Ministry of Transport
TE MANATŪ WAKA

Sector report

Aging of the light vehicle fleet – May 2011

1 The Scope

At an average age of 12.7 years in 2010, New Zealand has one of the oldest light vehicle fleets in the developed world. This report looks at some of the key variables affecting the light vehicle fleet age and makes estimates of what the fleet may look like in 2020.

2 Background

2.1 Why look at vehicle age?

Vehicle age is important as it is a proxy for a range of vehicle attributes, but especially the safety technology and the vehicle's level of harmful vehicle emissions such as carbon monoxide or fine particulates[1]. It is reasonable to assume that an older fleet will be less safe and have higher harmful emissions than a younger fleet. The importance of age was recognised in the 2010 Safer Journeys strategy which recommended a target of an average age of ten years for the light vehicle fleet, which is comparable to Australia.

2.2 What does our light vehicle fleet look like today?

There are around 3.2 million vehicles on New Zealand's roads and a little over 90 percent of these are light vehicles. Light vehicles are those that have a gross vehicle mass less than 3.5 tonnes and include cars, vans, 4WDs, utes and light trucks.

While heavy vehicles (mainly trucks and buses) are important economically and also in terms of the amount of fuel used and travel undertaken, they make up a very small part of the total fleet (around four percent). This sector report looks only at the light vehicle fleet. However, the issues of vehicle aging are likely to be similar in the heavy vehicle fleet as the age structure is similar.

2.3 The size of the light vehicle fleet

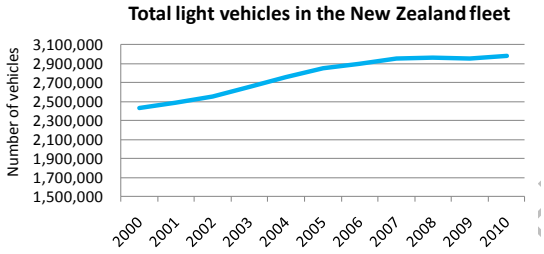
Between 2000 and 2005 there was a relatively large increase in the size of the light vehicle fleet. This was principally the result of the entry of large numbers of used vehicles from Japan. These used vehicles also included small numbers from other countries, especially Singapore along with European models sold in Japan.

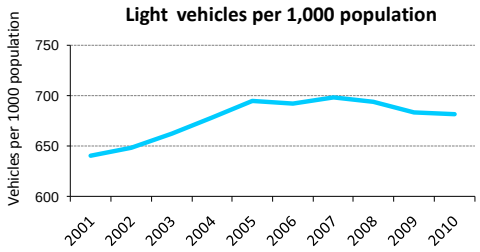
[1] We do not expect an aging fleet to have implications for fuel use (greenhouse gas emissions) as age in itself, is not a good proxy for fuel economy. Average fuel economy for light vehicles has not changed significantly in the past 20 years as technical gains in engine efficiency have largely been traded off against increased vehicle weight from fitting of safety and comfort features. There has also been a steady trend towards the purchase of vehicles with larger engines.

However, for simplicity all used vehicles are referred to in this report as Japanese-used vehicles. Similarly, all vehicles sold new in New Zealand are referred to as New Zealand-new regardless of their origin.

Between 2000 and 2010 the size of the light vehicle fleet increased from 2.44 million vehicles to 2.98 million. As a result of this increase, per capita vehicle ownership increased from around 640 light vehicles per 1,000 people in 2000, to a peak of almost 700 per 1,000 in 2007. Further growth in the fleet size above 700 light vehicles per 1,000 people is unlikely as this is nearly one vehicle per licensed driver (actually 0.98 licensed drivers per vehicle).

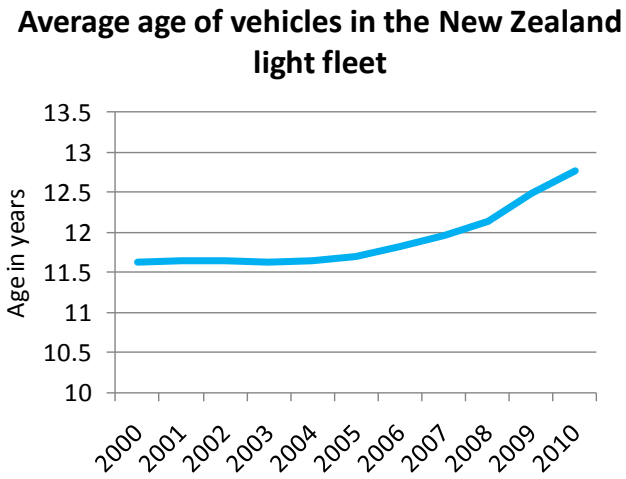
The number of Japanese-used vehicles being imported peaked in 2004 and has been in decline since then, although sales of New Zealand-new vehicles continued to increase over the entire decade. The decline in volume of Japanese-used vehicle imports largely reflects changing economic conditions and suggests that the domestic market had reached saturation. As a result of the reduced number of used vehicles entering since 2004, the size of the light vehicle fleet has remained reasonably stable at around 2.95 million light vehicles since 2007. This means that because the population continued to grow, per capita ownership has fallen slightly, back to 682 vehicles per 1,000 people in 2010 (0.92 licensed drivers per vehicle).





3 The aging of the New Zealand light vehicle fleet

The average age of the New Zealand light vehicle fleet has been increasing steadily since the mid-2000s.



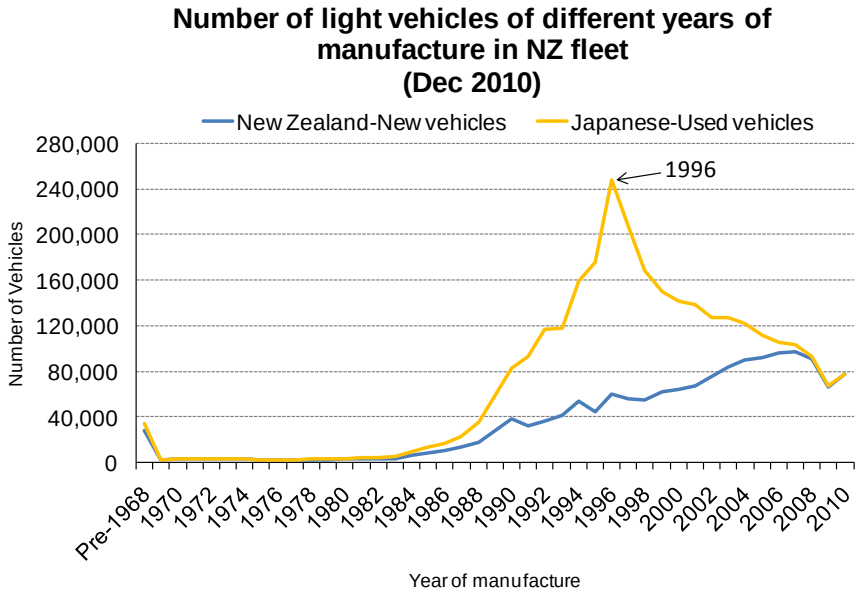
3.1 Aging of the vehicle fleet is a global phenomenon

The development of better rust prevention techniques in the early 1990s, along with improved mechanical reliability, means that most countries have aging vehicle fleets. In the past five years the United States, European and Japanese fleets have all become older, albeit from much younger average ages[2]. The rate at which our fleet has been getting older since 2005 has been broadly consistent with other countries.

Australia, where the light vehicle fleet increased in size by 10 percent between 2005 and 2009, is the only place we can identify where a light vehicle fleet has become younger in recent years. However, despite this large influx of new vehicles, the average age reduced by only 0.2 years over this period (from 10.1 years to 9.9 years).

3.2 We have a 'peak' of Japanese-used vehicles

We expect that over the next ten years the New Zealand fleet will continue to get older. This is because past buying and importing patterns have created a peak of vehicles in the age band of 1995–1997. Over 20 percent of all light vehicles on the road in New Zealand in 2010 were manufactured in just these three years. As this peak of vehicles gets older, the average age of the fleet will also get older. Significant intervention would be required to change this process.

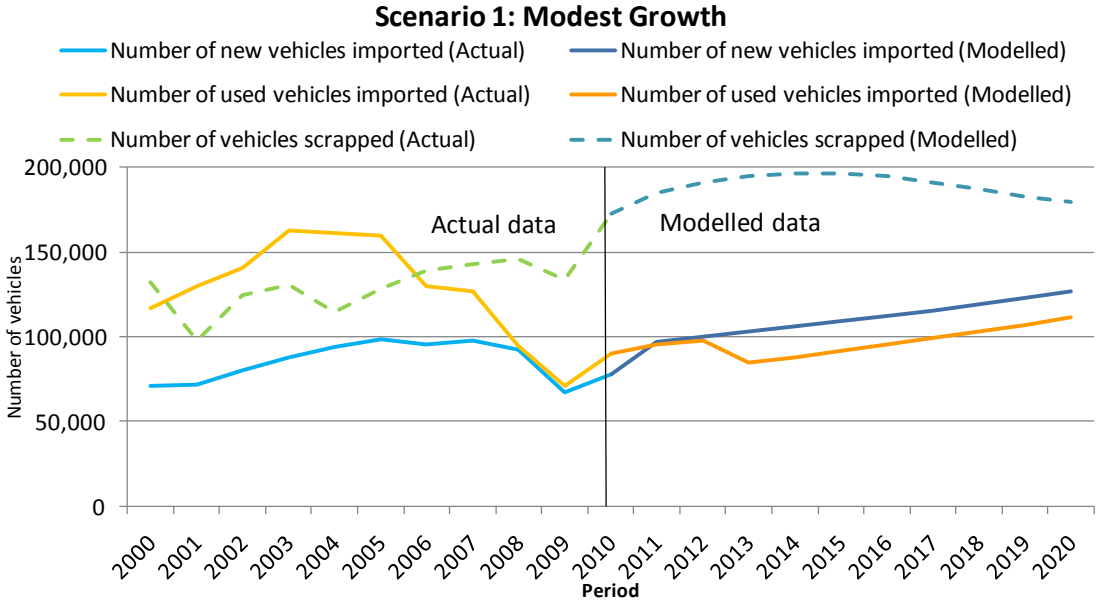


3.3 The Ministry's model of fleet turnover

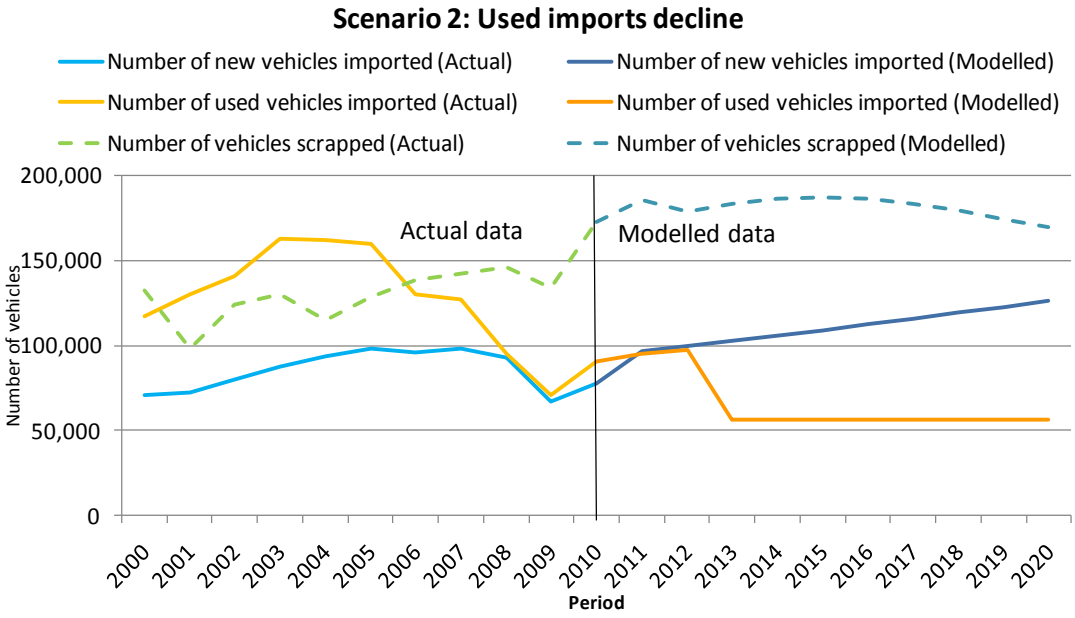
The Ministry has developed a simple model to allow us to test various scenarios of how the fleet will age up to 2020. Two scenarios are presented in this report. Under the first scenario, referred to as the 'modest growth' scenario, we assume that the volumes of both new and used vehicle imports increase by three percent per annum and that there are no changes to the current scrappage patterns. We also assume that used imports are reduced back to 2010 levels in 2012 (due to effects of the 2007

[2] The average age of the light vehicle fleet in 2009: USA (cars only) 10.6 years, Japan 7.5 years, Europe (14 core states) 8.2 years

Vehicle Exhaust Emissions Rule), before growing again at three percent. Given the recent economic conditions the 'modest growth' scenario may be on the optimistic side in its assumptions around levels of imports.



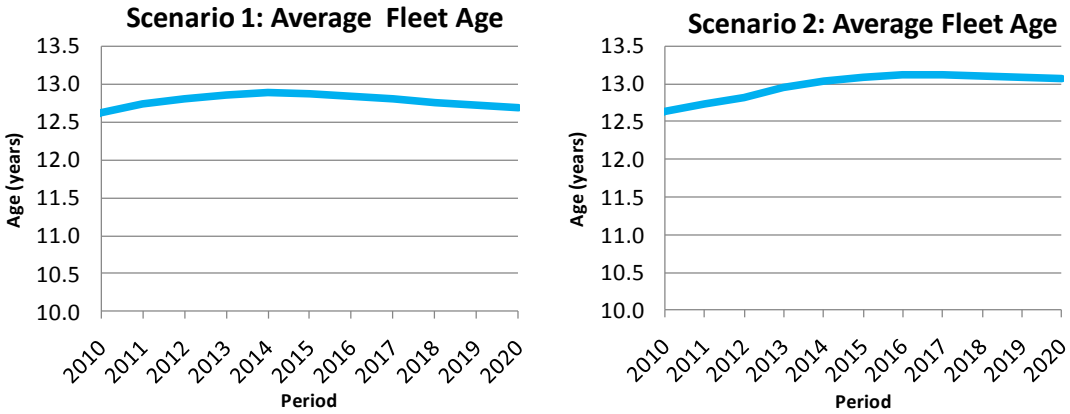
In the second scenario, which we refer to as 'used imports decline', we assume that the volume of New Zealand-new vehicles being imported continues to increase at three percent per annum, but that general economic conditions and the absence of the circumstances that led to the peak of vehicles being created (discussed in 3.5 below), leads to reduced imports of used vehicles. In this scenario it is assumed that imports are reduced by the emissions Rule in 2012, as in the other scenario, but that they never recover, staying constant at 56,000 vehicles. As a response to reduced imports of used vehicles, we assume that scrappage rates of all vehicles are reduced by ten percent (ie ten percent fewer vehicles are scrapped each year and all vehicles stay in the fleet longer).



Because of the complexity of modelling dynamic changes, this relatively simple model does not make any allowance for the effects of the scrappage age increasing. All estimates of age are therefore likely to be minimums.

3.4 How much older will the light vehicle fleet get?

The model shows that under these two plausible scenarios, the average age is likely to rise slightly from 12.7 years in 2010 to reach between 12.8 and 13.1 years old by 2020.



We have also modelled a wide range of other scenarios ranging from ceasing the import of Japanese-used vehicles entirely, through to a 20 percent increase in the level of imports of both new and used vehicles. We have also modelled a range of scenarios on the effects on the average age of people retaining their vehicles for longer (reduced scrappage).

We found that for average fleet age:

- the model is most sensitive to assumptions about the rate of scrappage. Scenarios where fewer vehicles are scrapped cause the average age of the vehicle fleet to increase the most
- changes to assumptions around the rate of vehicles entering the fleet, whether they be new or used, had relatively little effect on the average age
- the large peak of 1995–1997 models means that the average age of the fleet in 2020 does not change significantly under most (realistic) scenarios for levels of import or scrappage

Once the peak of Japanese-used vehicles leave the fleet we can expect the fleet average age to start to get younger, but this will not be till after 2020. We have not attempted to look at dates after 2020 as it requires too many assumptions, but even at 2020 most scenarios show the average age of the fleet will still be increasing, or only falling slightly.

3.5 The fleet size may decrease in the next 10 years

One of the key issues affecting the aging of the fleet is the rate at which vehicles exiting the fleet are replaced. It is likely that as this 'peak' of Japanese-used vehicles exits the fleet over the next ten years the vehicles exiting will not be replaced by new(er) vehicles at the same rate at which they are scrapped. This is because the conditions that led to their arrival in large numbers from 2000 to 2005 no longer exist.

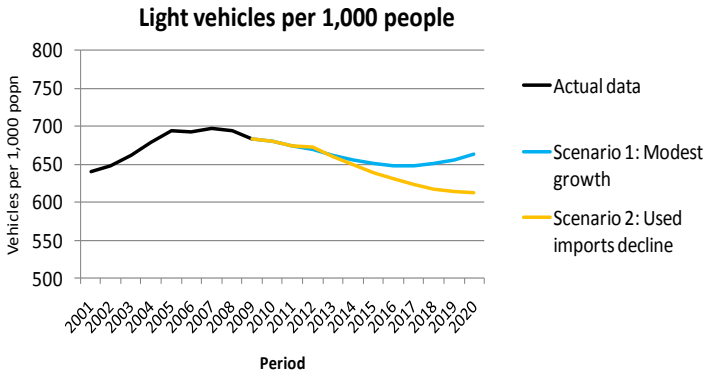
The conditions in the early 2000s that led to the peak of vehicles entering the fleet included:

- strong economic growth in both Japan and New Zealand leading to increased availability of older vehicles in Japan (as Japanese people bought new vehicles) and increased demand for such vehicles in New Zealand
- readily available, low cost credit
- a strong exchange rate against the Japanese Yen
- relatively little competition from other buyers in the Japanese market for used vehicles
- no restrictions on the type or age of vehicles able to be imported

None of these conditions is present in 2011.

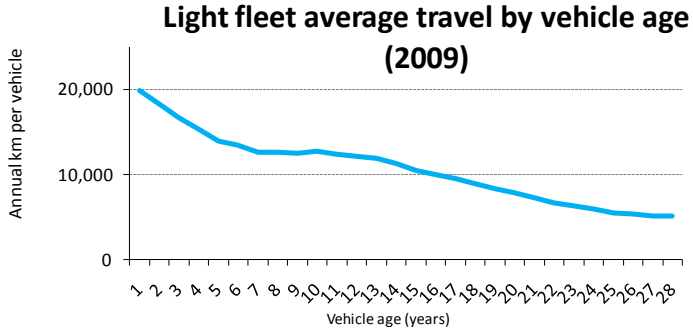
If the vehicles in the peak are not able to be replaced at the same rate at which they entered, then there are two possible outcomes. Either the fleet will get smaller (both per capita and in absolute terms) or people will retain their existing vehicles for longer, further increasing the average age of the fleet.

Virtually all scenarios show the fleet size remaining roughly the same size as it is in 2010. This means that the number of vehicles per 1,000 people (using population projections from Statistics NZ) will fall. These effects will be compounded if the supply of used vehicles is further constrained due to external factors such as the recent earthquake and tsunami in Japan.



3.6 What happens to vehicle travel if the average age of vehicles increases and vehicle ownership declines?

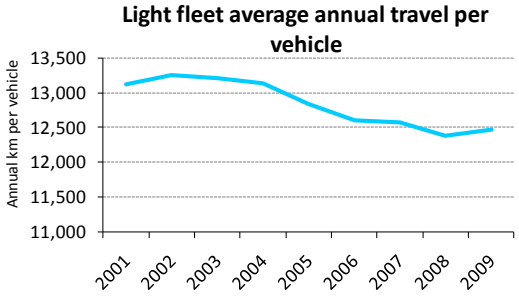
There is currently a strong relationship between the age of a vehicle and the distance it travels. This relationship has shown little change since 2000.

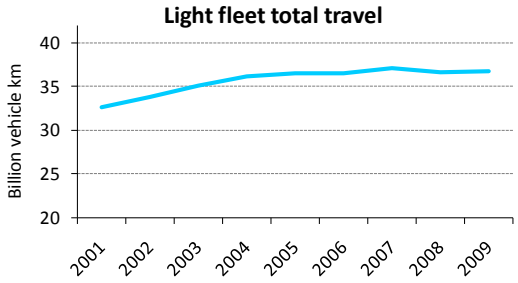


What has changed is the length of time vehicles stay in the fleet. One of the effects of increasing average age along with improved reliability is that vehicles are travelling further in their 'additional' years before they are scrapped. Since 2000 the average distance travelled before scrapping has increased by almost 40 percent for New Zealand-new vehicles and 22 percent for Japanese-used vehicles.

A key question that arises from the modelling therefore is: 'If the fleet gets older, and the size of the fleet also gets smaller; will the total amount of vehicle kilometres travelled (VKT) decline?'

There is no straightforward way to answer this question as it will be affected by other variables including fuel price and levels of employment. However, we know that total annual VKT per vehicle declined through the 2000s as vehicle numbers increased, while the total travel remained reasonably constant.





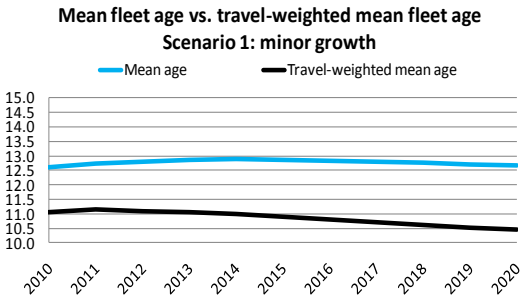
If we assume that the total national VKT continues to remain constant, this implies travel per vehicle will increase. This implies an increasing percentage of the travel will be being carried out by old (20+ years) vehicles.

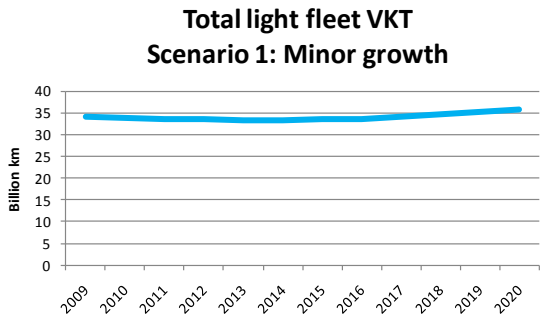
3.7 What effects will this have on age-weighted travel?

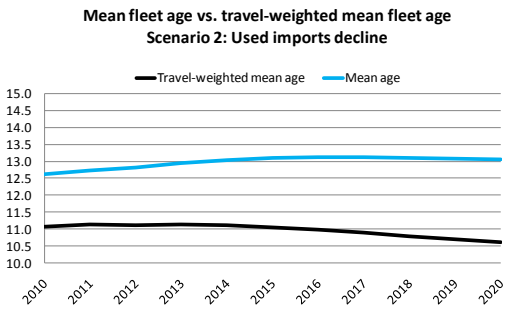
For a range of policy issues it is more useful to look at the travel-weighted age, rather than the age of all vehicles in the fleet. In 2009 the travel weighted age of New Zealand's light vehicles was 11 years, although the average age was 12.5 years. The travel weighted age is usually younger than the actual average because newer vehicles travel further.

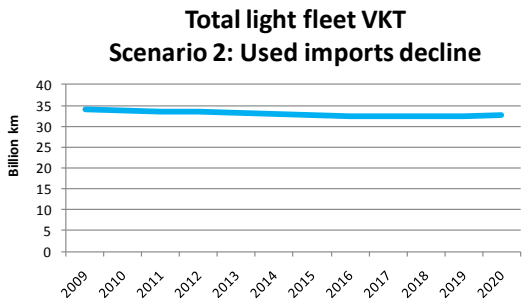
For the model we assume that the total annual travel by a vehicle varies by age and that the travel by vehicle of a specified age remains the same as it was in 2008 (ie an 11 year old vehicle in 2018 will travel the same distance per year as an 11 year old vehicle did in 2008). Therefore, if the number of vehicles in the fleet remains reasonably constant and the fleet as a whole becomes older, the model assumes that the total amount of travel done by the fleet will decrease. Accordingly the travel weighted age is expected to become slightly younger, relative to the mean fleet age, as newer vehicles do proportionately more travel.

Because the average age of the fleet does not change significantly in either scenario, the total VKT of the light fleet remains reasonably constant under both scenarios as well.





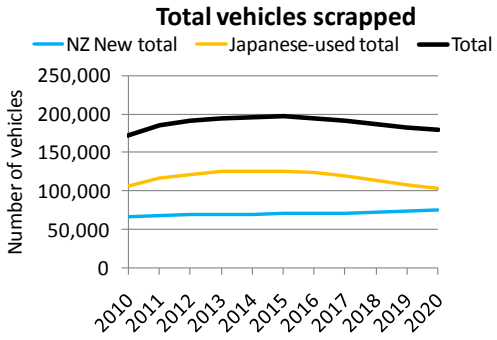


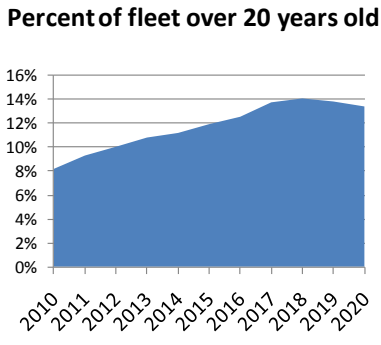


In reality, if imports of vehicles decreased and the number of vehicles per capita fell, we would assume that people would actually drive their older vehicles further than they do at present. We would therefore expect the travel weighted age to more closely follow the mean age curve than the model predicts.

3.8 What other changes may happen to the fleet before 2020?

Both of the scenarios show that the greatest number of vehicles will be scrapped around 2016, as the peak works its way through the fleet. However, many vehicles in the 1995–1997 peak will remain in the fleet long after 2016. Under both scenarios, by 2020, more than 15 percent of the light vehicle fleet is expected to be more than 20 years old. This is likely to have implications for road safety and for exhaust emissions.





4 What are the consequences of an aging fleet?

Vehicle age is a reasonable proxy for a number of variables, such as a vehicle's level of safety and level of harmful emissions. In both cases there is some deterioration of features with age as vehicle components wear or are damaged. It follows that an older fleet will usually be more polluting and less safe than a younger fleet, especially if more travel is being done by the oldest part of the fleet.

There are a range of possible issues for New Zealand associated with an aging, and possibly shrinking, light vehicle fleet:

- new technologies, especially safety and environmental technologies, will not be taken up as quickly as they could be
- there will be delayed benefits to society from technologies that require a critical mass of vehicles to be using the technology before they will become viable. NB The most obvious example of this is in the area of intelligent transport systems (ITS). ITS uses two way communication between vehicles and roadside transmitters and has great potential as a tool to reduce congestion and to aid revenue collection, but requires a pool of vehicles to be using the technology to justify development
- there may be welfare issues arising from decreased mobility if there is reduced access to vehicles for travel to employment or for social engagement

Any quantification of costs associated with an aging fleet would require predictions of the benefits foregone from not introducing technology changes over the next ten years. It is not clear that we have sufficient information to allow us to do this and further work would be required to address these questions.