NZ Vehicle Road Safety Data Pack

Ensuring our transport system helps New Zealand thrive

September 2018
Scope of this working group

• This reference group will look at the role vehicles play in road safety outcomes for vehicle occupants, other road users, and for the wider road transport system

• We will also touch on the contribution of vehicles to environmental and health harms - but CO₂ emissions are out of scope as they are being addressed through other forums

• The role of road user behaviour and infrastructure is also out of scope (but we recognise there is considerable overlap)

• The time period for this strategy is 2020-2030
The structure of New Zealand’s vehicle fleet
New Zealand’s vehicle statistics

The fleet grows slightly faster than our population

~4 million vehicles
- ~3,000,000 light petrol vehicles
- ~700,000 diesel powered light vehicles
  - mostly vans, light trucks and 4WDs (very few light vehicles)
- ~145,000 diesel heavy vehicles (trucks and buses)
- ~170,000 motorcycles

Number of vehicles vs population (1963 - 2017)

- All road vehicles as at year end
- Population
Peaks of different ages have formed around minimum standards for used vehicles.
1996 model year peak is visible, but second peak of 2005 models has formed since 2013.
As vehicles in these peaks get older, the average may get older.
Our light vehicle fleet has not appreciably aged since 2013, and the average age has only increased by two years since 2000.

The trend for increasing average age is similar to many other OECD nations, including Japan and the United States.
Globally, average vehicle fleet age is related to GDP

Average age of light vehicle fleet and per capita GDP (US$) in various countries

- New Zealand has an average fleet age of 14.2 years old and 7 fatalities per 100,000 people
- Finland has an average fleet age of 12.7 years old and 4.7 per fatalities 100,000 people
- Norway has an average fleet age of 10.5 years old and 2.6 fatalities per 100,000 people
Most households have 2 or more motor vehicles

Number of motor vehicles

Source: Statistics New Zealand
Most vehicles entering our fleet come from Japan

- Approx. half the vehicles entering the fleet in any given year are sold as new and half are used
- Up to 80% of new vehicles are purchased by companies
- Almost all used vehicles are purchased by private citizens
- The majority of new vehicles are imported from Japan and Europe
- Used vehicles are almost entirely imported from Japan, including European vehicles sold new in the Japanese market

Where light vehicles entering the fleet in 2017 were manufactured

- 85% from Japan (and other Asian countries)
- 14% from Europe
- 3% from Australia
- 0.2% NZ built
- 0.01% other

- 73% for used vehicles
- 24% for new vehicles
## Changes in preference for vehicle type (new cars)

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<td>24%</td>
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<td>3%</td>
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<td>687</td>
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- Clear increase in demand for SUV’s and utes, over passenger cars
- 74% of passenger car sales are small, light and micro-sized vehicles
- The increase in sales of utes/4WDs has implications for pedestrian safety
- Almost all new vehicles entering the vehicle fleet are ANCAP 5 star safety rated, primarily driven by health and safety legislation

Source: Motor Industry Association
Used vehicles safety ratings

Age and safety profile (CWR) of used imports (2016)

- Compared to new vehicles, used vehicles that were registered (in 2016) cover a wide range of safety star ratings
- Even some near-new (2012) used-vehicles have one star ratings
In service fleet – vehicles changing ownership

- The data that NZTA has access to shows only a third of all light vehicle sales are likely to involve a dealer selling to the public.

- Question: Is this data accurate and reflect your understanding of the market?

### Change of registered person transactions for passenger cars and vans (2017)

- Public to Trader: 15%
- Trader to Public: 19%
- Trader to Trader: 5%
- Ex-Overseas registration: 15%
- Public to Public: 46%

Source: NZTA
On average, older vehicles travel less

Light fleet average travel by vehicle age

- **Light commercial**
- **Light passenger**
- **Light fleet**

Average age of vehicles:
- 8,600 km/yr
- 12,100 km/yr
- 14,900 km/yr
- 17,200 km/yr
- 23,600 km/yr
Scrappage

• The average age of scrapping a light vehicle has risen by just over two years (17.2yrs – 19.5yrs) since 2000
  • We scrap vehicles about the same age as Australia and the US
• Distance is a better predictor of scrappage than age - people dispose of vehicles due to mechanical failure rather than age
• Distance travelled over vehicle life has steadily increased since 2000 due to improved mechanical reliability
What does the public know about vehicle safety?
The reasons why people buy or replace a vehicle

- Previous vehicle getting too old/high mileage: 39%
- Change in personal/family circumstances: 22%
- Like to replace vehicle every few years: 18%
- Previous vehicle died: 16%
- First car/needed a car (16-19yrs): 5%

Source: Vehicle Safety Awareness Research, Glasshouse Consulting, November 2014
Young drivers spend the least on vehicles

66%
Young drivers on a restricted license spend less than $5,000

37%
Young drivers spend less than $3,000 on a car

Source: TradeMe and Young Drivers, Safer Vehicles, Colmar Brunton, September 2017
Vehicle safety in consumers minds

• Do people know the value of a vehicle’s role in road safety outcomes?

  12% believe vehicle age contributes to serious crashes
  20% believe encouraging newer vehicles is an effective solution
  27% know the safety rating of their car

• 72% believe it is reckless behaviour
• 65% driving too fast
• 62% driver mistakes

• Most believe enforcement, encouraging more care, and road improvements are effective solutions to reducing road risk

Source: Better Conversations on Road Risk Summary of National Research Findings, The Navigators, October 2017
Proxies for safety

• We use a number of safety proxies to help us determine if a vehicle is safe

- WOF
  • Perceived by parents and young drivers as being an indicator of a car's safety
  • Reliability and safety used interchangeably

- Size
  • Belief among parents that a smaller car is safer for their children as they can't get into trouble with a smaller (less powerful) car

- Age, Brand
  • European seen as the safest, followed by mainstream brands
  • Asian brands seen as least safe.
  • Belief safety means spending more

Source: Young Drivers, Safer Vehicles, Colmar Brunton, November 2017; TfNSW Snapcracker Research, 2017
Where can we have influence?
Points of influence

There are three broad points at which we can influence the vehicle fleet:

- **Entry**
  - New – 145,275
  - Used – 161,418

- **In service**
  - 3,300,000

- **Exit**
  - 158,875

More vehicles entering than leaving means our fleet grows by approx. 150,000 per year.

Data is for 2017
Safety profile of the fleet
Data collection

• Most of our data about road safety and vehicles comes from Police reports
  • stored in the Crash Analysis System (CAS)
• This data forms the basis of the next section
• We get data from Police reports about what they see and what they perceive to be the causal factors in a crash - some information is subjective and other data is hard to collect

Question: Can we improve the evidence on what factors make a direct contribution to the cause of a crash?
Determining vehicle safety – rating systems

There are two vehicle safety rating systems for consumers:

- **ANCAP rating for new cars**
  - The vehicle scores a rating based on its performance in a series of crash tests that are repeatable under controlled conditions
  - Almost all new light vehicles entering the fleet are five star ANCAP

- **Used Car Safety Rating for used cars**
  - A key input to a vehicle's Used Car Safety Rating (UCSR) is the Crash Worthiness Rating (CWR) achieved for that vehicle
  - A vehicle scores a rating based on the outcome in real world crashes for the vehicle occupants and those outside the vehicle, as well as the presence of crash avoidance technology
  - Calculations are made by Monash University Accident Research Centre (MUARC)
The CWR Rating of Fleet is improving

2017 Light Passenger Fleet CWR Proportion by star rating

- 1 star: 30%
- 2 star: 15%
- 3 star: 22%
- 4 star: 14%
- 5 star: 19%

CWR Star Rating of Light Passenger Fleet by year

- The number of one star rated vehicles is decreasing as they ‘drop out’ the back of the fleet
- The number of five star rated vehicles is growing, but slowly
Vehicle age varies by council area

- There is a wide variation in the average age across New Zealand
  - 10 years difference between youngest and oldest fleet in NZ
- The youngest vehicles are in cities
- The oldest fleets are in the South Island
- We do not know why the average vehicle age increases as you go south
- If the average vehicle age was important for predicting crashes, you would expect to see different crash rates in different parts of New Zealand

Map of average age of light vehicles (Dec 2014)
- Blue is younger than average
- Red is older than average
Crashes are not directly related to average vehicle age

- There is no statistical relationship between average vehicle age in a region and crash statistics
- Vehicle age (and safety standards) are a predictor of surviving crashes, but not of being in one
Vehicles & relationship to death & serious injury (DSI) crashes
79% DSI crashes in which vehicles played a role.

18% of fatalities could have been avoided if the car was fitted with ESC and/or Side Curtain Airbags.

66% of DSI are in 1 & 2 Star cars which make up 45% of the fleet.

DSI crashes and Warrant of Fitness (WOF)

Vehicles involved in fatal and serious injury crashes that have a current WOF at time of crash, 2013 - 2017

- No: 6%
- Yes: 14%
- Unknown: 81%

Vehicles involved in fatal and serious injury crashes that have a current WOF at time of crash

WOF rule change on frequency of inspections

Ministry of Transport
National Transport Model
Factors contributing to DSI crashes

Vehicle factors are 13th most important by social cost

The relative importance of these factors has increased slightly (1%) since 2000

Vehicle factors are a failure or problem with the headlights, brakes, steering (defective or failed suddenly), tyres, windscreen or mirrors, mechanical (engine and transmission failure), body or chassis (including defective seatbelts and airbags), or load (insecure, over-dimension, too heavy).
Cars with lower safety ratings are over-represented in serious crashes

Higher safety rated vehicles are more likely to have active safety features that help drivers avoid crashes, as well as passive safety features that protect the occupants if a crash occurs and can reduce the likelihood of serious harm.
We know that younger drivers (light blue) are more likely to be in a crash.

Newer cars are more likely to be owned by older drivers.
The graph shows the age of the vehicles in relation to the age of the driver involved in fatal & serious crashes in 2017. The blue line (right axis) is the number and age grouping of light vehicles in the fleet. The bar of vehicle age groups shows that there was a higher proportion of young drivers in older vehicles than in newer vehicles.
Vehicle safety is more than cars

- Occupants of light vehicles make up the majority of DSI’s, but proportionately per kilometre travelled they are much safer than most other modes of transport (excluding buses)
- The safety of light vehicles is improving with new technology
- But there are other vehicles and road users to consider
Motorcyclists face the highest risk per km travelled

Deaths/serious injuries per 100 million km travelled (July 2010 - June 2014)

- Motorcyclists: 180
- Cyclists: 50
- Pedestrians: 20
- Car/SUV/Van/Ute drivers: 10
- Car/SUV/Van/Ute passengers: 10
- Bus passengers: 5
And younger motorcyclists have a much higher risk...

Average number of motorcyclist deaths or serious injuries in crashes per distance motorcycled, by age (2009–2014)
Followed by cyclists….

- Approximately nine in every ten reported cyclist casualties occurred on urban roads.
- Vehicles are primarily responsible in nearly two-thirds of cyclist-vehicle collisions.
- Of these crashes, the majority failed to give way to, or did not see the cyclist.
- Crashes on the open road are less common but more likely to be fatal.

![Percentage of cyclist deaths and injuries by road type (2013–2017)](image)
Young and elderly pedestrians are the most vulnerable

Pedestrian deaths or serious injuries in motor vehicle crashes per time spent walking by age and gender (annual average July 2010 – June 2014)
Heavy vehicles in serious crashes

• Deaths from crashes involving trucks are rising - currently contributing 20% of fatalities but only 6 percent of the total distance travelled

• Deaths from crashes with buses are relatively low (average 6 per year since 2000)

• Approx. 90% of those killed in heavy vehicle crashes are not the occupants, but the other road users involved
  - regardless of what caused the crash, there is a much higher probability of death or serious injury in a collision between a heavy vehicle and a light vehicle or vulnerable road user, than in a collision involving only light vehicles

• Approx. 20% of those killed in collisions with trucks are vulnerable road users
Heavy vehicle fatalities per km are relatively stable

Since 2000:

- heavy vehicles have increased by 50% (95,000 – 144,000)
- buses have increased by 130% (4,600 – 10,700)
- 40% increase in distance travelled by all heavy vehicles (2.33 - 3.26 billion km)
- fatalities per kilometre travelled have remained relatively stable

Fatal truck crashes per 100 million kilometres travelled by trucks

Note: Truck km travelled based on odometer readings at time of WoF
Road transport emissions show a mixed picture

- Carbon monoxide (CO) and nitrogen oxide (NO) are significant pollutants from our light fleet
- Per-vehicle emissions of CO and NO have decreased significantly between 2003 and 2015
- CO emissions from petrol vehicles are no longer a significant health concern
- Emissions of fine particulates (PM10) and NOx (NO and NO$_2$) remain the most significant health concern. These are mostly from diesel vehicles
- As well as air quality, dust, noise and stormwater runoff are transport related environmental issues
Future trends for New Zealand’s vehicle fleet
Future fleet composition based on current policy

If current trends **continue with no policy or regulatory interventions**, we could expect:

- the continued move to SUVs and utes from passenger cars
- the continued growth of the electric vehicle market
- the continued growth in number of vehicles carrying freight
- higher levels of automation in our vehicle fleet – active safety features and higher autonomy levels
- a move away from car ownership to shared mobility (car/ride sharing etc)
ANCAP’s Safety Road Map 2025

ANCAP has been steadily increasing the levels of technology needed for a vehicle to achieve a five star rating.

From 2020 the following active safety features will be required for a vehicle to achieve a five star safety rating:

- Driver Monitoring (2020)
- Automatic Emergency Steering (2020, 2022)
- Autonomous Emergency Braking (2020, 2022)
- Vehicle to Vehicle Data Exchange and Vehicle to Infrastructure communication (2024)
What ANCAP said about new technologies

“What potential safety benefits of automated driving are huge. If we can eliminate human error, we should see road casualty numbers tumbling and many lives being saved.”
Advanced driver assistance systems (ADAS)

**General info:** driver support such as active headlights, speed limit alerts, traffic conditions, weather, and warnings about things ahead

**Warnings:** about immediate hazards like vehicles in blind spots or when the driver is tired/distracted

**Active intervention:** Vehicle will actively seek to avoid collision by braking or swerving etc. (AEB, ESC, speed assist)

**Post Accident:** Vehicle will call emergency services and advise location and severity of accident, or if less severe ring a tow truck

► ADAS technologies are the building blocks of automation
New technologies we can expect in used cars

Vehicles entering the Japanese domestic car market with specific safety technologies

- Rear-view camera
- Automated following distance warning system
- Lane departure warning (LDW)
- Advanced emergency braking system (AEB)
- ESC
- ABS with traction control system
- Emergency stop signal
- Low-speed autonomous emergency braking (AEB)
- Pedal misapplication prevention device
- Discharge headlight / high-intensity discharge lamp
New Australasian research on the benefits of intelligent transport systems

The full adoption among the light passenger vehicle fleet of a selection of key automated driving and connected vehicle safety applications has the potential to prevent between …310-485 fatal and serious injury crashes in New Zealand each year”

Safety Benefits of Cooperative ITS and Automated Driving in Australia and New Zealand