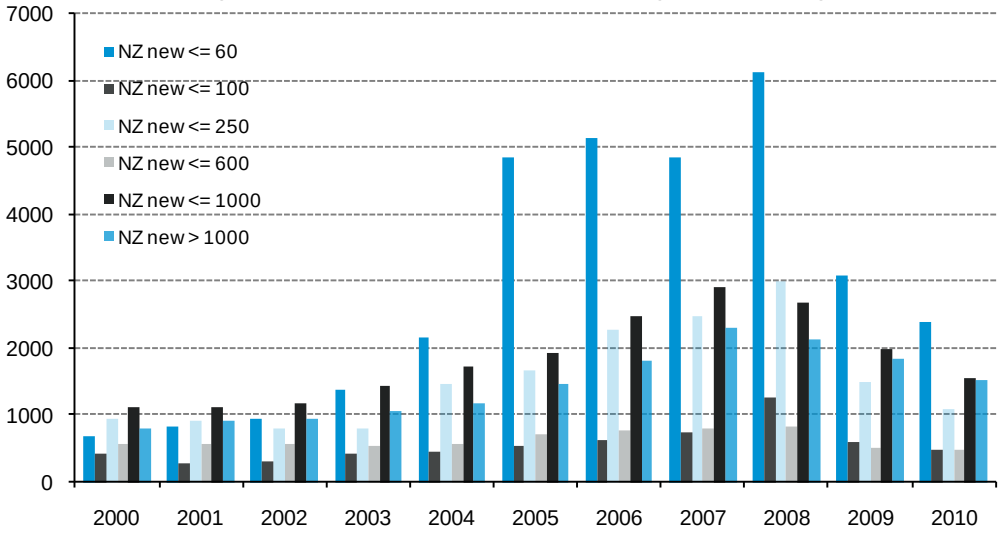


Figure 6.4b : Engine size of NZ new vehicles entering the light fleet



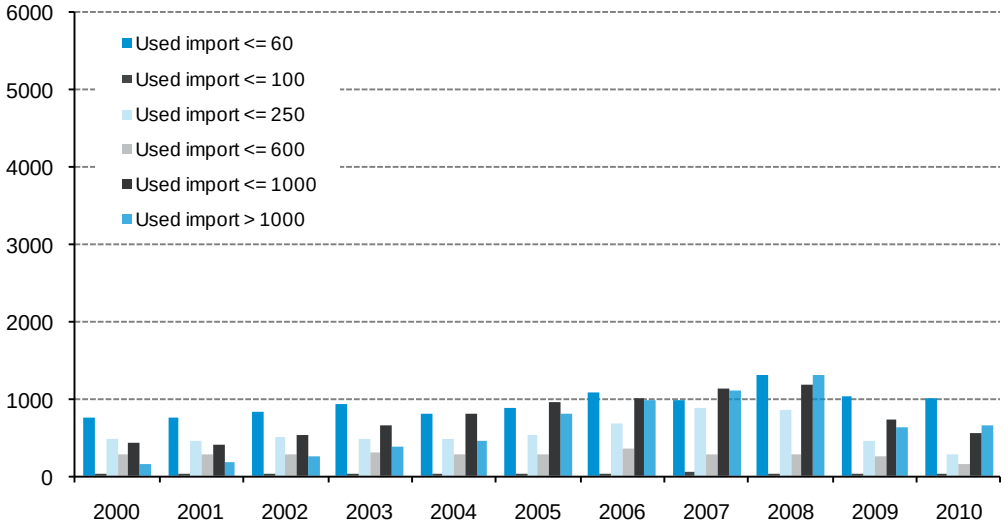
Much of the growth in new motorcycle registrations in recent years has been in machines under 60cc, although the number of larger machines has also increased.

Figure 6.5a : New Zealand new motorcycles entering the fleet



Used motorcycle imports have also increased, but to a far lesser degree than new motorcycles.

Figure 6.5b : Used motorcycles entering the fleet



7. VEHICLES EXITING THE FLEET

Until recently, more New Zealand-new vehicles were scrapped than used imported vehicles. Figure 7.1a shows that this is changing, now that used imports make up half the light fleet and also because they are scrapped sooner (see Figure 7.2a also).

The number of vehicles scrapped fell again in 2010. It is likely that this reflects people holding onto their vehicles for longer due to the economic downturn.

Figure 7.1a : Vehicles scrapped from the light fleet

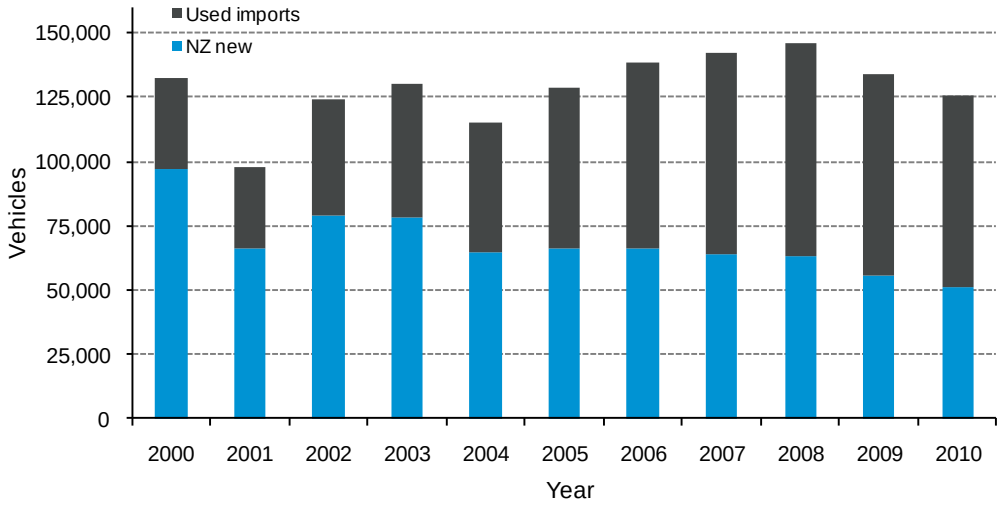
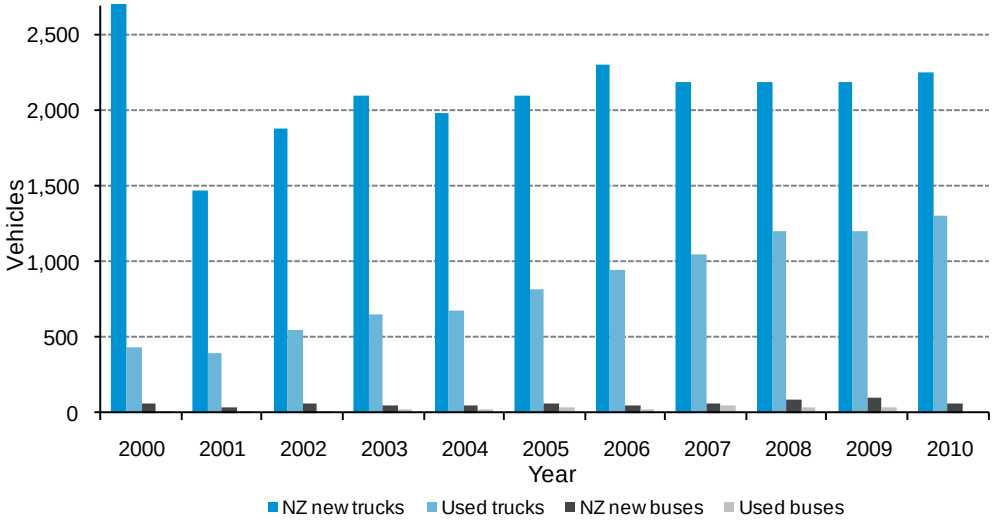
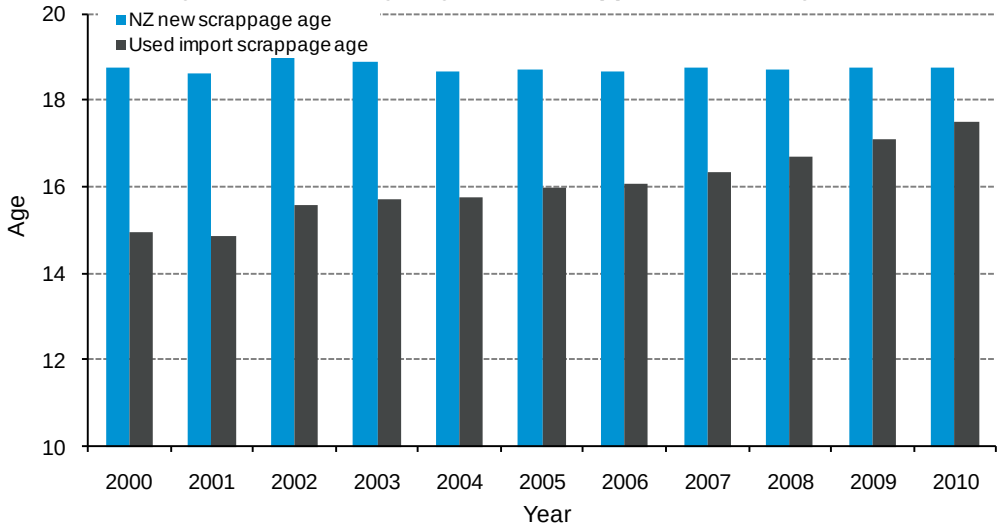


Figure 7.1b : Vehicles scrapped from the heavy fleet



Used imports are leaving the light fleet at an average age of 17.5 years, whereas New Zealand-new vehicles are averaging 18.8 years old when they are scrapped (see Figure 7.2a). The gap between New Zealand-new and used import scrappage ages has continued to close.

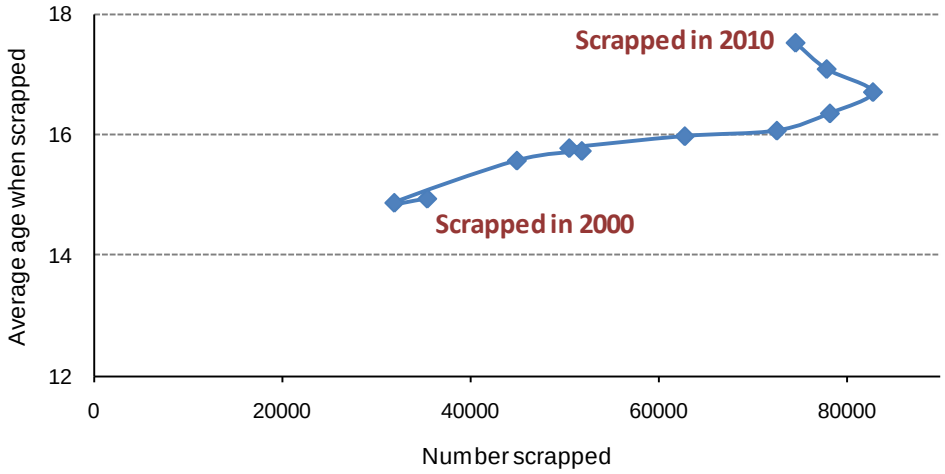
Figure 7.2a : Average age when scrapped from the light fleet



The economic downturn has seen a change in the pattern of used import scrappage. In 2009 and 2010 the number of vehicles being scrapped dropped, and the average age at scrappage increased faster than it had been.

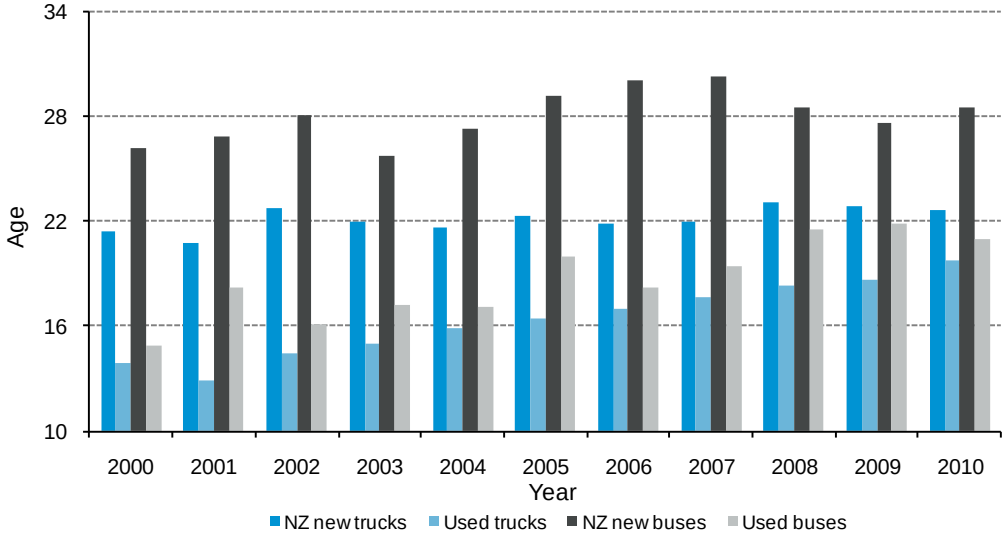
This pattern will not continue indefinitely. Vehicle replacements have been deferred but eventually vehicles will come to the end of their useful lives. Many of the used imports manufactured in the mid 1990s will be reach the end of their lives over the next 5 years, and scrappage will increase. Figures 2.5a and 2.5b show the age structure of the light fleet. Figure 7.2b shows how used import scrappage volumes and age at scrappage had been increasing until the economic downturn in 2009.

Figure 7.2b Used import scrappage vs average age when scrapped



While not many buses are scrapped, the average age when scrapped is extremely high. New Zealand-new buses survive in the fleet for about 30 years (also see Figure 5.2d).

Figure 7.2c : Average age when scrapped from the heavy fleet



How far have vehicles travelled when they are scrapped? The final WoF odometer reading provides a good estimate. Figures 7.3a, 7.3b and 7.3c show that the average lifetime distance travelled has been increasing, and that trend is apparent no matter how the light fleet is split.

Figure 7.3a : Final odometer reading of vehicles scrapped from the light fleet

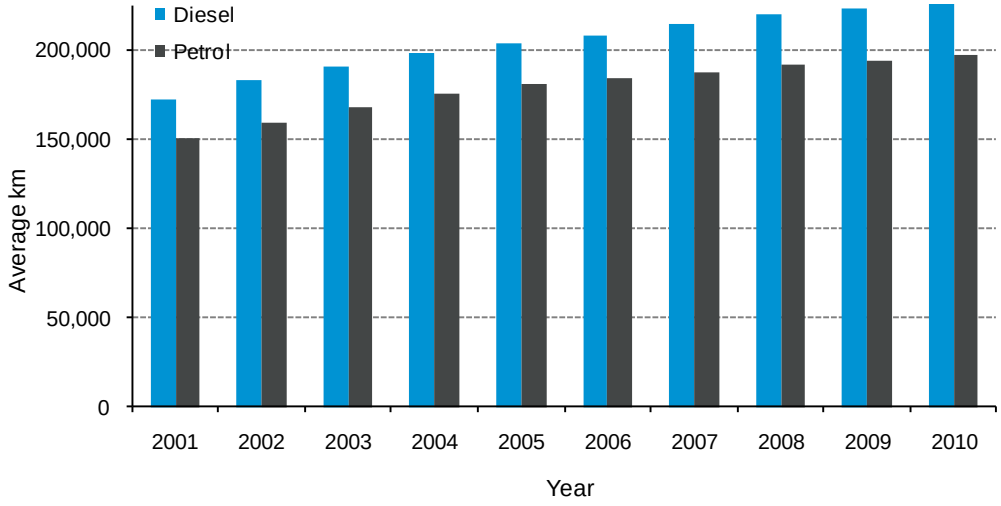


Figure 7.3b : Final odometer reading of vehicles scrapped from the light fleet

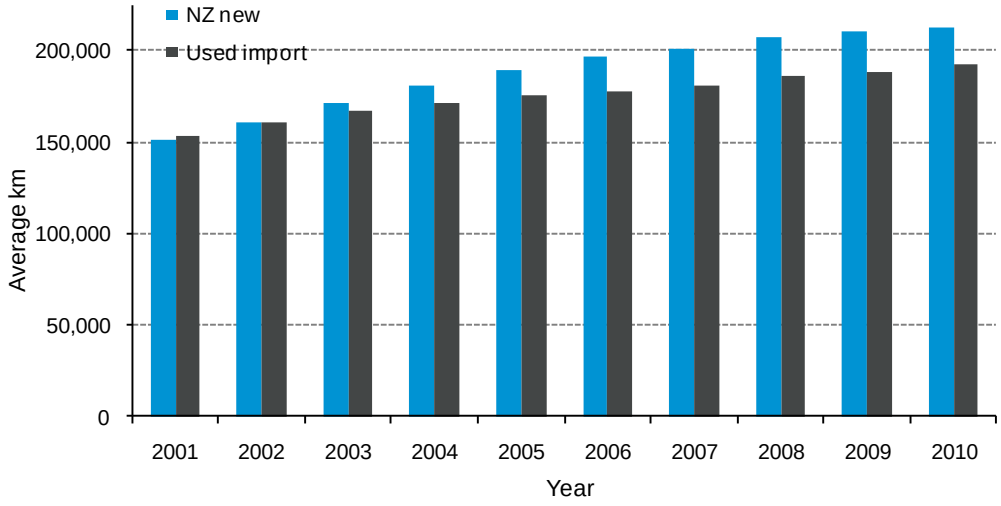
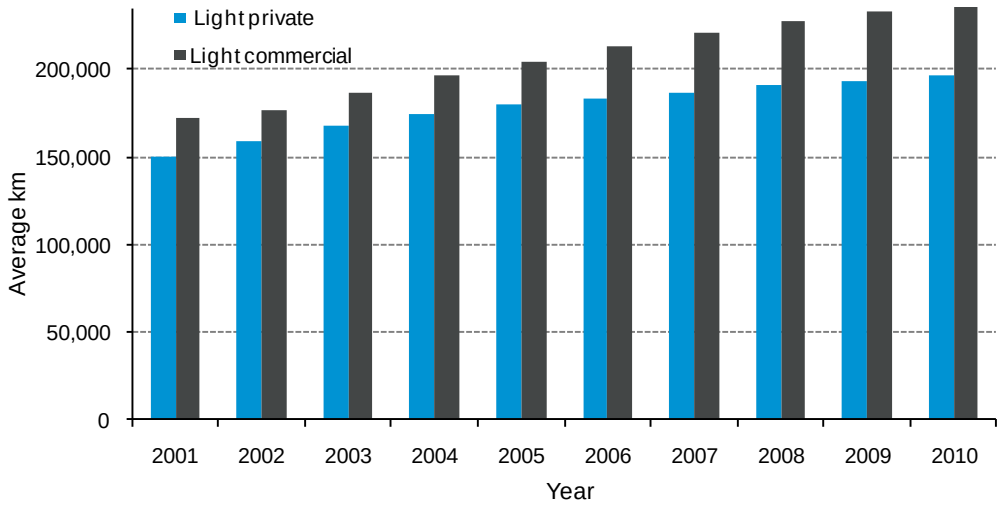
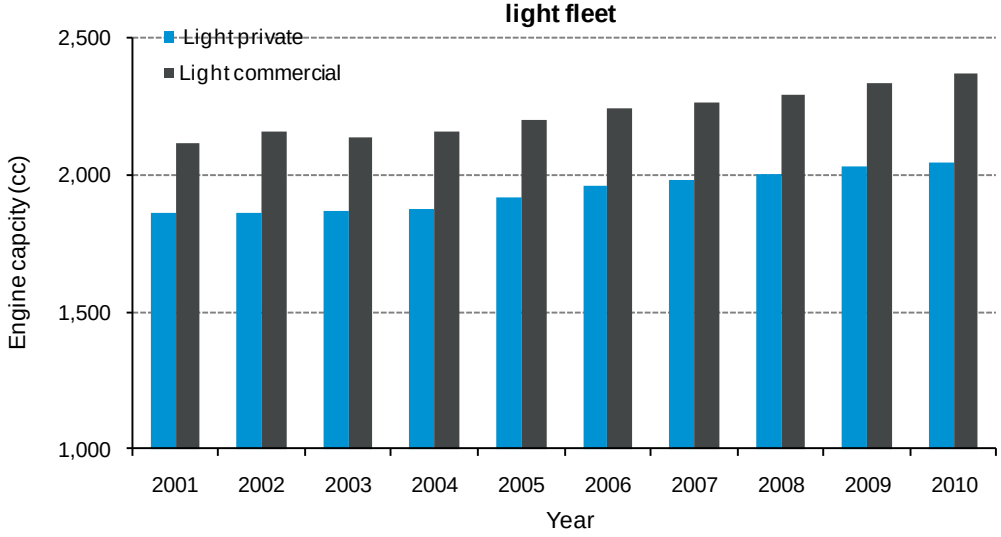


Figure 7.3c : Final odometer reading of vehicles scrapped from the light fleet



But why would the average lifetime distance travelled have been increasing? An examination of the engine sizes of vehicles being scrapped shows that the average size has been increasing.

Figure 7.3d : Average engine size of vehicles scrapped from the light fleet



If the final odometer reading is broken down by vehicle type and engine capacity, then more is revealed. Figure 7.3d shows that engine size at scrappage has been increasing. Figures 7.3e and 7.3f show that larger-engined vehicles travel further in their lifetime, which, combined with 7.3d, explains in part why the fleet average lifetime distance is increasing.

In addition, Figures 7.3e and 7.3f show that lifetime distance has been increasing for vehicles of a given size. When these two effects are combined, we get the lifetime distance increases seen in 7.3a, 7.3b and 7.3c.

Figure 7.3e : Final odometer reading of private vehicles scrapped from the light fleet

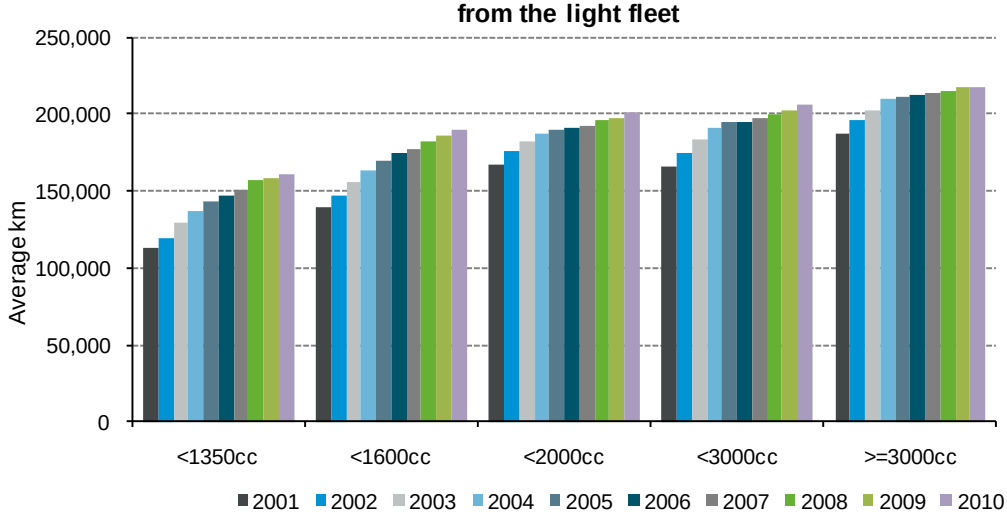
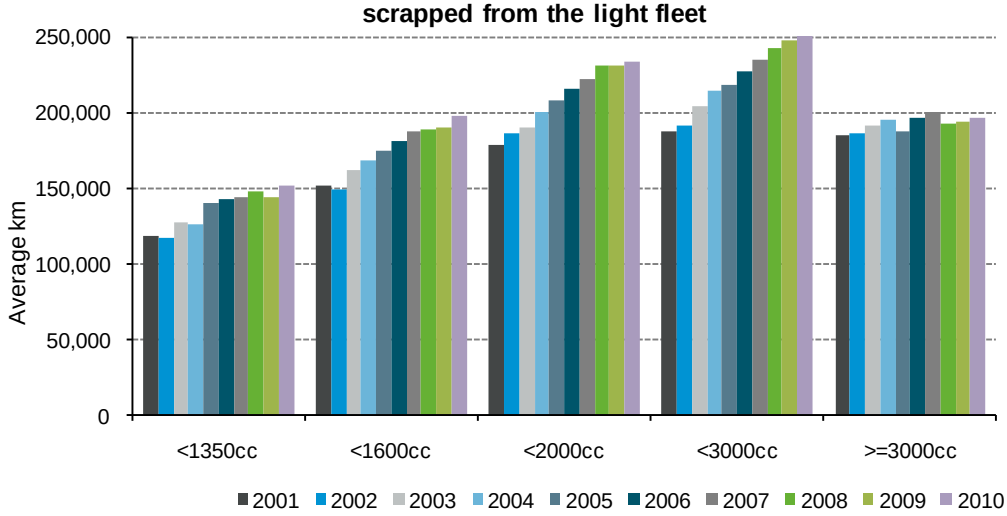


Figure 7.3f : Final odometer reading of commercial vehicles scrapped from the light fleet



SCRAPPAGE CURVES

The accompanying spreadsheet (available from the research tab on the Ministry of Transport website: www.transport.govt.nz) includes scrappage curves for 2010. The curves show the percentage of vehicles of each age that were in the fleet at the start of January 2010, but gone by the end of December 2010. They are shown in table 7.4 in the website spreadsheet.

8. THE DIESEL FLEET AND DIESEL TRAVEL

THE PROPORTION OF DIESEL VEHICLES IN THE FLEET

The diesel proportion of the light fleet has grown steadily, from 11.7 percent in 2000 to 15.7 percent in 2010. (Also see Table 3 and Figures 8.2a, 8.2b and 8.3.) The rate of growth has fallen in recent years with the decline in the import of used diesels.

Figure 8.1a : Diesel vehicles within the light fleet

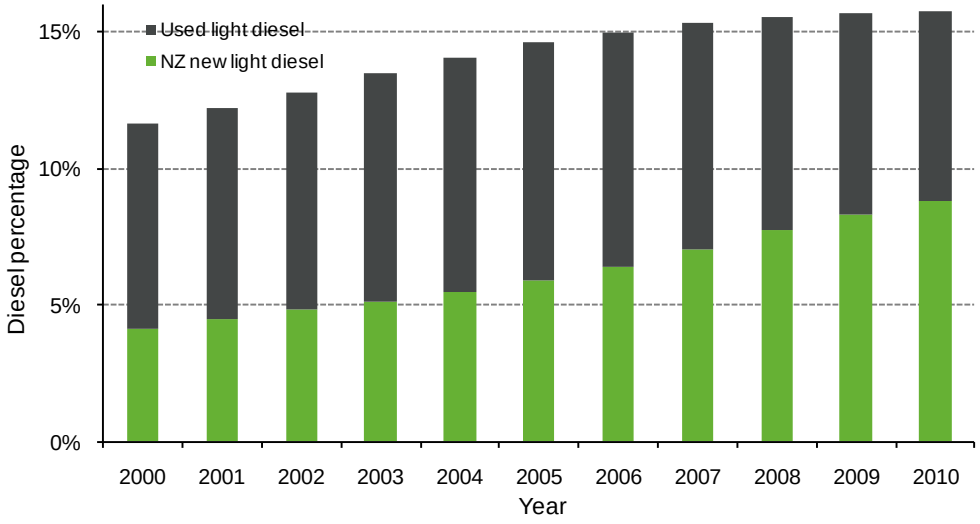


Figure 8.1b : Diesel vehicles within the truck fleet

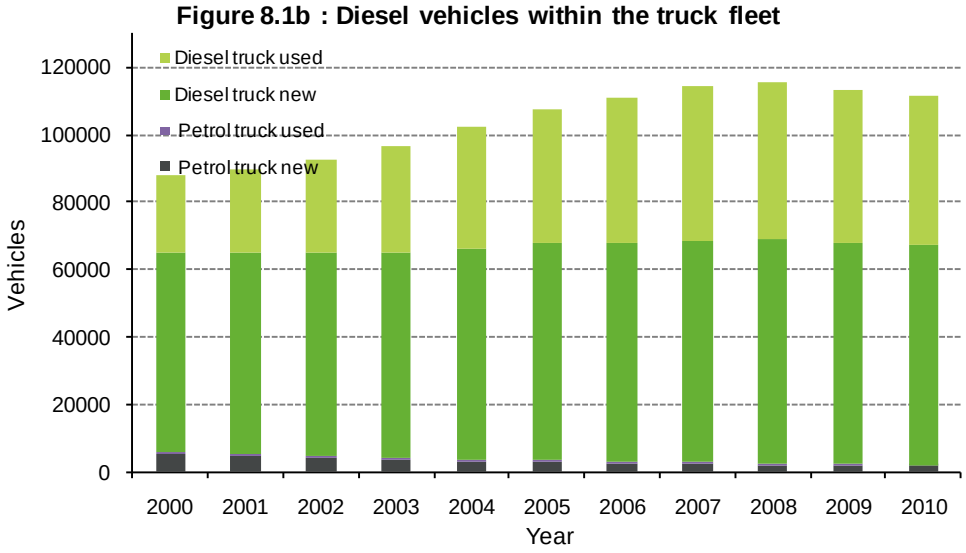
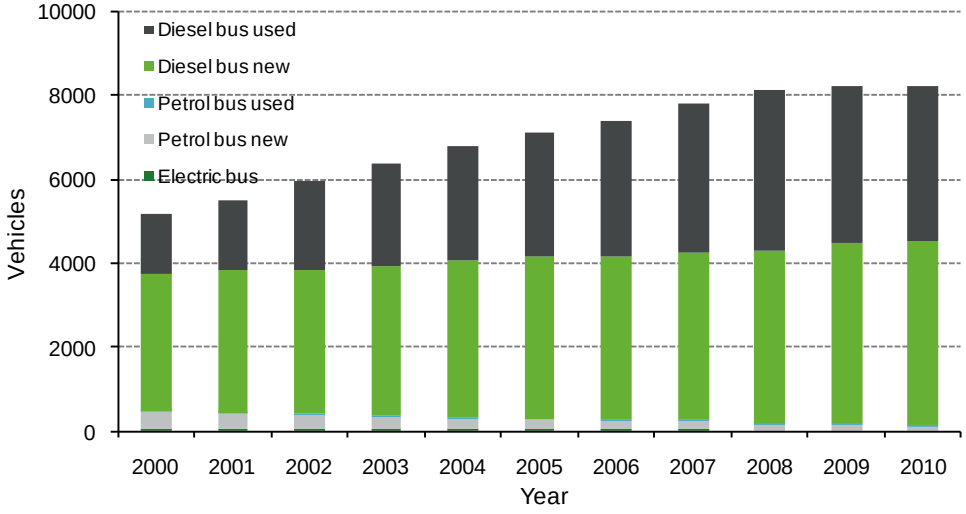


Figure 8.1c : Diesel vehicles within the bus fleet



DIESEL VEHICLES IN THE LIGHT FLEET

Table 3 shows the segment of the light fleet that is diesel powered, and the percentage of light fleet travel that is diesel powered. Figures 8.2a and 8.2b show this information for the entire light fleet (also see Figure 1.3a, which shows travel for the entire fleet).

Table 3	Diesel vehicles	Diesel travel
2010 Light fleet overall	15.8%	20.1%
2010 Light passenger fleet	8.6%	9.9%
2010 Light commercial fleet	65.0%	74.7%

Figure 8.2a : Light fleet makeup by fuel type 2010

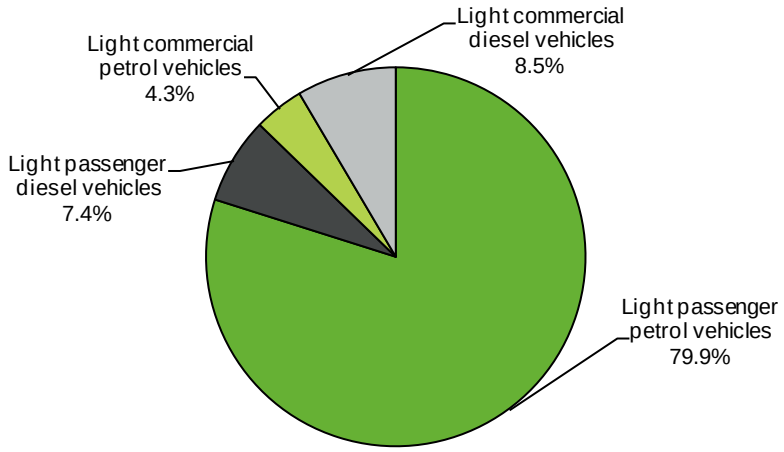
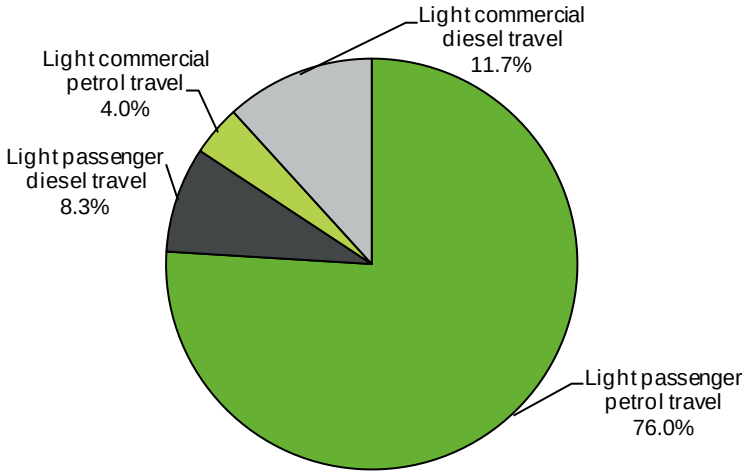
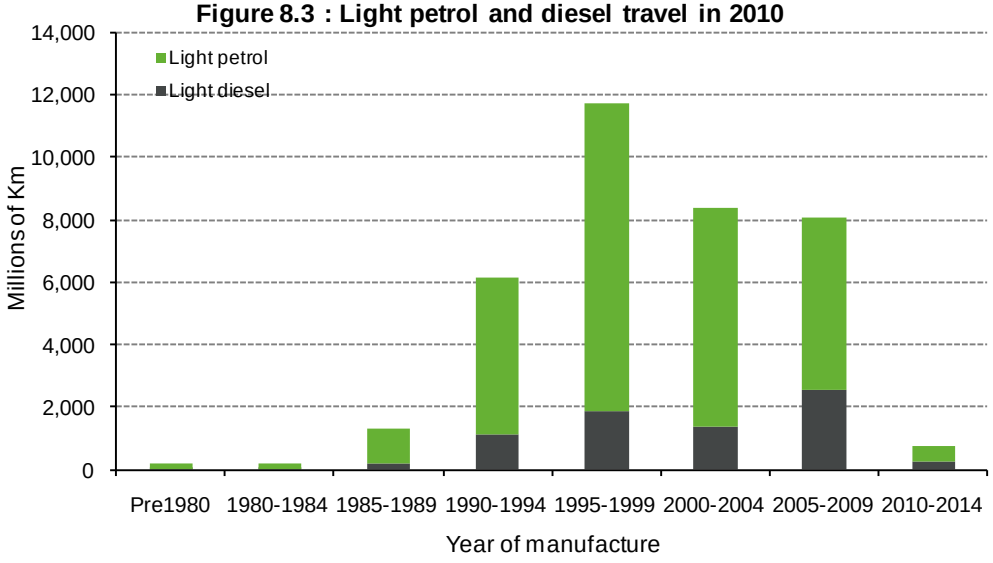


Figure 8.2b : Light fleet travel by fuel type 2010



Light fleet travel can also be broken down by year of manufacture. Figure 8.3 shows that a high proportion of the light fleet diesel travel is by vehicles manufactured in the 1990s, when the harmful emissions standards that vehicles were built to were typically far inferior to recent standards[11].

Figure 8.3 : Light petrol and diesel travel in 2010



[11] The PM (Particulate Matter) column in Table 1 in http://www.dieselnet.com/standards/eu/hd.php shows how successive standards have tightened emission requirements.

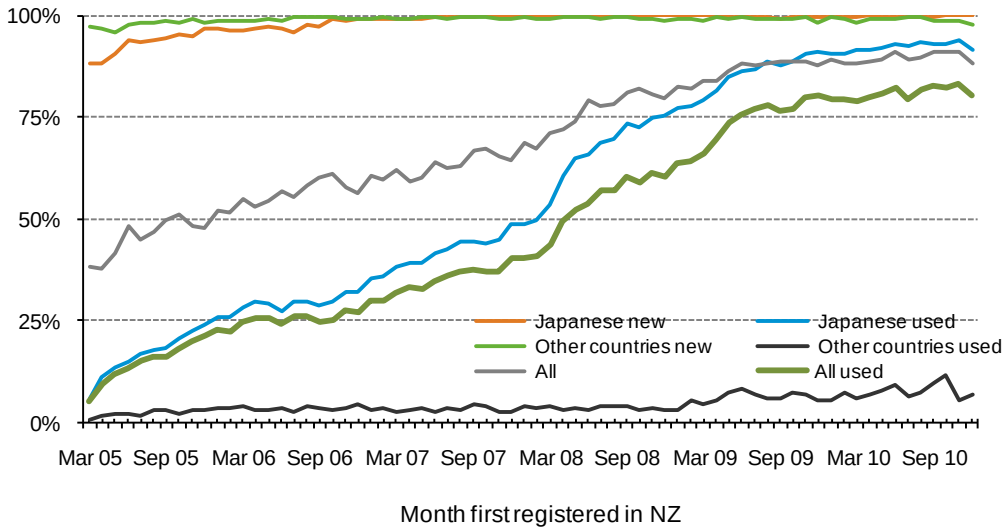
9. HOW FUEL-EFFICIENT IS THE LIGHT FLEET?

FUEL ECONOMY VALUES

Vehicle importers have been supplying fuel consumption figures for New Zealand-new light vehicles since March 2005. They have also provided values for most used Japanese imports manufactured since 2000, and imported into New Zealand since March 2005. Before 2008, the majority of used vehicles being imported were manufactured before 2000 and therefore do not have fuel consumption values.

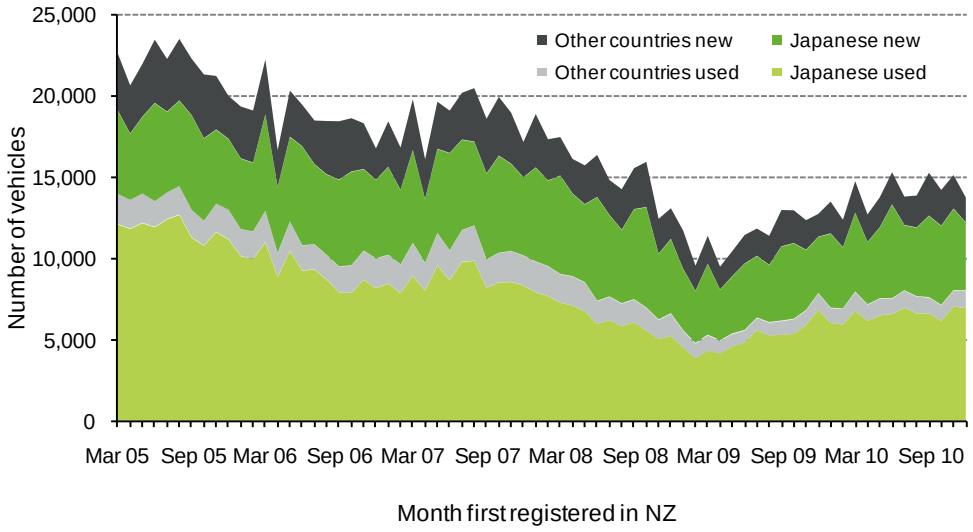
Figure 9.1 shows that a fuel test cycle value[12] is now being recorded against almost all new vehicles entering New Zealand, and by far the majority of the used light vehicles.

Figure 9.1 Percentage of vehicles with fuel test cycle values



In order to put Figure 9.1 in context, Figure 9.2 shows the number of each of these vehicles (both with and without fuel test cycle values) that were first registered each month.

Figure 9.2 : Monthly vehicle registrations



[12] Fuel cycle tests are pre-defined drive cycles conducted on dynamometers. The cycle of accelerations, decelerations and driving represents a typical vehicle use pattern, and is used to assess vehicle emission levels and fuel economy. The advantage of testing vehicles in this way is that the tests are repeatable.

MONTHLY FUEL CONSUMPTION TRENDS

The data shown in Figures 9.3a and 9.3b is the fuel test cycle values of the vehicles that have them, by the month the vehicle was first registered in New Zealand. The graphs are split by petrol/diesel.

This is different to Figure 1.9. That figure showed New Zealand real world petrol consumption, whereas these results came from repeatable test cycles run on dynamometers, with new vehicles in a perfect state of tune.

The Japanese domestic test cycle results[13] are NOT directly comparable with the European test cycle[14] results on a vehicle-by-vehicle basis. Used imported Japanese vehicles were subject to the Japanese test regime, whereas almost all new Japanese vehicles are subject to the European test cycle.

The Asian classification shown in Figure 9.3a and 9.3b is Japanese, Korean and other Asian vehicles, but not Australian. Very few diesel vehicles that are subject to a Japanese test have a fuel consumption value recorded. That is why the Japanese test line is so variable in Figure 9.3b.

Figure 9.3a : Average petrol consumption by test regime

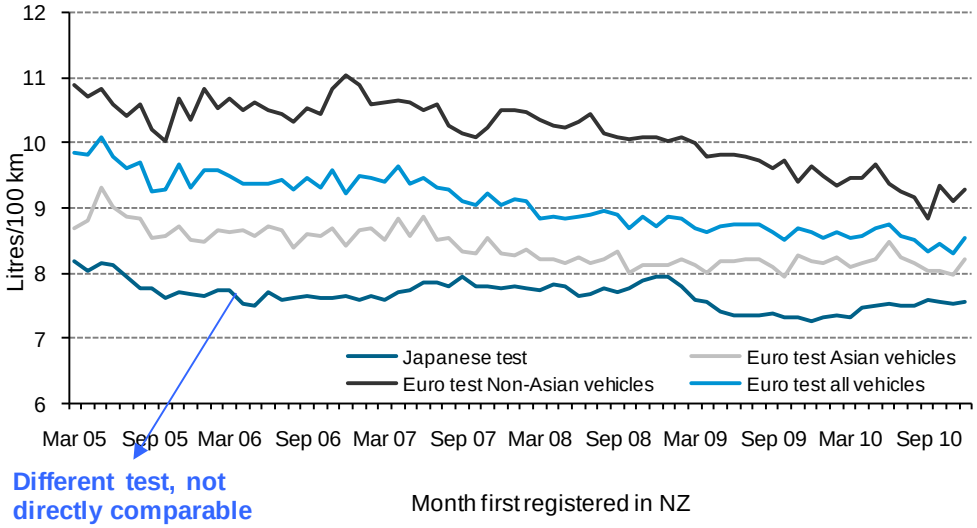
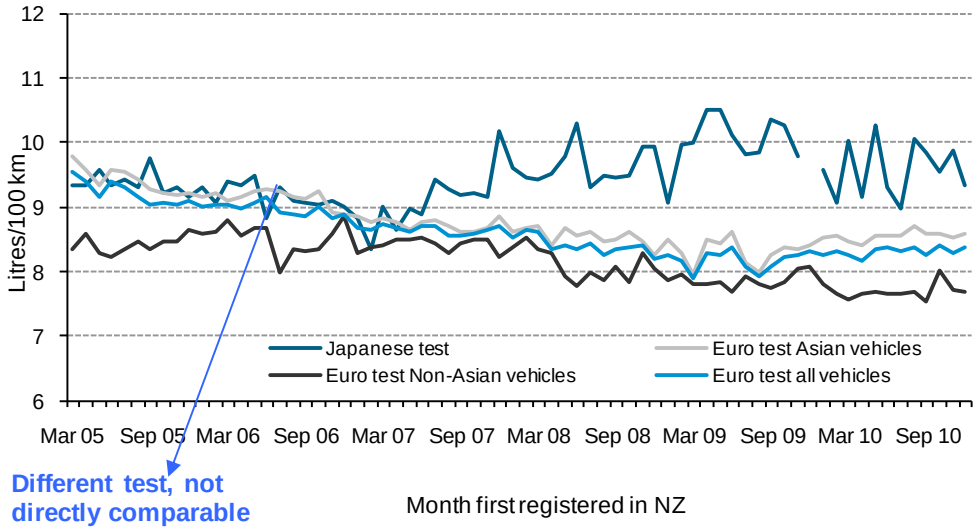


Figure 9.3b : Average diesel consumption by test regime



[13] Japanese 10–15 test cycle http://www.dieselnet.com/standards/cycles/jp_10-15mode.html. Japanese JC08 test cycle http://www.dieselnet.com/standards/cycles/jp_jc08.html.
[14] Euro standards http://www.dieselnet.com/standards/eu/ld.php.

ANNUAL FUEL CYCLE TRENDS

The annual trends in fuel economy (based on the vehicles for which we have values) are shown in Figures 9.4a and 9.4b. The Japanese test data is NOT directly comparable with the European test data, as the test method is different, and produces lower results.

Figure 9.4a : Average petrol consumption

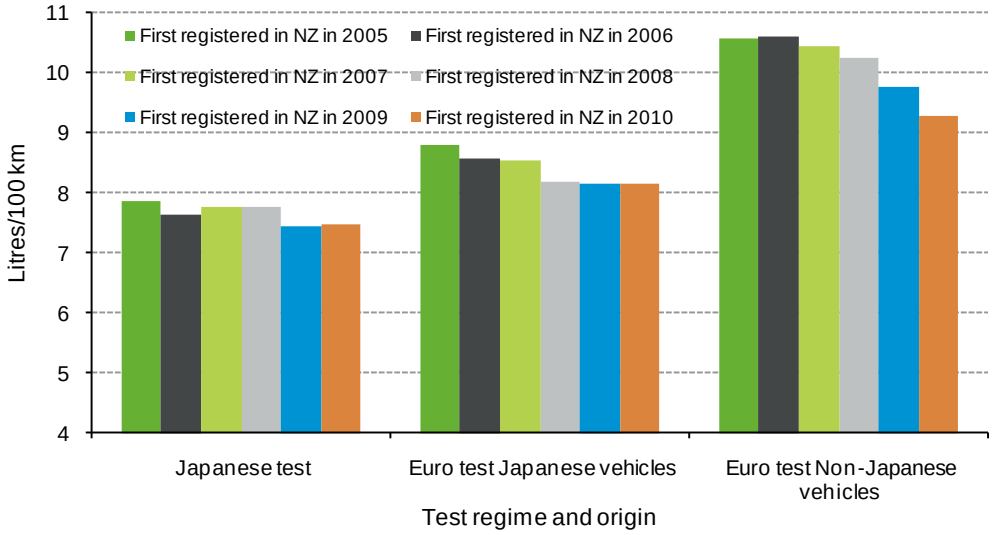
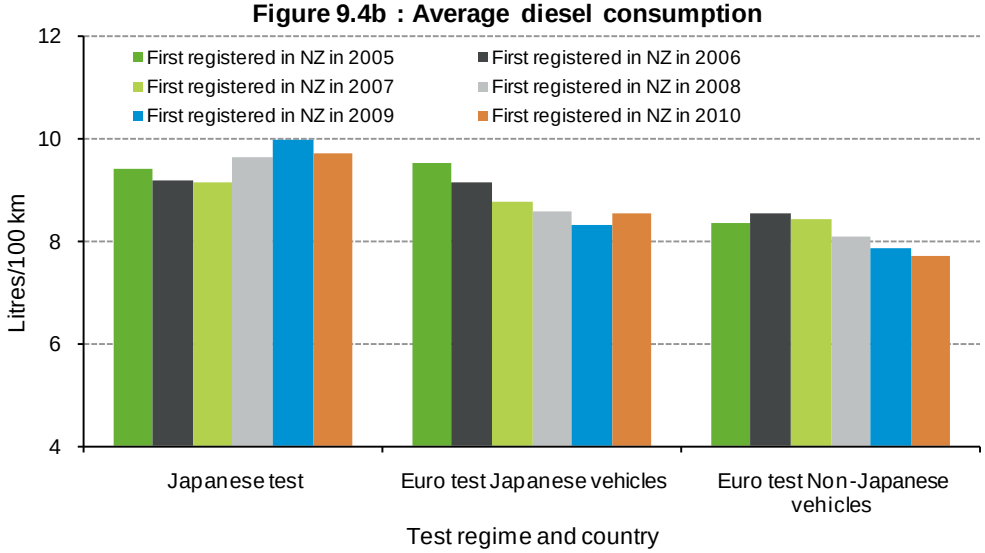


Figure 9.4b : Average diesel consumption



THE CO_2 EMISSIONS OF NEW LIGHT VEHICLES ENTERING THE FLEET

Figure 9.5a shows the CO_2 emissions[15] per kilometre of travel of New Zealand-new light vehicles that entered the fleet from April 2005.

Fuel consumption test values were first recorded on the vehicle register in March 2005 (also see Figure 9.1). The number of new vehicles without a test cycle value dropped away rapidly during 2005, and has been static for some time.

The number of new light vehicle imports has shown signs of recovery in the second half of 2009. Figure 9.5b shows that the market share of the most fuel efficient vehicles (up to 200g CO_2/km) has been growing.

Figure 9.5a : New Zealand new light vehicle registrations CO_2 emissions per km driven

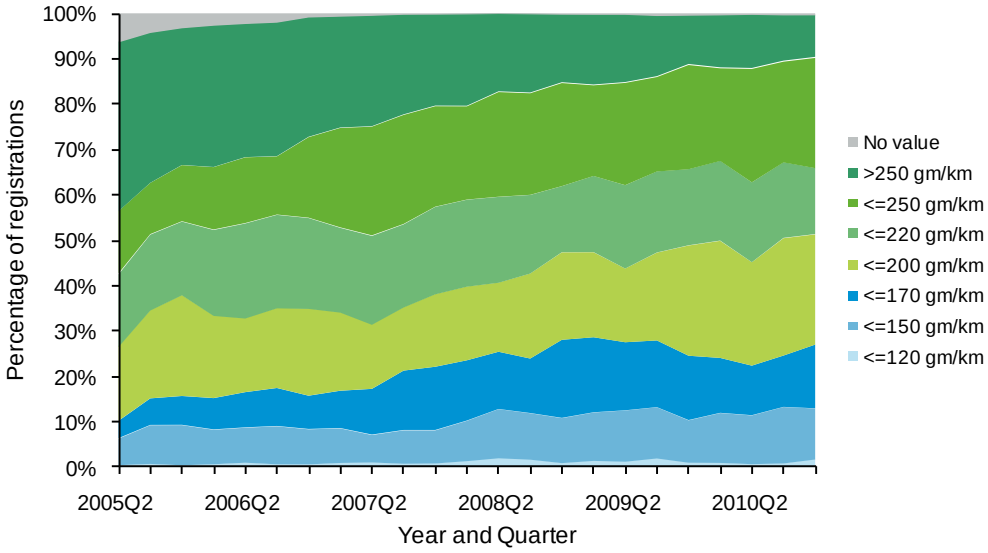
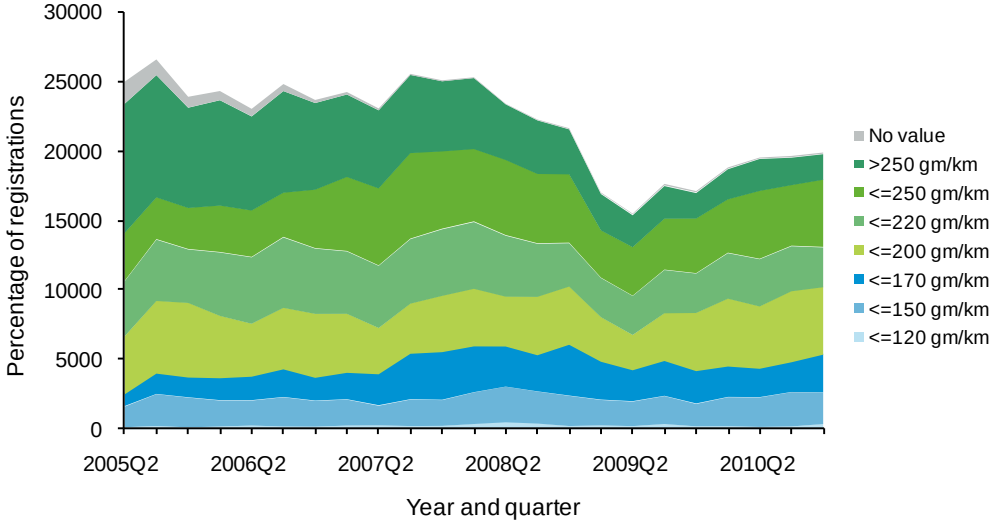


Figure 9.5b : New Zealand new light vehicle registrations CO_2 emissions per km driven



The values shown are for vehicles tested using the European test methodology (cold start). A small number of new vehicles are tested to the Japanese test standard (warm start) and their values have not been included as they are not directly comparable. A cold start test generally returns a higher consumption value than a warm start test for the same vehicle. The technical notes on page 60 detail how the gm/km calculations are done.

[15] Vehicles using petrol or diesel produce CO_2 in direct proportion to the amount of fuel used.

THE CO2 EMISSIONS OF USED LIGHT PETROL VEHICLES ENTERING THE FLEET

Figure 9.6a is an estimation[16] of the carbon dioxide emissions of all the petrol consumed by light used imported vehicles.

Figures 9.6a and 9.6b show that the number of petrol light used imports started to increase again in the second half of 2009. The lower consumption segments (under 200 g/km) have been increasing their market share.

Figure 9.6a : Used import light petrol registrations CO_2 emissions per km driven

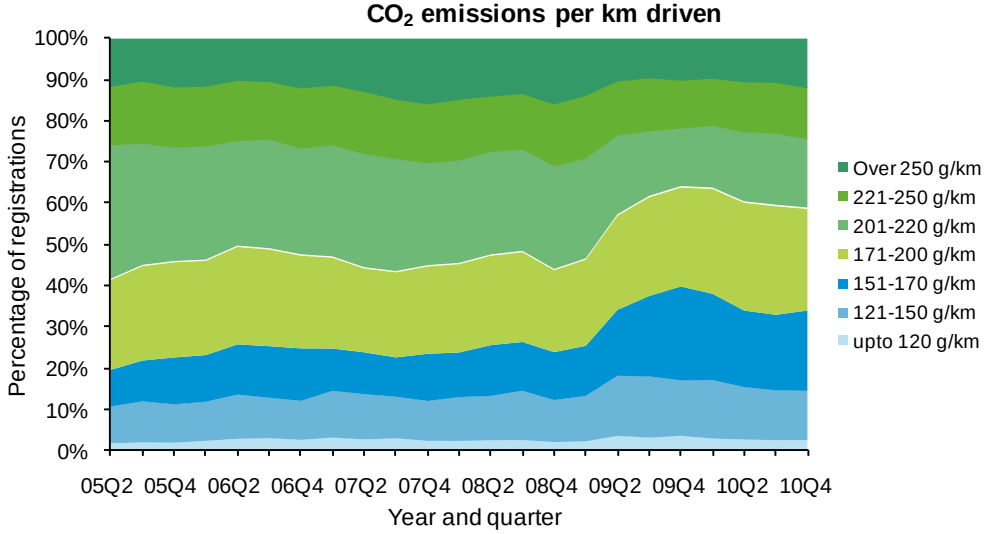
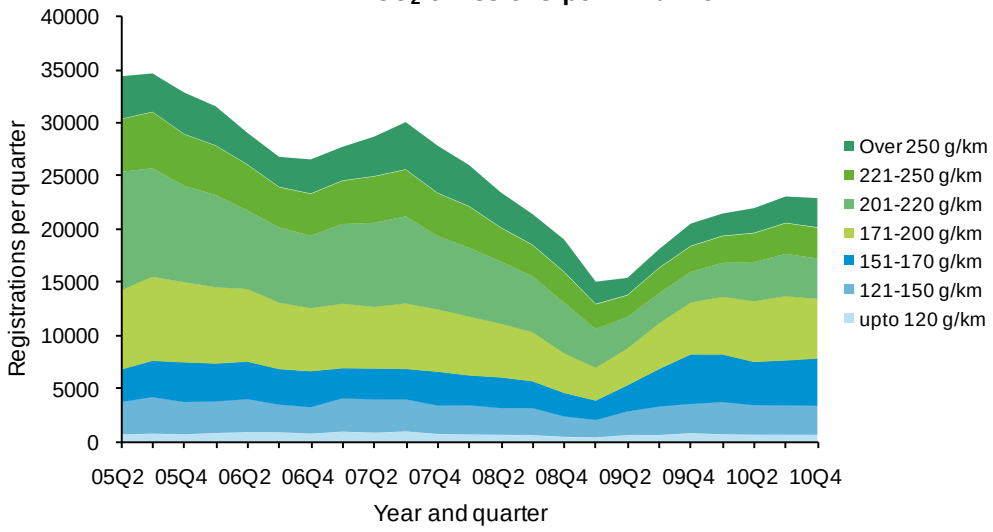


Figure 9.6b : Used import light petrol registrations CO_2 emissions per km driven



[16] The estimation process:

1. Convert the Japanese test values to European test values, using the Ministry's Japanese warm cycle to Euro cold cycle test converter (unpublished).
2. Split each quarter's new registrations into engine capacity bands.
3. Use the vehicles with known consumption values, in each engine capacity band, to establish a CO_2 mix for that engine capacity band and quarter.
4. Apply the CO_2 mix for each engine capacity band to the vehicles without a value for that quarter.

THE CO_2 EMISSIONS OF USED DIESEL VEHICLES ENTERING THE FLEET

Table 5 (in the technical notes at the end of this chapter) shows that under 4 percent of used import diesel vehicles had known fuel consumption, therefore it is not possible to analyse their fuel economy.

Typically, used diesels will have higher fuel consumption than the used petrol vehicles, as the diesel engines are larger.

The number of used diesels imported is now very low (see Figure 5.3).

The CO_2 emissions of petrol vehicles and new diesel vehicles entering the light fleet

Figure 9.7a shows the CO_2 emissions of the new and used petrol vehicles combined.

New Zealand-new vehicles with Japanese test cycle values have been included, after their values have been converted[17] to the equivalent European test value. The fuel economy of used imports without fuel economy values has been estimated using the methodology described on page 60.

Figure 9.7a : New and used light petrol registrations CO_2 emissions per km driven

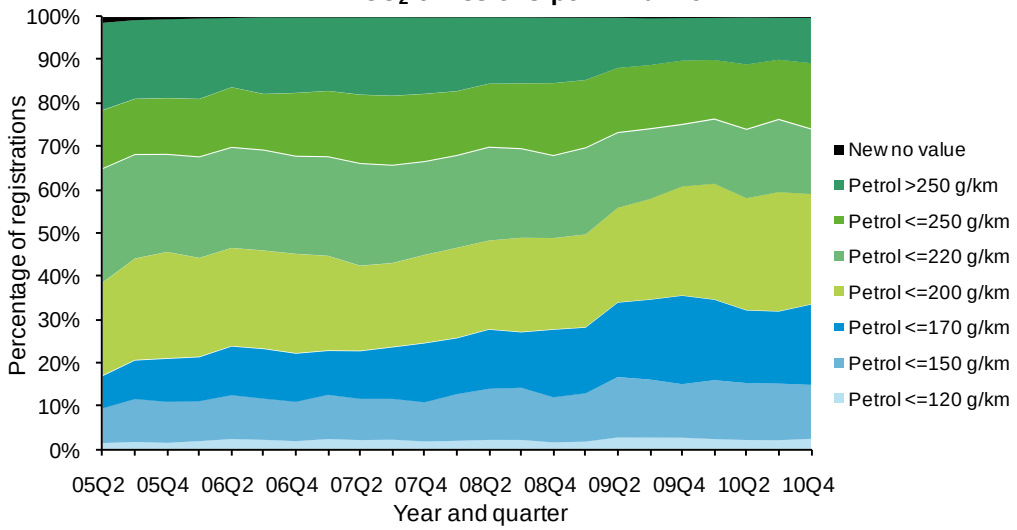
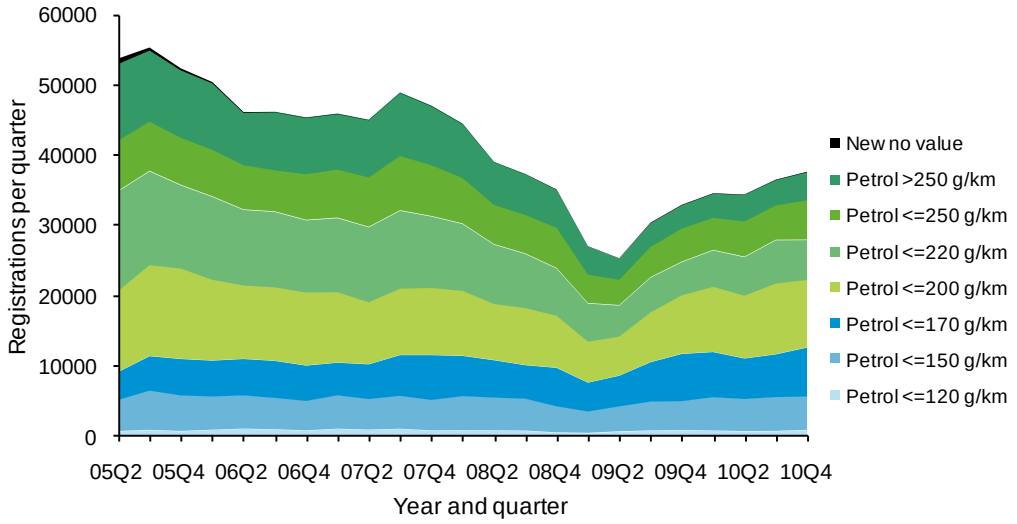


Figure 9.7b : New and used light petrol registrations CO_2 emissions per km driven



[17] See pg 60 for a description of the CO_2 emissions estimation process.

Figure 9.7b shows the CO_2 emissions of the new diesel vehicles. Used diesel vehicles could not be analysed as too few of them have known fuel consumption values.

Figure 9.7c : New light diesel registrations CO_2 emissions per km driven

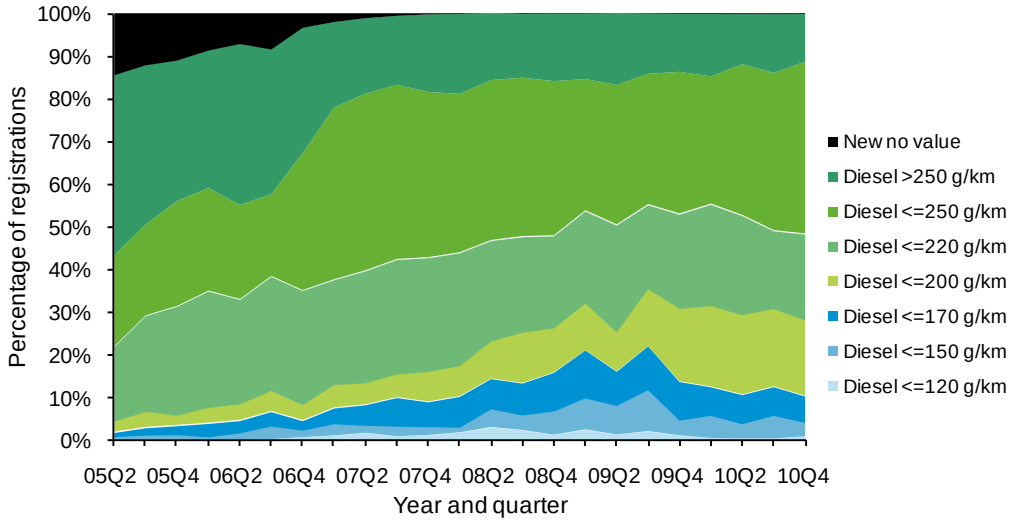
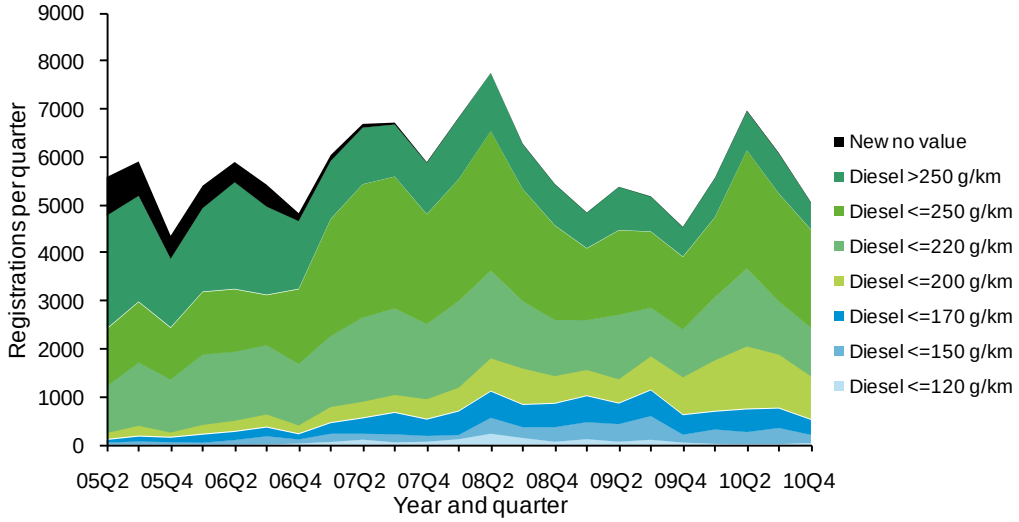


Figure 9.7d : New light diesel registrations CO_2 emissions per km driven



AVERAGE CO_2 EMISSIONS OF LIGHT VEHICLES ENTERING THE FLEET

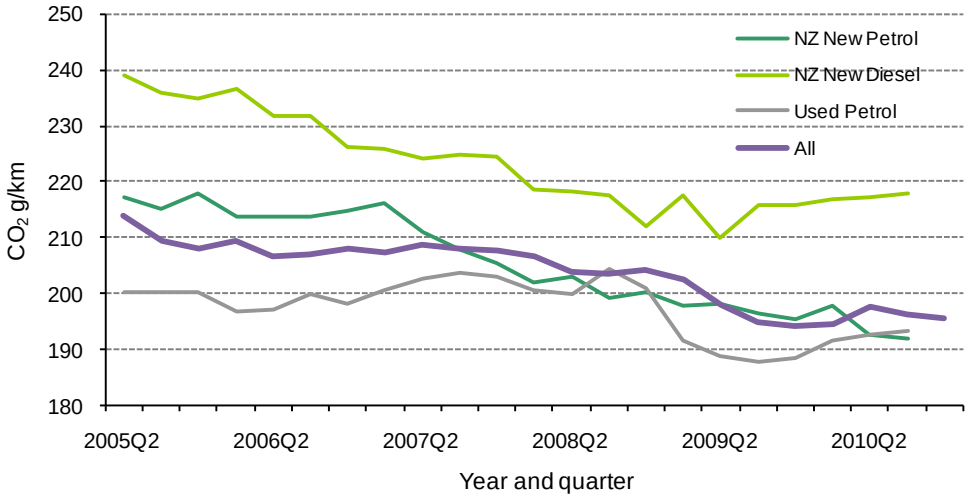
Figure 9.8 is a summary of the information that has been presented in Figures 9.5, 9.6 and 9.7. It shows some response to the rapidly increasing fuel prices in 2006[18] and 2008.

Note, however, that the used import fuel consumption data is not as reliable as the new vehicle data. The Ministry of Transport has estimated values from the used petrol imports that have a fuel consumption test value, and the Japanese test cycle values have also been converted to European test cycle values.

The used diesel imports are not included in the analysis, as too few of them have known fuel consumption. Used diesels made up a very low fraction of used imports now (see Table 4 on page 62). This graph is updated each quarter in the Quarterly Fleet Statistics.

Figure 9.8 shows that there has been an improvement in fuel economy since 2005, but New Zealand-new diesels and used imports have increased again in recent quarters (also see Figure 9.10)..

Figure 9.8 : Light vehicle registrations
Average CO_2 emissions



TECHNICAL NOTES

How CO_2 per km is calculated

The fuel consumption test results recorded on the vehicle register have been converted from litres per 100km to grams of CO_2 per kilometre driven. This allows direct comparison of petrol and diesel vehicles, which have different fuel consumption and CO_2 emissions (diesel vehicles typically have lower fuel consumption than their petrol equivalents, but there is more carbon in a litre of diesel compared with a litre of petrol). The conversions that have been used are:

- Diesel g CO_2 per km = 26.05 x diesel consumption (L/100km)[19]
- Petrol g CO_2 per km = 22.961 x petrol consumption (L/100km)[20]

The petrol factor is based on the carbon content of the regular/premium mix sold in New Zealand in 2005 (premium petrol has a higher carbon content than regular petrol).

The CO_2 emissions of used import light vehicles entering the fleet

Ideally it would be possible to present the same information shown in Figures 9.5a and 9.5b for the used imports.

Figure 9.1 showed the percentage of used imported vehicles that have a fuel consumption value recorded on the vehicle register. A more detailed examination (see Table 4) shows that almost no fuel consumption test values are recorded for used diesels.

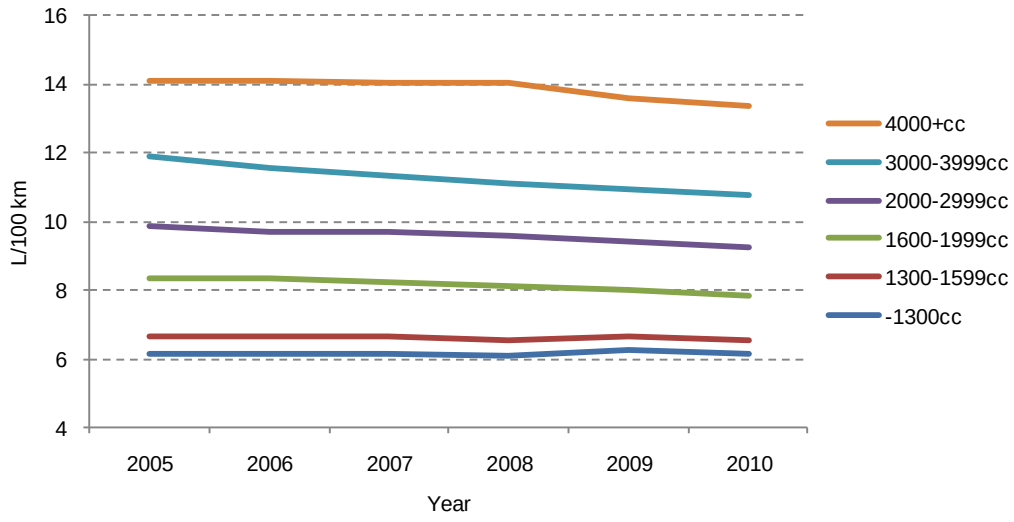
[18] See Section 12.
[19] Ministry of Economic Development, NZ Energy Greenhouse Gas Emissions 1990–2006.
[20] Ministry of Economic Development, NZ Energy Greenhouse Gas Emissions 1990–2006.

HOW HAVE THESE ECONOMY GAINS COME ABOUT?

Figure 9.8 shows the fuel economy of light vehicles entering the fleet has improved from about 220gm CO_2/km in 2005 to close to 190gm/km in 2010.

Figure 9.10 shows the economy trends within each engine cc band. The decreases have not been particularly marked (apart from the two largest categories of petrol vehicles) which suggests that some of the fleet reduction has been achieved by downsizing the engine purchased or by purchasing diesels rather than the largest petrol vehicles.

Figure 9.10a : Petrol economy trend



The economy trend for diesels with engine capacity under 1300cc varies as the sales of those vehicles are very limited.

Figure 9.10b : Diesel economy trend

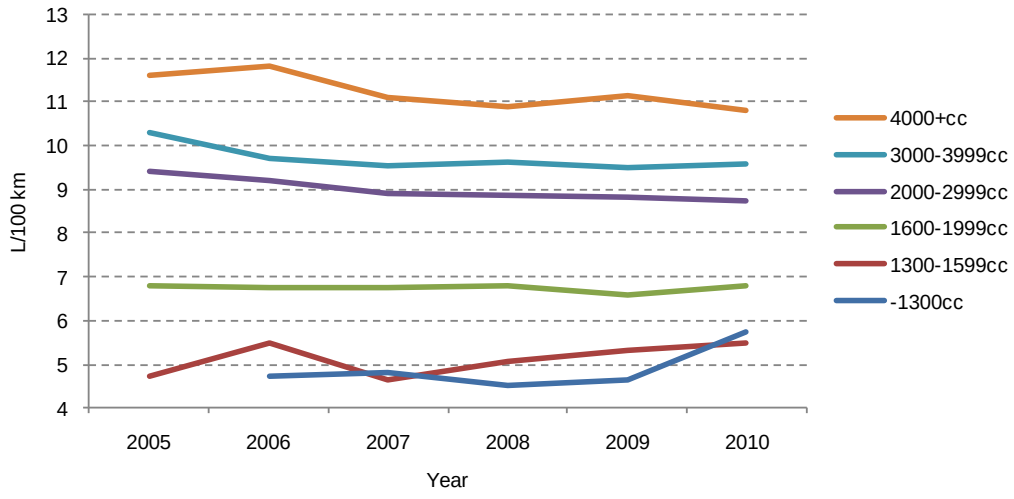


Table 4

Number of used diesels registered

First Registration	<=999cc	<=1499cc	<=1999cc	<=2499cc	<=2999cc	>=3000cc	Total
2005 Apr-Jun	0	0	217	793	4248	1476	6734
2005 Jul-Sep	1	1	223	753	4462	1440	6880
2005 Oct-Dec	0	3	171	592	3693	1384	5843
2006 Jan-Mar	0	3	135	491	3085	1149	4863
2006 Apr-Jun	2	2	157	439	2778	1031	4409
2006 Jul-Sep	1	2	146	371	2460	856	3836
2006 Oct-Dec	0	7	119	352	2318	766	3562
2007 Jan-Mar	0	3	103	338	2074	611	3129
2007 Apr-Jun	0	2	80	332	2139	606	3159
2007 Jul-Sep	0	2	88	426	2607	614	3737
2007 Oct-Dec	0	0	70	380	2201	534	3185
2008 Jan-Mar	0	0	68	319	1582	417	2386
2008 Apr-Jun	0	4	35	229	893	234	1395
2008 Jul-Sep	0	1	37	219	604	131	992
2008 Oct-Dec	0	1	39	179	489	130	838
2009 Jan-Mar	0	1	37	88	280	94	500
2009 Apr-Jun	0	0	15	104	203	80	402
2009 Jul-Sep	0	2	40	117	173	48	380
2009 Oct-Dec	0	2	29	137	141	32	341
2010 Jan-Mar	0	0	28	96	122	21	267
2010 Apr-Jun	0	0	24	69	64	20	177
2010 Jul-Sep	0	0	20	50	46	15	131
2010 Oct-Dec	0	2	23	46	70	15	156
Total	4	32	1555	6088	35699	11377	54755

Percentage of used diesels with known fuel consumption

First Registration	<=999cc	<=1499cc	<=1999cc	<=2499cc	<=2999cc	>=3000cc	Overall
2005 Apr-Jun	-	-	0%	1%	2%	1%	1.3%
2005 Jul-Sep	0%	0%	0%	1%	2%	2%	1.6%
2005 Oct-Dec	-	0%	0%	2%	2%	1%	1.6%
2006 Jan-Mar	-	0%	1%	4%	3%	1%	2.3%
2006 Apr-Jun	50%	0%	2%	5%	2%	1%	2.3%
2006 Jul-Sep	100%	0%	1%	6%	3%	2%	2.8%
2006 Oct-Dec	-	0%	0%	5%	2%	1%	1.9%
2007 Jan-Mar	-	0%	2%	8%	3%	2%	2.9%
2007 Apr-Jun	-	0%	4%	12%	4%	3%	4.5%
2007 Jul-Sep	-	0%	3%	6%	6%	2%	5.3%
2007 Oct-Dec	-	-	1%	6%	5%	2%	4.7%
2008 Jan-Mar	-	-	3%	8%	5%	2%	4.9%
2008 Apr-Jun	-	100%	0%	5%	5%	3%	4.8%
2008 Jul-Sep	-	100%	0%	9%	7%	3%	6.5%
2008 Oct-Dec	-	100%	0%	3%	6%	2%	4.4%
2009 Jan-Mar	-	0%	0%	7%	10%	1%	6.8%
2009 Apr-Jun	-	-	7%	4%	4%	3%	4.0%

2009 Jul-Sep	-	-	3%	5%	4%	0%	3.7%
2009 Oct-Dec	-	-	0%	4%	13%	0%	7.3%
2010 Jan-Mar	-	-	0%	88%	4%	84%	15%
2010 Apr-Jun	-	-	0%	92%	3%	82%	23%
2010 Jul-Sep	-	-	0%	95%	2%	83%	22%
2010 Oct-Dec	0%	100%	0%	100%	0%	82%	14%
Overall							3.7%

The percentage of used light diesels with a known fuel value is so low that it has not been possible to estimate the fuel consumption of the used diesels imports.

The situation for the used imported petrol vehicles is significantly different.

Table 5

Number of used petrol vehicles registered

First Registration	<=999cc	<=1499cc	<=1999cc	<=2499cc	<=2999cc	>=3000cc	Total
2005 Apr-Jun	270	6810	18203	6224	1700	1533	34740
2005 Jul-Sep	304	7525	18110	6040	1539	1435	34953
2005 Oct-Dec	276	7294	16596	6059	1518	1444	33187
2006 Jan-Mar	359	7069	15954	5625	1534	1278	31819
2006 Apr-Jun	325	7021	14800	4982	1275	1077	29480
2006 Jul-Sep	381	6267	13818	4772	1206	1015	27459
2006 Oct-Dec	401	6352	13158	4729	1313	1222	27175
2007 Jan-Mar	451	6550	13977	4723	1472	1244	28417
2007 Apr-Jun	380	6377	14341	5027	1777	1547	29449
2007 Jul-Sep	451	6469	14487	5476	2026	1929	30838
2007 Oct-Dec	376	6295	13494	4925	1683	2026	28799
2008 Jan-Mar	410	5796	12570	4630	1520	1852	26778
2008 Apr-Jun	587	5531	11307	4046	1323	1537	24331
2008 Jul-Sep	673	5274	10093	3706	1140	1301	22187
2008 Oct-Dec	542	4478	8733	3536	1307	1398	19994
2009 Jan-Mar	493	3364	6363	2797	1092	877	14986
2009 Apr-Jun	534	4394	6072	2698	991	623	15312
2009 Jul-Sep	497	5735	6957	3016	1122	704	18031
2009 Oct-Dec	482	6901	7706	3234	1193	932	20448
2010 Jan-Mar	407	6799	8375	3588	1187	1052	21408
2010 Apr-Jun	307	6346	8568	4095	1396	1211	21923
2010 Jul-Sep	318	6451	8792	4583	1586	1267	22997
2010 Oct-Dec	389	6641	8453	4507	1491	1358	22839
Total	8165	113342	230873	85103	26071	24694	488248

Percentage of used petrol vehicles with known fuel consumption

First Registration	<=999cc	<=1499cc	<=1999cc	<=2499cc	<=2999cc	>=3000cc	Overall
2005 Apr-Jun	23%	17%	10%	13%	18%	5%	12.1%
2005 Jul-Sep	36%	23%	14%	17%	24%	7%	16.7%
2005 Oct-Dec	41%	33%	17%	19%	26%	4%	20.9%
2006 Jan-Mar	38%	37%	20%	23%	27%	7%	24.1%
2006 Apr-Jun	37%	40%	22%	24%	28%	6%	26.2%
2006 Jul-Sep	30%	39%	22%	25%	28%	8%	26.1%
2006 Oct-Dec	28%	43%	21%	26%	29%	7%	27.0%

2007 Jan-Mar	43%	47%	24%	33%	31%	8%	30.8%
2007 Apr-Jun	49%	51%	27%	38%	37%	10%	34.2%
2007 Jul-Sep	56%	56%	31%	42%	39%	16%	38.1%
2007 Oct-Dec	54%	58%	34%	41%	38%	12%	39.3%
2008 Jan-Mar	48%	60%	38%	44%	37%	16%	42.2%
2008 Apr-Jun	43%	70%	46%	55%	43%	22%	51.3%
2008 Jul-Sep	48%	76%	53%	60%	44%	21%	57.3%
2008 Oct-Dec	58%	78%	55%	62%	47%	21%	58.6%
2009 Jan-Mar	76%	83%	62%	69%	61%	23%	65.9%
2009 Apr-Jun	87%	89%	68%	77%	67%	27%	74.5%
2009 Jul-Sep	88%	90%	74%	79%	73%	29%	78.6%
2009 Oct-Dec	88%	92%	75%	82%	73%	28%	79.9%
2010 Jan-Mar	91%	91%	76%	84%	69%	34%	80.0%
2010 Apr-Jun	91%	93%	78%	85%	75%	41%	81.6%
2010 Jul-Sep	95%	93%	80%	85%	74%	38%	82.3%
2010 Oct-Dec	95%	92%	81%	87%	73%	38%	82.4%
Overall							45.8%

10. WHAT IS THE AVERAGE VEHICLE ENGINE SIZE AND AGE OF THE VEHICLES IN USE?

We have established the average vehicle age and engine capacity of the light fleet. But how does that compare with the average vehicle that is actually travelling on the road?

The technique to establish this is to weight engine size and age by travel.

Say the fleet consisted of a 1000cc car that did 5,000 km/year and a 2000cc van that did 12,000 km/year.

- The average size of the fleet would be 1500cc = (1000+2000)/2.
- The travel-weighted size would be (1000x5000 + 2000x12000) / (5000+12000) = 1706cc.

Similarly, say the fleet consisted of a 10-year-old vehicle doing 4,000km/year, and a 4-year-old vehicle doing 10,000km/year.

- The average fleet age would be seven years = (4+10)/2.
- The average travel-weighted fleet age would be (10 x 4000 + 4 x 10000) / (4000 + 10000) = 5.7 years.

Using this technique, we learn in Figures 10.1 and 10.2 that the average vehicle actually travelling is younger than the average vehicle in the fleet, and that it has a larger engine capacity then the average vehicle in the fleet.

Figure 10.1 : Light fleet travel weighted average vehicle age

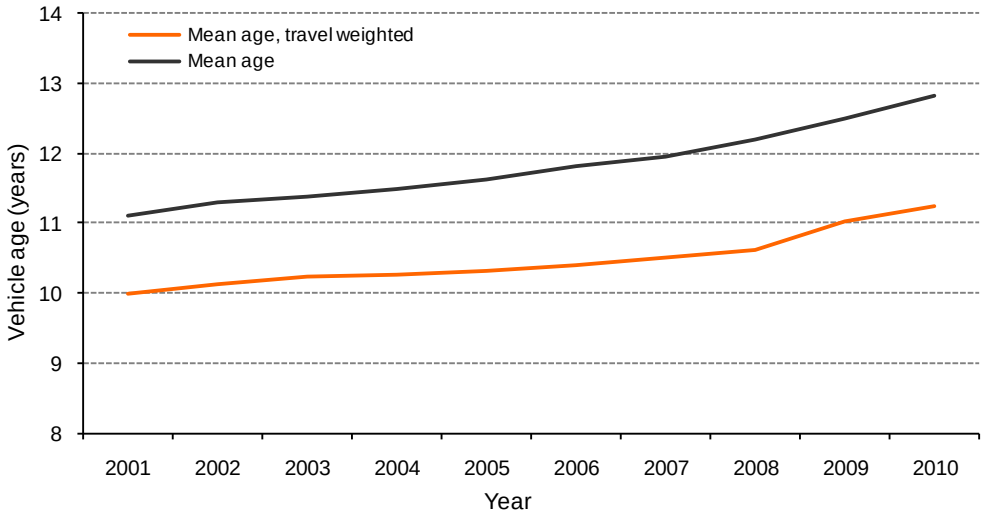
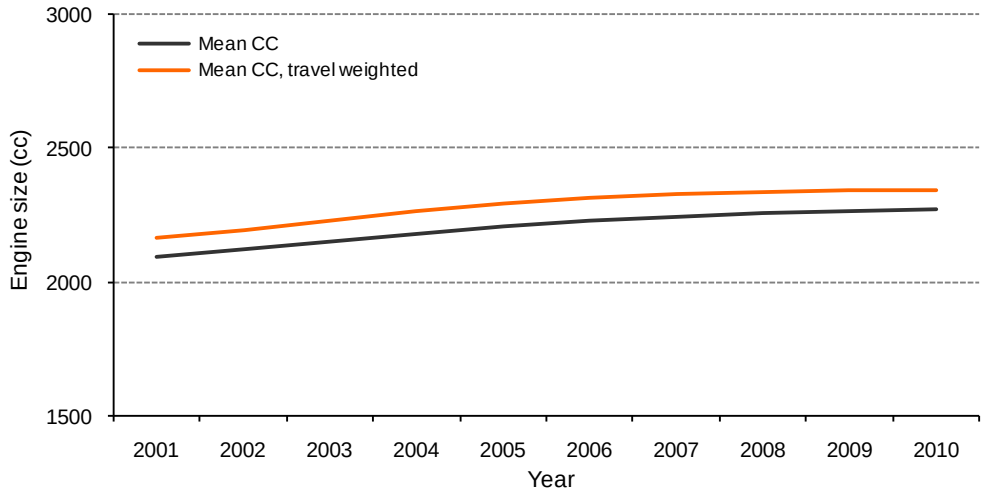


Figure 10.2 : Light fleet travel weighted average engine size



11. ROAD FREIGHT

Heavy road freight vehicles and their trailers are subject to road user charges (RUC)[21]. RUC licences are purchased for the maximum weight each component of the vehicle will operate at, and for a distance. It is possible to estimate[22] heavy freight tonne-km[23] by making assumptions about the typical loading levels, and the fraction of RUC weight that is the weight of the unladen vehicle.

The estimates indicate the slowing of the growth in truck travel and tonne-km growth in recent years was followed by a pronounced drop in 2009, and a partial recovery in 2010.

Figure 11.1 : Truck and trailer travel

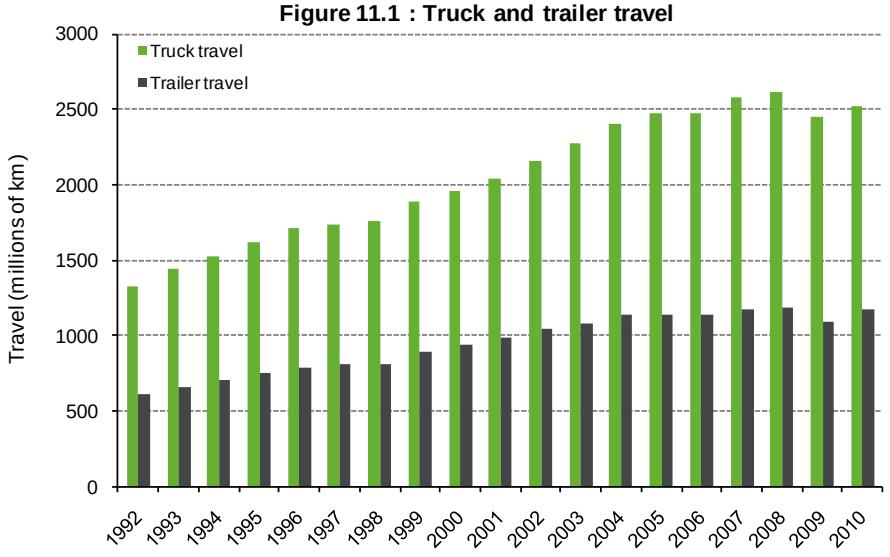
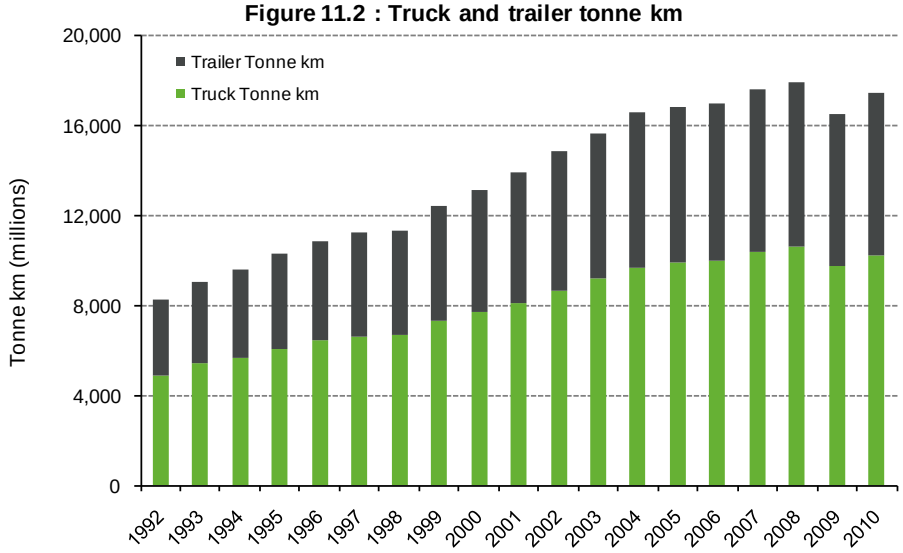


Figure 11.2 : Truck and trailer tonne km



[21] http://www.nzta.govt.nz/commercial/ruc.html.

[22] This methodology was developed by Transport Engineering Research New Zealand (TERNZ) and reported to the Ministry of Transport in the 2007 report 'Estimate of New Zealand's Freight Transport tonne-kilometres'.

- It applies to trucks and trailers with RUC licence weight of four or more tonnes.
- Truck load capacity is estimated as 50 percent of RUC licence weight, the remaining 50 percent being the weight of the truck.
- Trucks are estimated to use 55 percent of their load capacity on average, trailers 45 percent.
- Trailer and semi-trailer load capacity is estimated as 75 percent RUC licence weight, the remaining 25 percent being the weight of the trailer or semi-trailer.
- Trailer and semi-trailers are estimated to use 75 percent of their load capacity on average.

[23] A tonne-km is moving a tonne of freight one kilometre.

An understanding of freight trends is vital to projecting future demands on the roads, fuel and the consequent emissions.

It was long been thought that New Zealand road transport freight growth exceeds GDP growth by about 50 percent, but this is no longer the case. Tables 6 and 7 compare GDP and tonne-km growth, and Table 7 in particular makes it clear that tonne-km growth has dropped relative to GDP growth.

Table 6 shows the growth in tonne-km and GDP. The growth in tonne-km has become more comparable with GDP growth in recent years. In earlier years freight growth exceeded GDP growth by a wide margin.

Table 6

Period	Total tonne km (m)	Tonne km Growth	GDP	GDP growth
1992	8267		79577	
1993	9064	10%	83725	5.2%
1994	9610	6%	88636	5.9%
1995	10277	7%	92481	4.3%
1996	10900	6%	96200	4.0%
1997	11263	3%	98262	2.1%
1998	11334	1%	98223	0.0%
1999	12434	10%	102501	4.4%
2000	13138	6%	106379	3.8%
2001	13935	6%	109181	2.6%
2002	14836	6%	114548	4.9%
2003	15663	6%	119272	4.1%
2004	16610	6%	125637	5.3%
2005	16838	1%	129619	3.2%
2006	16963	1%	130938	1.0%
2007	17633	4%	134609	2.8%
2008	17915	2%	134375	-0.2%
2009	16509	-8%	132270	-1.6%
2010	17477	6%	134915	2.0%

It can be easier to see the patterns if longer time periods are analysed. One way to do this is to examine the compounding annual tonne-km and GDP growth rates over five-year periods. Table 7 shows that the rate of tonne-km growth has been dropping, relative to economic growth.

Table 7

Period	Compounding annual tonne-km growth	Compounding GDP growth
1992-1997	6.4%	4.3%
1993-1998	4.6%	3.2%
1994-1999	5.3%	2.9%
1995-2000	5.0%	2.8%
1996-2001	5.0%	2.6%
1997-2002	5.7%	3.1%
1998-2003	6.7%	4.0%
1999-2004	6.0%	4.2%
2000-2005	5.1%	4.0%
2001-2006	4.0%	3.7%
2002-2007	3.5%	3.3%
2003-2008	2.7%	2.4%
2004-2009	-0.1%	1.0%
2005-2010	0.7%	0.8%

ACKNOWLEDGEMENTS

Kheang Chrun of the NZTA, for advice on Motor Vehicle Register data
Stuart Badger, Sarah Wheaton, Iain McGlinchy of the Ministry of Transport

APPENDIX A: COMPARABILITY WITH OTHER PUBLISHED DATA

The fleet statistics in this analysis are not directly comparable with data published by the Transport Registry Centre. This analysis is based on a slightly different categorisation of the vehicle fleet and assessment of the number of active vehicles.

The information in this publication has been derived from a data extract from the New Zealand Motor Vehicle Register (MVR) which holds information on all active vehicles in New Zealand.

VEHICLE CATEGORISATION

The vehicle categorisation is the one used in the Vehicle Fleet Emissions Model (VFEM)[24], rather than the vehicle split traditionally found in statistics published annually by the NZTA.

The major difference from the NZTA statistics is that in this analysis, light vehicles (under 3.5 tonnes) have been categorised into light passenger vehicles and light commercial vehicles. In the NZTA data, light commercial vehicles are included with trucks, but they may actually be cars, vans, utes or SUVs. The NZTA categorisation is therefore not as useful when projecting the make-up of the fleet for the purposes of estimating fuel use or the level of emissions.

The objective of the VFEM is to estimate the size and activity of the on-road fleet. For this reason, vehicles exempt from licensing (typically those used off-road) and vehicles with restoration licences are excluded from the analysis.

Table 8	MVR Vehicle types	Mass
Light Passenger Fleet	Passenger car/van	Up to 3500 kg
Light Commercial fleet	Goods van/truck/utility Motor caravan Bus (*)	Up to 3500 kg
Bus	Bus	Over 3500 kg
Truck	Passenger car/van Goods van/truck/utility Motor caravan	Over 3500 kg
Motorcycles	Motorcycle ATV Moped	
Miscellaneous (**)	Mobile machine Special purpose vehicle Tractor Agricultural machine	

(*) Light buses have been included in the light fleet as they have the same fuel use and emissions characteristics. Physically they are vans and SUVs.

(**) A small number of vehicles are classified as ‘miscellaneous'. Many of these vehicles are exempt from licensing and therefore not included in these analyses.

[24] The VFEM is a computer model of the New Zealand vehicle fleet that is used to predict emissions. Much of the analysis in this report was carried out as part of work by the Ministry of Transport to improve the accuracy of the VFEM.

VEHICLE CATEGORISATION VS MVR VEHICLE BODY TYPE

The breakdown of vehicle categorisation by vehicle body type for the December 2010 fleet is shown in Table 9.

Table 9

	Fleet Statistics category						
MVR Body Type	Light passenger vehicle	Light commercial vehicle	Heavy goods vehicle	Bus	Motor-cycle	Miscellaneous	Total
Articulated Truck	0	81	6735	0	0	0	6816
Cab And Chassis Only	0	1976	1418	13	0	0	3407
Convertible	24935	0	1	0	0	0	24936
Flat-Deck Truck	0	16628	17527	0	0	0	34155
Hatchback	590102	0	0	0	0	0	590102
Heavy Bus	0	15	201	0	0	0	216
Heavy Van	205	11205	4552	0	0	0	15962
Light Van	43438	100730	256	0	0	0	144424
Minibus	0	12218	0	92	0	0	12310
Mobile Machine	0	0	0	0	0	6644	6644
Motorcycle	183	0	0	0	112997	0	113180
Other Truck	0	13200	63516	0	0	1058	77774
Saloon	1015435	0	11	0	0	0	1015446
Self-Propelled Caravan	0	9682	16712	0	0	0	26394
Service Coach	0	112	0	8210	0	0	8322
Sports Car	51073	0	0	0	0	0	51073
Station Wagon	868088	3921	102	0	0	0	872111
Tractor	0	0	0	0	0	6992	6992
Unknown	0	1	5	0	0	0	
Utility	6109	209617	618	0	0	0	216344
Total	2599568	379305	104919	8315	112997	14694	3219798

NUMBER OF ACTIVE VEHICLES

The number of potentially active vehicles is a critical factor in estimation of travel and fuel use by the fleet. The traditional administrative practice of NZTA has been to include vehicles in fleet statistics unless either their owner actively de-registers them, or the vehicle has not been re-licensed for 12 months. This approach is likely to over-estimate the size of the active fleet, as some vehicles will become inactive well within the 12 months.

An alternative approach has therefore been taken in this analysis. In this case, as with the NZTA practice, vehicles are included in these fleet statistics unless they are de-registered. However, we have also excluded those vehicles where their WoF/CoF renewal is more than six months overdue. This is considered more realistic[25].

VEHICLE TRAVEL ESTIMATES

Vehicle travel estimates have been calculated on the basis of the difference between successive WoF/CoF odometer readings. The resulting fleet travel estimate has been validated against three large-scale traffic counting exercises conducted by the former Land Transport Safety Authority (LTSA).

[25] It is acknowledged that a small number of vehicles will continue to operate without a WOF or registration. As the number of these vehicles is unknown, no attempt has been made to include them, however including the vehicles in the active fleet until their WoF/CoF is six months overdue appears to compensate.