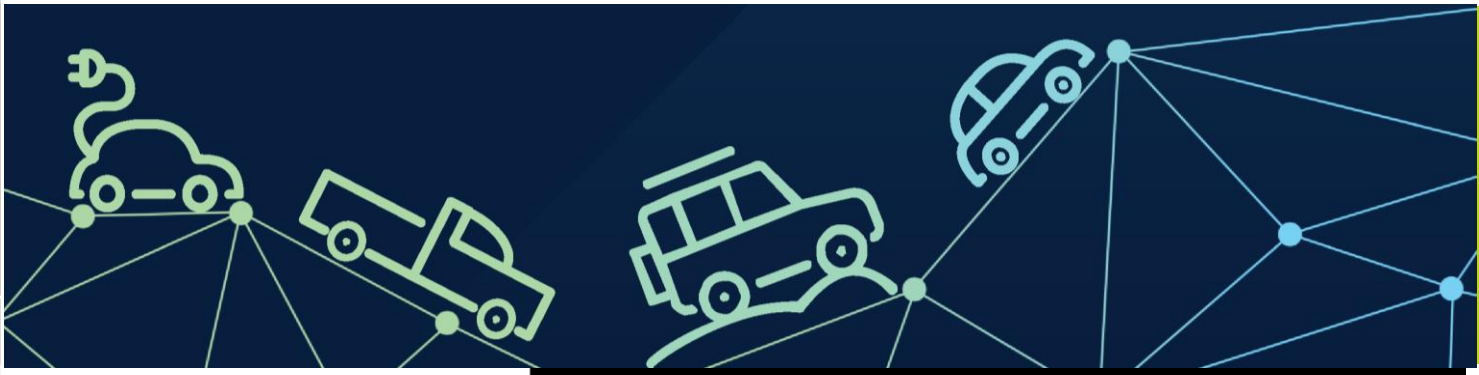
Australian Government

Department of Infrastructure, Transport, Regional Development and Communications

Bureau of Infrastructure and Transport Research Economics



Australia's light vehicle fleet – some insights

At a glance

- This report provides information on the composition of Australia's light vehicle fleet (passenger vehicles or PVs, Light Commercial Vehicles or LCVs and motorcycles), and how it has varied over time and across cities and regions. The main data source is the Australian Bureau of Statistics' (ABS') *Motor Vehicle Census* (MVC) for 2018. The results provide an evidence base for vehicle related policy, including for road safety and environmental standards. The ABS is discontinuing the MVC and BITRE is working with Austroads to develop a replacement. BITRE also intends to deliver regular national reporting on new vehicle sales, vehicle characteristics and advanced safety features, commencing with the *Australian Infrastructure Statistics Yearbook 2021*.

Composition of fleet

- As of 2018, Australia's light vehicle fleet comprised 78 per cent PVs, 17 per cent LCVs and 5 per cent motorcycles.
- The majority of PVs ran on petrol (86 per cent), 12 per cent on diesel and the rest on LPG/dual fuel (1.4 per cent), whilst 34 per cent of LCVs ran on petrol, 63 per cent on diesel and 1.4 per cent on LPG/ dual fuel.
- Registered electric vehicles (EVs) were dominated by Tesla (i.e. Tesla Model 3, Tesla Model S and Tesla Model X) and the Nissan Leaf.
- The average age of PVs (9.8 years) is less than that of LCVs (10.5 years) and motorcycles (10.4 years).
- The most common vehicle in Australia's light vehicle fleet in 2018 was the 2003 Holden Commodore.

Changes in the fleet over time

- Sales of Sport Utility Vehicles (SUVs) have grown strongly in recent years, with the SUV share of the national PV and LCV fleet rising from 17.6 per cent in 2013 to 25.3 per cent in 2018. Between 2013 and 2018, there was strong growth in the SUV share across all jurisdictions, with Victoria and Tasmania recording the largest increases (up 8.6 and 8.1 percentage points, respectively). However, the Northern Territory had the highest proportion of SUVs at 30.6 per cent of its PV and LCV fleet in 2018.
- Between 2013 and 2018 average vehicle age showed minimal change (9.86 years versus 9.92 years) but there were significant shifts towards more light vehicles with four cylinder engines (up 7.4 percentage points) and more diesel-fuelled light vehicles (up 6.8 percentage points). These shifts were observed consistently across the capital cities and regional Australia.

Spatial differences in composition of the fleet

- LCVs had greater prominence in regional areas, contributing 39 per cent of the light vehicle fleet in remote areas and 32 per cent in inland country areas, compared to 17 per cent nationally.
- Use of diesel fuel by light vehicles was highest in remote areas (43 per cent versus 21 per cent nationally).
- Canberra and Sydney had the highest proportion of EVs in their PV fleet (0.13 and 0.09 per cent).
- Tasmania had the oldest light vehicles (average age of 12.3 years for PVs and 13.4 years for LCVs), whilst the Northern Territory and the Australian Capital Territory had the newest vehicles (average ages between 9.1 and 9.3 years).

- Capital cities have comparatively newer vehicles than regional areas (9.4 years versus 10.7 years for PVs and 9.5 years versus 11.5 years for LCVs). Average vehicle age was lowest for inner city locations such as Adelaide City and Melbourne City (at 6.0 years for PVs) and highest in Tasmanian regions such as South East Coast (15.0 years) and Huon - Bruny Island (13.9 years).
- While the 2003 Holden Commodore was the most common light vehicle across capital cities, coastal cities, inland cities, coastal country and inland country areas, the 2012 Toyota Hilux was the most common vehicle in remote areas.

1 Introduction

This Information Sheet presents results of a study into the Australian light vehicle fleet (age profile, fuel mix, popular vehicle makes and models) and how it varies across different geographical settings. The paper addresses the following key research questions:

1. What is the light vehicles[1] fleet size and composition in capital cities and the rest of Australia?
2. How do the key vehicle characteristics (e.g. age, fuel type, cylinders, tare weight) vary across different types of regions (e.g. coastal city, inland city, coastal country, inland country and remote) and across specific cities and regions (e.g. Greater Capital City Statistical Areas (GCCSAs), Significant Urban Areas (SUAs), ABS Statistical Area 3 or SA3)?
3. What are the most popular light vehicle models in different types of regions (and specific cities and regions)?
4. Are there any significant changes in vehicle characteristics over time, from 2013 to 2018? In particular, this analysis will explore:
   a. Changes in the significance of SUVs and Utilities in the light vehicle fleet.
   b. Changes in the average rate of fuel consumption by PVs and LCVs.
   c. Changes in fuel types, number of cylinders, average age and tare weights of PVs and LCVs.
   d. How the identified trends vary across broad geographies (i.e. capital cities and regional areas).

This Information Sheet uses the ABS *Motor Vehicle Census* (MVC) to provide a stocktake of the light vehicle fleet as of 2018, with a focus on how key characteristics of light vehicles vary across different geographic settings. ABS is discontinuing the MVC and BITRE is working with Austroads to develop a replacement collection.

BITRE also intends to deliver regular national reporting on new vehicle sales, classified by key vehicle characteristics (e.g. vehicle age, fuel type – including EVs) and advanced safety and driver assist features. Initial reporting will commence with the *Australian Infrastructure Statistics Yearbook 2021*, building progressively over time.

2 Building on other BITRE research

BITRE has previously presented Australian data on how realised rates of fuel consumption varied over time, and how the rates depended on key vehicle characteristics, such as the number of cylinders, fuel type and vehicle age. It also investigated state/territory differences in fuel economy and presented new small area estimates of the average rate of fuel consumption for Australia's regions. These small area estimates were based on the composition of the passenger vehicle and motorcycle fleet in the region, and were derived at both the Statistical Area Level 3 (SA3) and Statistical Area Level 4 (SA4) scale. The key data sources for that research were the ABS *Survey of Motor Vehicle Use* (SMVU) 2016 and the ABS *Motor Vehicle Census* 2016. The results were published in BITRE (2017), *Fuel economy of Australian passenger vehicles — a regional perspective*. The research identified some key differences in the vehicle fleet across regions, but did not explore them in detail. The current study explores these differences in greater depth using the most recent data, and investigates changes that have occurred since 2013.

[1] In this study, light vehicles include passenger vehicle (Conventional Passenger Vehicles and Forward Control Passenger Vehicles), LCVs (Panel Vans and Utilities) and motorcycles.

3 Data sources and methodology

The main data source for this study is the ABS 2018 *Motor Vehicle Census* (MVC) (ABS 2018a). The MVC provides statistics on vehicle types comprising PVs, campervans, LCVs, trucks, buses and motorcycles.[2] It also provides vehicle characteristic information, including make of vehicle, year of manufacture, type of fuel, gross vehicle mass (GVM) or gross combination mass (GCM) for trucks.

For this research, light vehicles include passenger vehicle (Conventional PVs and Forward Control PVs), LCVs (panel vans and utilities) and motorcycles (for definitions, see Glossary at the end). While summary statistics will be provided for motorcycles, this project will be focused on PVs and LCVs.

The MVC provides data down to the registered postcode and state or territory of registration. However, the ABS warns that for analysis at postcode level, the following considerations need to be taken into account:

- There are some instances where the postcode of the vehicle's owner is in a different state or territory from that in which the vehicle is registered. For example, the postcode of the owner of the vehicle could be in Sydney, yet the vehicle could be registered in Queensland.
- Some official postcodes (PO boxes, competition postcodes) do not correspond to residential areas.
- Some postcodes could be invalid.

Besides the MVC, other data sources used to explore particular aspects of the vehicle fleet in this information sheet include:

1. **ABS *Survey of Motor Vehicle Use* (SMVU)**: The SMVU provides information on vehicle characteristics, vehicle kilometres travelled and fuel usage. Linking in the national SMVU data on vehicle use can help with drawing out the policy implications of the spatial differences and changes in vehicle characteristics over time.
2. **Federal Chamber of Automotive Industries (FCAI) VFACTS reports:** VFACTS reports information about new vehicle sales including breakdowns by model, state, fuel-type or buyer type by states and territories and at a national level.
3. **BITRE Infrastructure Yearbook**: The BITRE Infrastructure Yearbook provides time-series data on the total vehicle fleet and vehicle kilometres travelled.
4. **ABS *Census of Population and Housing* 2016**: The Census provides data on the number of motor vehicles garaged at a household, which can be coupled with the survey data on vehicle assets to derive estimates of the average value of a motor vehicle for broad geographic regions.

Results are presented at several geographical levels, including:

- BITRE sectoral (rings) classification of five major capital cities (e.g. Inner, Middle and Outer suburban), while for three smaller capital cities, only 'total capital city' with be considered.
- BITRE Migration Geography 2016 Classification covers Capital cities, Coastal cities, Inland cities, Coastal country, Inland country and Remote areas, based on ABS 2016 Australian Statistical Geographical Standard (ASGS) (for details of six geographical areas, see Appendix A).
- Major cites[3] which are used in the National Cities Performance Framework.

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[2] ABS *Motor Vehicle Census* or MVC (ABS 2018 *Motor Vehicle Census*; Explanatory notes, ABS Cat No. 9309.0) listed the scope of the MVC. The MVC excludes:
- recreational vehicles such as trail bikes, quad bikes, and sand dune buggies intended for off-road use;
- veteran and vintage vehicles registered for restricted use only;
- consular vehicles; and
- vehicles registered by the defence forces.

[3] Major cities with populations over 80 000 people, which consist of a total of 21 cities including 8 capital cities (i.e. Greater Sydney, Greater Melbourne, Greater Brisbane, Greater Adelaide, Greater Perth, Greater Hobart, Greater Darwin and Canberra) and 13 non-capital major cities (i.e. Albury - Wodonga, Newcastle - Maitland, Wollongong, Ballarat, Bendigo, Geelong, Cairns, Gold Coast - Tweed Heads, Mackay, Sunshine Coast, Toowoomba, Townsville and Launceston) (Commonwealth of Australia 2017, p.7).

- Small areas, specifically ABS' Statistical Area Level 3s (SA3). Note that due to the quality of concordances used to convert postcode data to statistical areas, data can't be presented below the SA3 level.

4 Setting the scene: Australian light vehicle fleet

There were 19.2 million registered motor vehicles in Australia as at 31 January 2018 (ABS 2018a). Of these registered motor vehicles, 18.4 million were light vehicles (i.e. PVs, LCVs and motorcycles), accounting for about 96 per cent of the total vehicle fleet.

To explore current light vehicle types in Australia, this section is organised into:

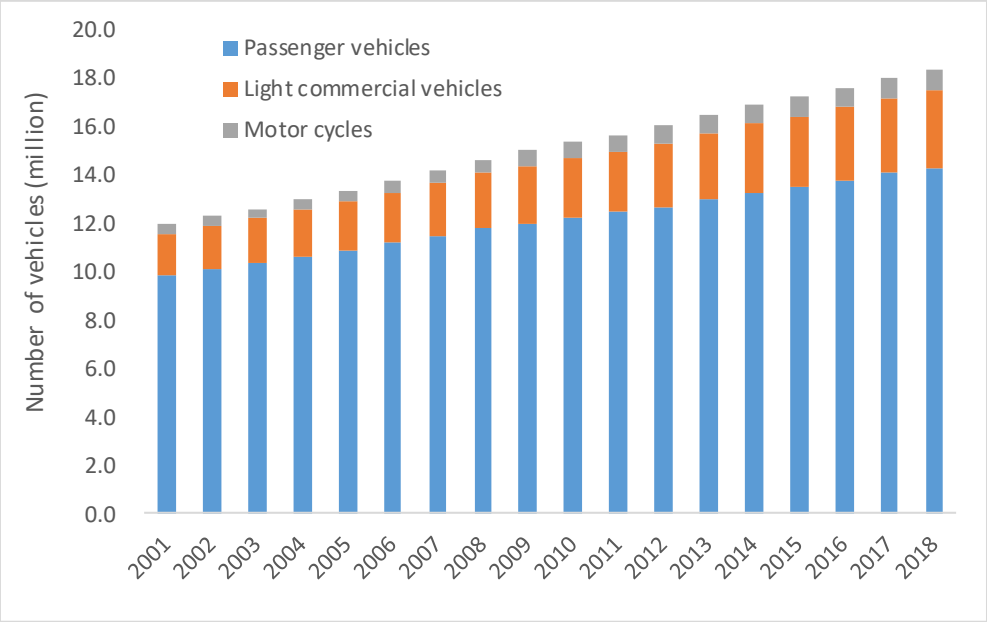
- Trends in light vehicle fleet size and distribution in Australia between 2001 and 2018.
- Average value of Australian vehicles by households.

4.1 Trends in light vehicle fleet size and distribution in Australia, 2001-2018

This section provides estimates of light vehicle volumes by vehicle types (as PVs, LCVs and motorcycles) between 2001 and 2018. The average annual growth rates are presented for three different periods, i.e. 2001 to 2018, 2001 to 2013 and 2013 to 2018. The later period was chosen because the last part of this information sheet concentrates on changes in selected vehicle characteristics between 2013 and 2018.

Figure 4.1 reveals that the number of light vehicles registered in Australia was 12.0 million in March 2001 and has shown a trend increase since then to reach 18.4 million in 2018. Among these light vehicles, there were 9.8 million PVs, 1.8 million LCVs and 0.4 million motorcycles in 2001. The corresponding vehicle numbers for 2018 were 14.3 million, 3.2 million and 0.9 million, respectively.

Figure 4.1: Number of light vehicles registered in Australia by vehicle types, 2001 to 2018

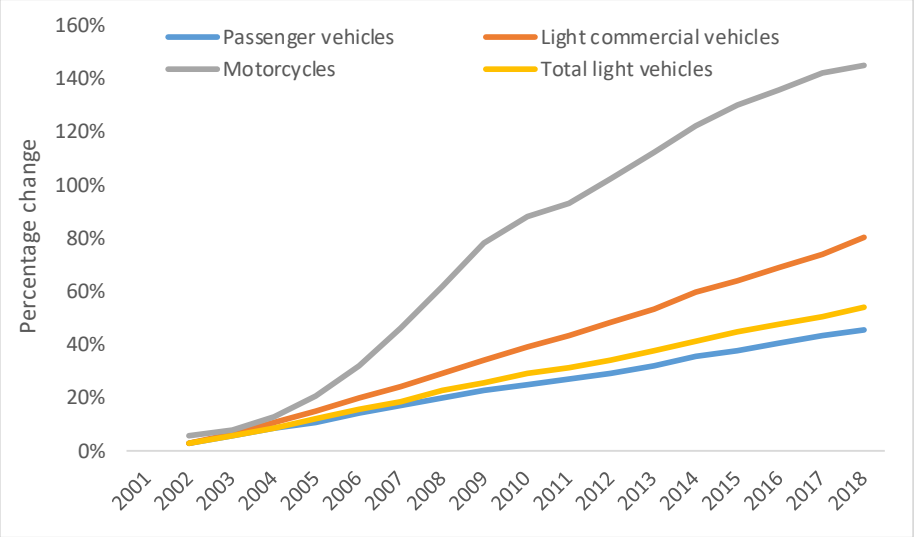


Note: Light vehicles include PVs, LCVs and motorcycles.
Source: BITRE (2018).

Figure 4.2 shows the percentage change of light vehicles by vehicle type relative to 2001, while Figure 4.3 presents average annual growth rates for two different periods (i.e. 2001 to 2018 and 2013 to 2018).

On average, growth of total light vehicles in 2018 (relative to 2001) was 54 per cent (Figure 4.2). Among the three types of light vehicles, growth of motorcycle numbers was much faster (145 per cent) compared to the number of LCVs (80 per cent) and PVs (46 per cent).

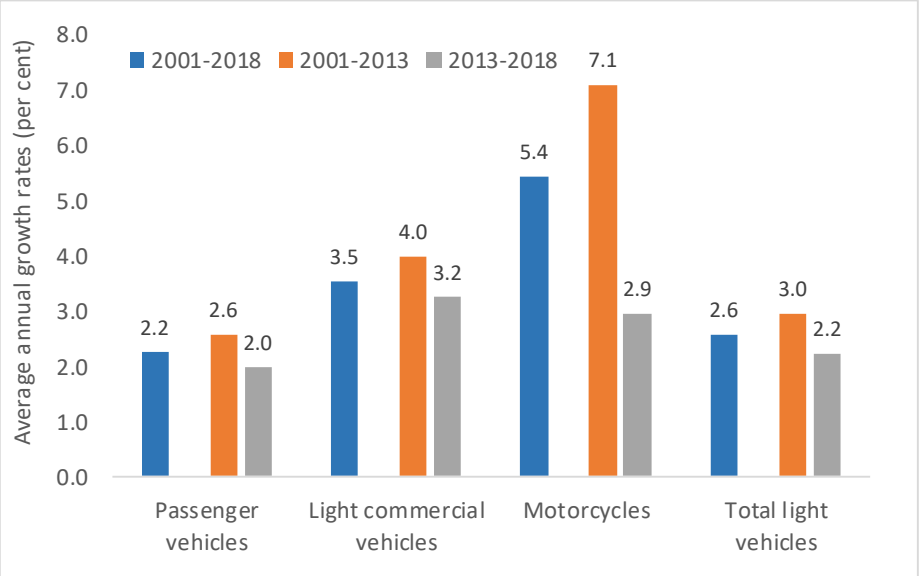
Figure 4.2: Growth of light vehicles since 2001, Australia



Note: Light vehicles include PVs, LCVs and motorcycles.
Source: BITRE (2018).

Between 2001 and 2018, the average annual rate of light vehicle growth at the national level was 2.6 per cent per annum (Figure 4.3). In terms of light vehicle types, the average annual growth of PVs was the slowest (2.2 per cent per annum), followed by LCVs (3.5 per cent per annum) and growth was fastest for motorcycles (5.4 per cent per annum). Average annual growth in vehicle numbers were higher during the early growth period (2001 to 2013) in comparison to the later period (i.e. 2013 to 2018) for all three light vehicle types.

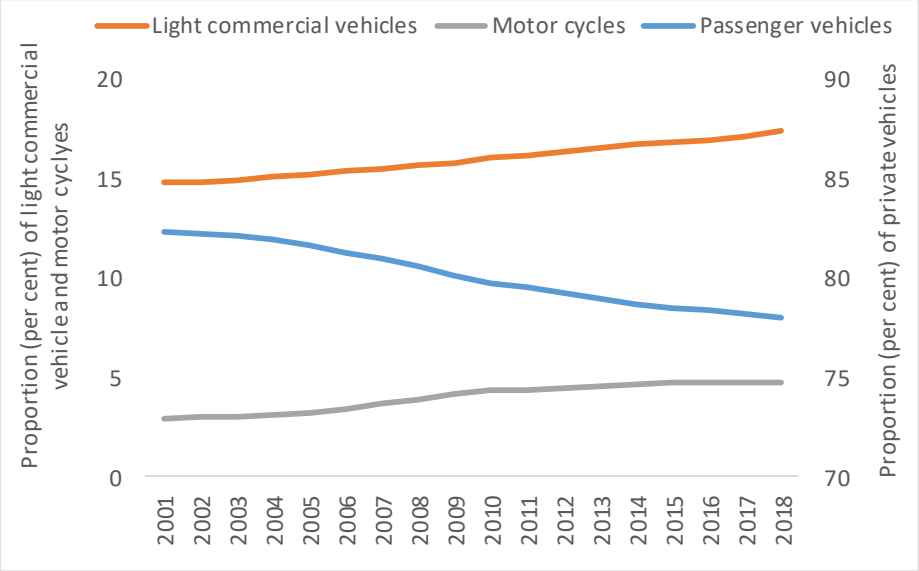
Figure 4.3: Average annual growth rates of light vehicles by vehicle types, Australia, 2001-2018 and 2013-2018



Note: Light vehicles include PVs, LCVs and motorcycles.
Source: BITRE (2018).

As shown in Figure 4.4, the proportion of PVs in the light vehicle fleet has declined gradually by 4.3 percentage points, from 82.3 per cent in 2001 to 78.0 per cent in 2018. The proportions of LCVs and motorcycles in the light vehicle fleet have grown steadily, from 14.8 per cent in 2001 to 17.3 per cent in 2018 for LCVs, and from 2.9 per cent in 2001 to 4.7 per cent in 2018 for motorcycles.

Figure 4.4: Proportion of light vehicles by vehicle types, Australia, 2001 to 2018



Note: Light vehicles include PVs, LCVs and motorcycles.
Source: BITRE (2018).

4.2 *Average value of Australian vehicles by households*

The ABS *Survey of Income and Housing* (SIH) shows that Australian households, on average, had vehicle assets valued at $24 500 per household in 2015-16.[4] The mean value of vehicles per household was lower in the capital cities ($23 600) than across the rest of state ($26 400) (ABS 2018b).

BITRE (2019c) uses ABS *Census of Population and Housing* 2016 data to produce an estimate of the average number of motor vehicles per dwelling of 1.94 vehicles per household in Australia, which was slightly lower for the capital cities (1.92) than the state balances (1.98). While the original ABS Census data excludes motorcycles, BITRE's estimates reflects an adjustment to include motorcycles.

Combining these two data sources, BITRE estimates that the estimated average value of vehicles in Australia was $12 600 per vehicle (Figure 4.5). The average value of vehicles was around 9 per cent higher for the state balances ($13 300) than for the capital cities ($12 300).

There were also differences in the average value of vehicles between individual capital cities and state balances. For example, although the average numbers of vehicles per dwelling were very similar in Brisbane and the rest of Queensland (1.97 and 1.96, respectively), the average value of vehicles was lower in Brisbane than in the rest of Queensland, so it follows that the mean value of vehicles per household was lower in Brisbane ($25 000) compared to the rest of Queensland ($29 200). A similar pattern was found for Perth and the rest of Western Australia.

Among capital cities, the average value of vehicles varied substantially, between $10 600 in Greater Hobart and $15 600 in Greater Darwin. The average values of vehicles for other capital cities were (sorted from lowest to highest): Greater Adelaide ($11 200), Greater Melbourne ($11 800), Greater Sydney ($12 300), Greater Brisbane ($12 700), Greater Perth ($13 200) and Canberra ($13 200).

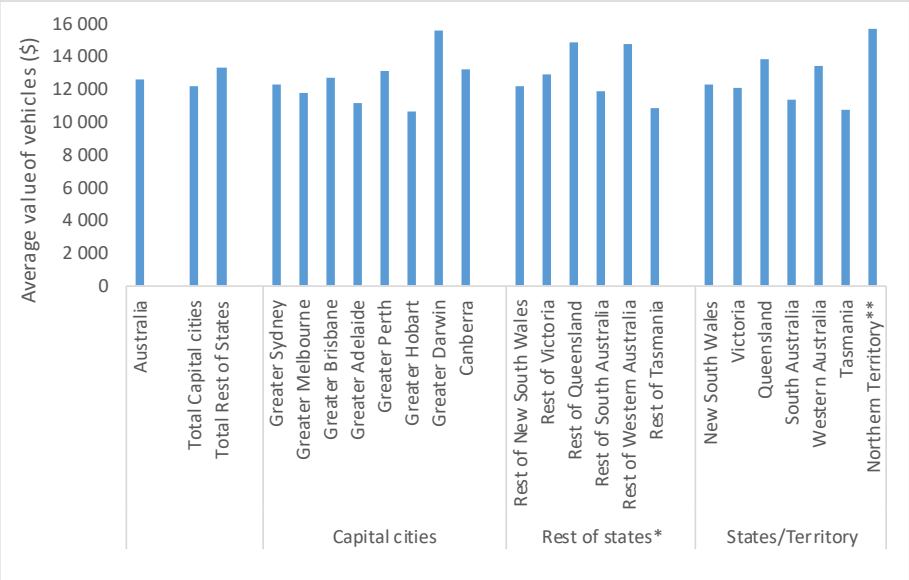
Among the regional areas of the six states, the rest of Queensland and the rest of Western Australia had the highest average value of vehicles ($14 900 and $14 800, respectively) and the rest of Tasmania had the lowest average value of vehicle ($10 900). While differences in the age of the vehicle fleet play a role in explaining these differences, it is likely that the greater representation of large vehicles (such as SUVs) in regional and remote areas is also a contributing factor. (Sections 7 to 10 explore how vehicle age and other vehicle

[4] Vehicles include registered and unregistered vehicles used for passenger purposes including cars, trucks, buses, motorcycles, caravans, aircraft, boats and bicycles (Glossary, ABS *Household Income and Wealth*, Australia, 2015-16, Cat No. 6523.0).

characteristics (i.e. fuel type, number of cylinders and tare weights) vary across capital cities and state balances).

For states and territories, the pattern for the average value of vehicles was similar as for capital cities, being lowest in Tasmania ($10 800) and highest in the Northern Territory ($15 800).

Figure 4.5: Estimated average value of vehicles owned by households in Australia, 2016



a. Vehicles include registered and unregistered vehicles used for passenger purposes including cars, trucks, buses, motorcycles, caravans, aircraft, boats and bicycles.

* Rest of Northern Territory was not shown separately since estimates for the Northern Territory other than Darwin were not considered reliable, while Australian Capital Territory is same as Canberra and was included in the Capital cities.

** Households in SA1s defined as Very Remote were excluded, accounting for over 20 per cent of the population of Northern Territoryy

Sources: BITRE estimates based on ABS Census of Population and Housing 2016 (Table Builder Pro) and ABS (2018b).

Section 5 (next) provides a snapshot of the composition of the light vehicle fleet at the national level for 2018, as well as describing the characteristics of light vehicles in terms of fuel types, average age of vehicles and the number of cylinders.

5 Composition of light vehicle fleet in Australia, 2018

This section summarises the composition of light vehicles (i.e. PVs, LCVs and motorcycles) for Australia, based on the ABS *Motor Vehicle Census* 2018. This section is subdivided into four subsections:

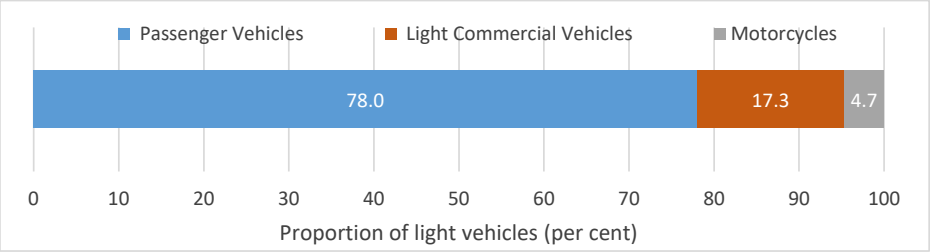
- Composition of the light vehicle fleet
- Light vehicle fleet by fuel type
- Light vehicle fleet by average age, and
- Light vehicle fleet by number of cylinders.

In ABS (2018a), only New South Wales, Victoria, Western Australia and the Australian Capital Territory report tare weights in a reasonably comprehensive manner. These jurisdictions had more than a 98 per cent response rate for both PVs and LCVs. In addition to the above four jurisdictions, Queensland and South Australia also had more than 98 per cent response rate of LCVs, but not PVs. Thus, average and median tare weight data are analysed for the different geographies, based on only a subset of jurisdictions. Average/median tare weights of four jurisdictions (i.e. New South Wales, Victoria, Western Australia and the Australian Capital Territory) for PVs and six jurisdictions (New South Wales, Victoria, Queensland, South Australia, Western Australia and the Australian Capital Territory) for LCVs are analysed and presented in Section 10.

5.1 Composition of the light vehicle fleet

According to ABS (2018a), registered passenger vehicles (PVs) made up 78 per cent of the total light vehicle fleet in 2018, while just over 17 per cent were LCVs and less than five per cent were motorcycles (Figure 5.1).

Figure 5.1: Proportion of registered passenger vehicles, light commercial vehicles and motorcycles in light vehicle fleet, Australia, 2018



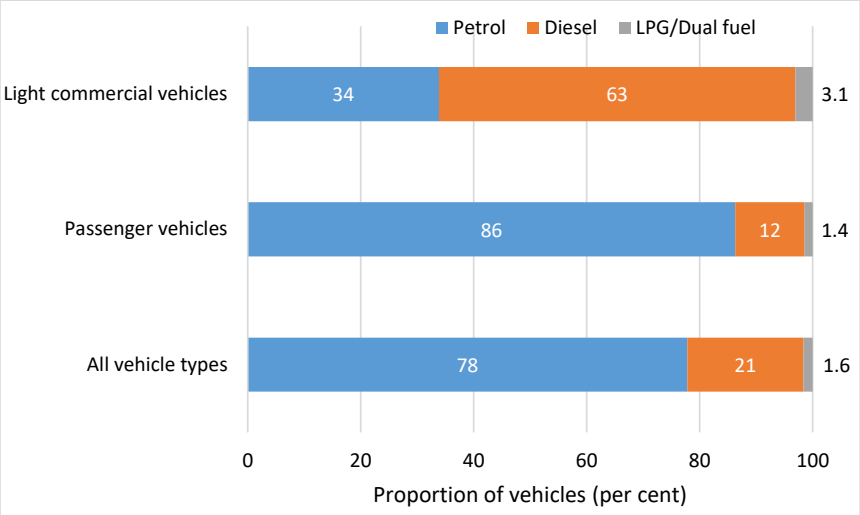
a. Excludes external territories.
b. Number of light vehicles by types were downloaded by 2018 national total.
Source: BITRE analysis of ABS Motor Vehicle Census 2018 (TableBuilder Pro).

5.2 Light vehicle fleet by fuel type

Based on ABS (2018a), nearly 78 per cent of light vehicles registered in Australia ran on petrol, around 20 per cent on diesel and less than two per cent on LPG/dual fuel (Figure 5.2). (Motorcycles are not disaggregated by fuel type as they are almost exclusively petrol-fuelled.) In this sub-section, electric vehicles are not separately presented, because they represent less than 0.1 per cent of the vehicle fleet (ABS 2020). Section 12 presents a more detailed analysis of electric (passenger) vehicles.

Overall, 86 per cent of PVs registered in Australia ran on petrol, 12 per cent on diesel and the rest on LPG/dual fuel (1.4 per cent). Nationally, 34 per cent of LCVs ran on petrol, compared to 63 per cent on diesel and only 1.4 per cent on LPG/dual fuel.

Figure 5.2: Proportion of registered light vehicles by fuel type, Australia, 2018



a. Motorcycles could not be disaggregated by fuel type as they overwhelmingly used petrol, but are included in petrol fuel type of 'All vehicle types'.
b. Excludes electric and other/unknown fuelled vehicles.
c. Excludes external territories in total Australia.
d. Number of PVs and LCVs by fuel types were downloaded by 2018 national total.
Source: BITRE analysis of ABS Motor Vehicle Census 2018 (TableBuilder Pro).

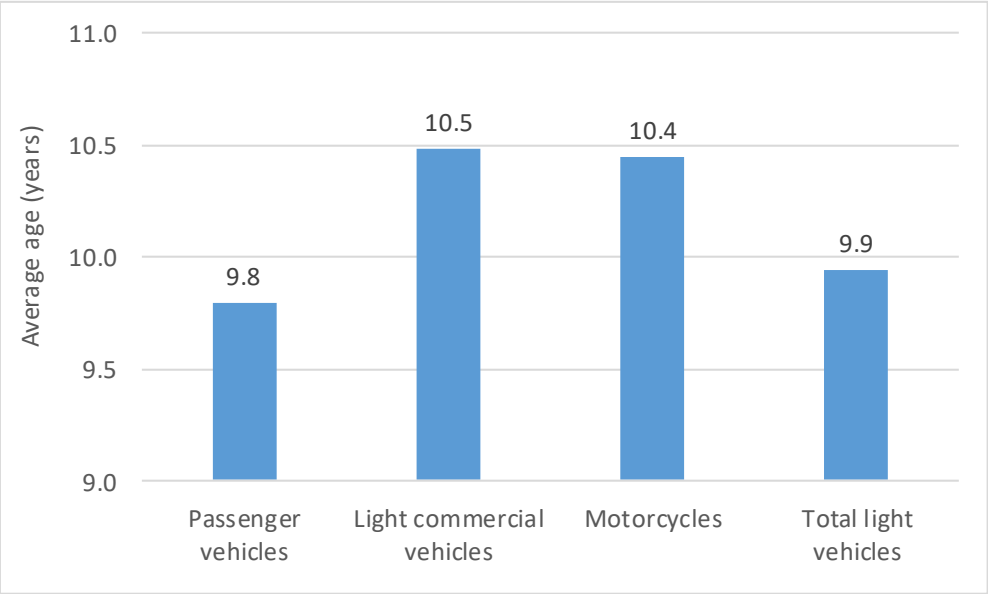
5.3 Light vehicle fleet by average age

Based on ABS (2018a), Figure 5.3 shows that the average age of all light vehicles registered in Australia was 9.9 years as at January 2018. The average age of PVs was 9.8 years, LCVs 10.5 years and motorcycles 10.4

years. The average age of the Australian light vehicle fleet has remained static over the past 10 years (Potterton and Ockwell 2017a). They reported that the average age was around 9.8 years for passenger cars and around 10.5 years for LCVs.

Grouped by year of manufacture, into the three time periods: 2001 and earlier, 2002 to 2011, and 2012 and after, the MVC data shows just over 17 per cent of light vehicles were manufactured in 2001 and earlier, whilst the proportions for PVs, LCVs and motorcycles were 16.5 per cent, 20.2 per cent and 18.3 per cent, respectively (data not shown).

Figure 5.3: Average age of light vehicles by vehicle types, Australia

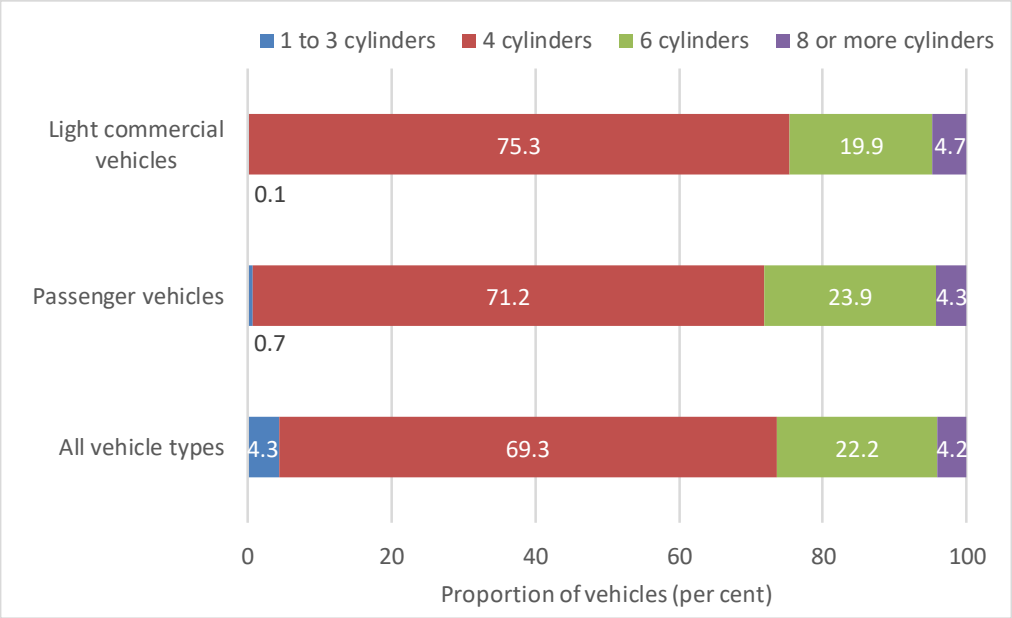


a. Years of manufacture from 1901 to 2018.
b. Average age is calculated using the individual years of manufacture of vehicles registered in the Motor Vehicle Census (for details, refer Data sources and methodology).
c. Number of light vehicles by types were downloaded by 2018 National data
Source: BITRE analysis of ABS Motor Vehicle Census 2018, using TableBuilder Pro.

5.4 Light vehicle fleet by number of cylinders

Figure 5.4 shows the proportions of PVs and LCVs by number of cylinders. (Motorcycles are not shows separately as over 99 per cent fall into the 1 to 3 cylinder category.) Around three quarters of the light vehicle fleet have four cylinder engines (71 per cent PVs and 75 per cent LCVs), 22 per cent have six-cylinder engines and 4 per cent have 8 or more cylinder engines. It also shows that the proportion of smaller vehicles (1 to 3 cylinders) in the all light vehicle types data is much higher (4 per cent) than those of PVs or LCVs (less than one per cent), reflecting the fact that motorcycles are overwhelmingly 1 to 3 cylinder vehicles.

Figure 5.4: Proportion of registered light vehicles by vehicle type by number of cylinders, Australia, 2018



a. Excludes 'Other - Not elsewhere specified' which includes rotary powered and other or not stated) from cylinder category.
b. Motorcycles are included in 'All vehicle types', but not shown separately.
c. Excludes external territories.
d. Number of PVs, LCVs and motorcycles were downloaded by 2018 National data.
Source: BITRE analysis of ABS Motor Vehicle Census 2018 (TableBuilder Pro).

6 Spatial differences in the light vehicle fleet, 2018

This section provides data on the composition of light vehicles (i.e. PVs, LCVs and motorcycles) across different types of regions, based on the ABS *Motor Vehicle Census* 2018. This section is subdivided into four subsections, namely:

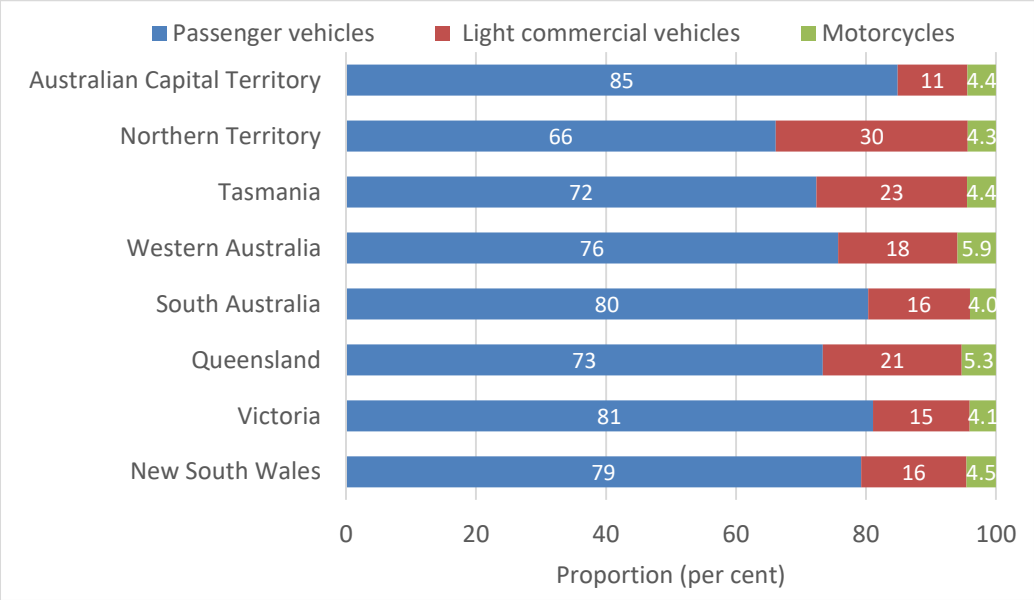
- States and Territories
- Capital cities and regional areas
- Major cities, and
- Statistical Area Level 3s (SA3s).

6.1 States and Territories

Figure 6.1 shows the composition of registered light vehicles by states and territories for 2018.

According to the ABS *Motor Vehicle Census* 2018, the proportion of PVs was highest in the Australian Capital Territory, Victoria and South Australia (each state and territory had PVs making up more than 80 per cent of the total light vehicle fleet) and lowest in the Northern Territory (66 per cent). Consequently, the Northern Territory had the highest proportion of LCVs (29 per cent). Tasmania and Queensland also had a relatively high proportion of LCVs (more than 21 per cent). Western Australia and Queensland had the highest proportions of motorcycles (more than 5.0 per cent).

Figure 6.1: Proportion of registered passenger vehicles, light commercial vehicles and motorcycles by states and territories, 2018



a. Excludes external territories.
b. Number of light vehicles by types were downloaded by 2018 State of registration.
Source: BITRE analysis of ABS Motor Vehicle Census 2018 (TableBuilder Pro).

6.2 Capital cities and regional areas

Table 6.1 shows the composition of light vehicles in capital cities (including sectors of five major capital cities) and regional areas (i.e. BITRE Migration Geography 2016 Classification) in 2018.

The five major capital cities (i.e. Sydney, Melbourne, Brisbane, Adelaide and Perth) are subdivided into three sectors–Inner, Middle and Outer. These sectoral boundaries have been developed by BITRE and are visually shown in the Maps in Appendix B. All five city maps are presented at a common scale. Each city has been disaggregated into sectors based on ABS 2016 Statistical Area 2 (SA2) boundaries. Sydney, Melbourne, Adelaide and Perth reflect GCCSA boundaries, while Brisbane reflects a narrower definition (capturing 3 per cent less population than the GCCSA).

The BITRE migration geography draws on and closely matches the ABS classification utilised in ABS (2009): *A Picture of the Nation: the Statistician's Report on the 2006 Census, 2006* (refer section 'On the move'). This type of geography captures the natural endowments, features and amenities of different regions, which takes into account the factors involved in a person's decision to move. This classification includes six broad geographical areas, namely Capital cities, Coastal cities, Inland cities, Coastal country areas, Inland country areas and Remote areas, based on the ABS 2016 Australian Statistical Geographical Standard (ASGS) (for details, see Appendix A).

When comparing capital cities, the proportion of PVs is higher in the five major capital cities than in the three smaller capital cities (82.4 per cent versus 78.8 per cent). Among city sectors, the proportion of PVs is highest in the middle sector, followed by the inner sector and lowest for the outer sector. The proportion of LCVs (17.0 per cent) is higher in smaller capital cities and lower in the large capital cities. Among the city sectors, the outer sector had the highest proportion of LCVs. There was not much difference in the proportion of motorcycles between the larger and smaller capitals. However, the middle sector had a much lower proportion of motorcycles compared to the inner and outer sectors.

Table 6.1 also shows that the proportion of PVs was higher in capital cities compared to regional areas and the opposite pattern was evident for LCVs and motorcycles.

When considering regional areas, the proportion of PVs followed the pattern: Coastal city > Inland city > Coastal country > Inland country > Remote. LCVs showed the opposite pattern. However, motorcycles showed a somewhat different pattern, being highest in Coastal areas and lowest in remote areas.

Table 6.1: Composition of registered light vehicles by capital cities and regional areas, 2018

Geographic location	Light vehicle types			
	PVs	LCVs	Motorcycles	All vehicle types
	Share (per cent)			
Capital cities by sectors				
Five major capital cites	82.4	13.3	4.2	100.0
Inner	83.3	12.1	4.6	100.0
Middle	85.2	11.4	3.4	100.0
Outer	80.1	15.1	4.8	100.0
Three minor capital cities	78.8	17.0	4.3	100.0
Regional areas by types				
Capital cities	82.3	13.5	4.2	100.0
Rest of states	70.3	24.2	5.5	100.0
Coastal city	75.1	19.3	5.6	100.0
Inland city	70.9	23.9	5.3	100.0
Coastal country	67.2	27.0	5.8	100.0
Inland country	62.8	31.8	5.3	100.0
Remote	56.5	38.6	4.8	100.0

a. Five major capital cities are: Sydney, Melbourne, Brisbane, Adelaide and Perth, while three small cities are: Hobart, Darwin and Canberra.
b. Number of light vehicles by types were downloaded by 2018 Postcodes, which were then concorded to Statistical Area Level 2 (SA2) and then to city sectors (Inner, Middle and Outer) of the five major capital cities and to the six region types (i.e. Capital cities, Coastal cities, Inland cities, Coastal country areas, Inland country areas and Remote areas). For details of city sectors and region types, see Appendix B and Appendix A, respectively.
c. Inner, Middle and Outer suburbs defined by BITRE based on SA2 boundaries and are visually shown in Appendix B.
d. For details of region types, i.e. Capital cities, Coastal cities, Inland cities, Coastal country areas, Inland country areas and Remote areas, see Appendix A.
e. Excludes external territories.
f. Excludes electric/hybrid and other/unknown fuelled vehicles.
Source: BITRE analysis of ABS Motor Vehicle Census 2018 (TableBuilder Pro).

6.3 *Major cities*

Table 6.2 shows the composition of light vehicles for the 21 major cities, based on the ABS *Motor Vehicle Census* 2018.

The proportion of PVs was highest in four capital cities (Melbourne, Canberra, Sydney and Adelaide) and Geelong, each of them having PVs as more than 80 per cent of the total light vehicle fleet. On the other hand, Mackay in Queensland had the lowest proportion of PVs in the total light vehicle fleet (64.3 per cent), followed by Darwin (67.6 per cent) and Townsville (68.9 per cent). Conversely, these three cities (i.e. Mackay, Darwin and Townsville) had the highest proportions of LCVs (each city had more than a 25 per cent share). Canberra had the lowest proportion of LCVs (10.8 per cent), followed by Melbourne (11.6 per cent) and Sydney (11.7 per cent).

In terms of motorcycles, the highest shares were in Sunshine Coast and Mackay (both had just over 6 per cent). Cairns also had a relatively high share of motorcycles (6 per cent), closely followed by Townsville (5.9 per cent). All these top four cities are located in Queensland. The lowest proportions of motorcycles were in Melbourne, Adelaide, Hobart and Sydney (each with a 4.0 per cent or lower share of the total light vehicle fleet).

Table 6.2: Composition of registered light vehicles by major cities, Australia, 2018

Geographic location	Light vehicle types			
	PVs	LCVs	Motorcycles	All vehicle types
	Share (per cent)			
Greater Sydney	84.3	11.7	4.0	100.0
Greater Melbourne	84.8	11.6	3.6	100.0
Greater Brisbane	77.1	18.0	4.9	100.0
Greater Adelaide	84.2	12.2	3.7	100.0
Greater Perth	79.0	15.4	5.5	100.0
Greater Hobart	76.7	19.4	4.0	100.0
Greater Darwin	67.6	28.1	4.3	100.0
Canberra	84.8	10.8	4.4	100.0
Albury - Wodonga	73.7	20.8	5.5	100.0
Ballarat	75.1	20.5	4.4	100.0
Bendigo	76.7	18.5	4.8	100.0
Cairns	71.5	22.5	6.0	100.0
Geelong	80.7	15.1	4.2	100.0
Gold Coast - Tweed Heads	78.6	16.5	5.0	100.0
Launceston	75.1	20.1	4.8	100.0
Mackay	64.3	29.6	6.1	100.0
Newcastle - Maitland	78.7	15.5	5.8	100.0
Sunshine Coast	75.5	18.5	6.1	100.0
Toowoomba	71.0	23.9	5.0	100.0
Townsville	68.9	25.3	5.9	100.0
Wollongong	79.5	15.1	5.4	100.0

a. Major cities with populations over 80 000 people, which consist of a total of 21 cities including the 8 capital cities (defined based on GCCSAs) and 13 non-capital major cities (defined based on SUAs).
b. PV – Passenger vehicles and LCV – Light commercial vehicles.
c. Excludes external territories.
d. Number of light vehicles by types were downloaded by 2018 Postcodes, which then concorded to 2016 ASGS GCCSAs and SUAs.
Source: BITRE analysis of ABS Motor Vehicle Census 2018 (TableBuilder Pro).

6.4 Statistical Area Level 3 (SA3)

Following the approach adopted in BITRE (2017), the postcode-level vehicle counts were concorded to the ABS' Australian Statistical Geography Standard (ASGS) Statistical Area Level 3 (SA3) scale using the ABS population-weighted concordance made available online. There are more than 2600 postcodes, and aggregating to the scale of SA3s (there are 351 SA3s) generally produced good quality estimates for those SA3s. The ABS assessed the overall quality of this concordance as 'good'. The quality of this concordance was assessed as good for 68 per cent of SA3s, acceptable for 22 per cent, and poor for 10 per cent of SA3s[5]. It was decided not to attempt to concord the postcode-level vehicle counts to the Statistical Area Level 2 (SA2) scale, which contains 2214 regions, due to the ABS' overall assessment of the concordance quality as 'poor', and its assessment that the majority (64 per cent) of the SA2 estimates would be of poor quality.

At smaller geographies, such as the SA3 scale, the proportion of registered vehicles by vehicle type varies more significantly, depending on the nature and characteristics of the area (e.g. primarily residential, urban/rural, distance from CBD).

Across all of Australia, the proportion of PVs in the total light vehicle fleet range between 49.9 and 92.9 per cent at SA3 level, compared to the national figure of 78.0 per cent, and the proportion of LCVs in the total

[5] ABS has reported that there were several SA3s which showed 'poor' quality concordance and these were: Bald Hills - Everton Park (QLD), Barkly (NT), Beaudesert (QLD), Botany (NSW), Burnside (SA), Cairns - North (QLD), Canberra East (ACT), Canning (WA), Central Highlands (TAS), Chermside (QLD), Daly - Tiwi - West Arnhem (NT), East Arnhem (NT), Gold Coast - North (QLD), Gold Coast Hinterland (QLD), Hawkesbury (NSW), Illawarra Catchment Reserve (NSW), Jimboomba (QLD), Loddon - Elmore (VIC), Mudgeeraba - Tallebudgera (QLD), Nathan (QLD), Noosa Hinterland (QLD), Nundah (QLD), Parramatta (NSW), Richmond - Windsor (NSW), Rouse Hill - McGraths Hill (NSW), Strathpine (QLD), Sunnybank (QLD), The Gap - Enoggera (QLD) and The Hills District (QLD) (ABS, Postcode 2018 to Statistical Area Level 3 2016, Table 2 QI Indicator).

light vehicle fleet ranges between 4.7 and 46.5 per cent at SA3 level, compared to the national figure of 17.3 per cent.

Table 6.3 presents the highest and lowest proportions of both PVs and LCVs as SA3 level. Among the top 10 SA3s with the highest proportions of PVs, there are eight SA3s located in Melbourne and two SA3s in Sydney. In addition, two SA3s in Canberra are ranked 11th (Woden Valley) and 14th (South Canberra). The top 55 SA3s are all located in the five major capital cities (Sydney, Melbourne, Brisbane, Adelaide and Perth) or Canberra. On the other hand, the areas with the lowest proportion of PVs in the total light vehicle fleet are located in regional areas. The bottom five SA3s which had the lowest proportion of PVs (55 per cent or less) include Outback - South (QLD), Far North (QLD) and Bourke - Cobar - Coonamble (NSW).

The top 75 SA3s that have the highest proportion of LCVs are located in regional areas of Queensland, Northern Territory, New South Wales and Western Australia, with a few exceptions such as the Litchfield SA3 in Greater Darwin and Brighton SA3 in Greater Hobart[6]. The top five SA3s with the highest proportions of LCVs (41 per cent or more) include Outback South (QLD), Far North (QLD) and Bourke - Cobar - Coonamble (NSW).

Among the bottom 10 SA3s which had the lowest proportion of LCVs, nine SA3s are located in Greater Melbourne and Greater Sydney, whilst South Canberra (ACT) had the 10th lowest position. The bottom six SA3s with the lowest proportion of LCVs (seven per cent or less) are Stonnington - West (VIC), Boroondara (VIC), Eastern Suburbs - North (NSW), Glen Eira (VIC), Manningham - West (VIC) and Bayside (VIC).

Table 6.3: Proportion of registered light vehicles by top and bottom 10 Statistical Area Level 3s, Australia, 2018

Top 10 Statistical Area 3 (SA3)	Share (per cent)	Bottom 10 Statistical Area 3 (SA3)	Share (per cent)
Passenger vehicles			
Stonnington - West (VIC)	92.9	Outback - South (QLD)	49.9
Boroondara (VIC)	92.2	East Arnhem (NT)	52.7
Manningham - West (VIC)	91.1	Daly - Tiwi - West Arnhem (NT)	54.4
Glen Eira (VIC)	90.8	Far North (QLD)	54.9
Whitehorse - West (VIC)	90.0	Bourke - Cobar - Coonamble (NSW)	55.0
Monash (VIC)	89.8	Outback - North (QLD)	55.8
Bayside (VIC)	89.7	Wheat Belt - South WA)	56.6
Carlingford (NSW)	89.6	Barkly (NT)	57.4
Whitehorse - East (VIC)	89.0	Lower Murray (NSW)	57.6
Hurstville (NSW)	88.9	Moree - Narrabri (NSW)	57.7
Light commercial vehicles			
Outback - South (QLD)	46.5	Stonnington - West (VIC)	4.7
East Arnhem (NT)	42.9	Boroondara (VIC)	5.2
Daly - Tiwi - West Arnhem (NT)	41.9	Eastern Suburbs - North (NSW)	6.3
Far North (QLD)	41.6	Glen Eira (VIC)	6.6
Bourke - Cobar - Coonamble (NSW)	41.5	Manningham - West (VIC)	6.6
Barkly (NT)	39.7	Bayside (VIC)	7.0
Outback - North (QLD)	38.8	Manly (NSW)	7.5
Moree - Narrabri (NSW)	38.6	Eastern Suburbs - South (NSW)	7.6
Lower Murray (NSW)	37.7	Carlingford (NSW)	7.7
Wheat Belt - South (WA)	37.4	South Canberra (ACT)	7.8

a. Number of light vehicles by types were downloaded by 2018 Postcodes, which then concorded to 2016 ASGS SA2 and then to SA3s.
c. The SA3s with asterisks (*) were rated 'poor' by ABS. Note that the quality of the postcode to SA3 concordance was rated by ABS as either 'good', 'acceptable' or 'poor' for all SA3s. For a list of all poorly rating SA3s, see Footnote 5.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

The next four sections (Section 7 to Section 10) deal with the spatial differences in the light vehicle fleet by fuel type, average age of the vehicles, number of cylinders and tare weights (only PVs and LCVs).

[6] Note that these two SA3s are located on the outskirts of their respective capital cities and are largely peri-urban in nature.

7 Spatial differences in light vehicles by fuel type

The following sub-sections provide information on the representation of different fuel types across different types of regions (i.e. States/Territories, capital cities and regional areas, major cities and SA3s). Motorcycles are not separately enumerated as they are predominantly petrol-fuelled. Therefore, motorcycles are included in the 'petrol' fuel type of 'All light vehicle types'. In addition, electric/hybrid and other/unknown fuelled vehicles are excluded.

7.1 States and Territories

Table 7.1 provides MVC (2018a) data on the distribution of registered PVs, LCVs and total light vehicles by fuel type in states and territories.

The proportion of both petrol-driven PVs and LCVs were higher for South Australia and Tasmania (around 89 per cent for PVs and around 39 per cent for LCVs, respectively). On the other hand, Northern Territory had the lowest proportion of both petrol-driven PVs (nearly 80 per cent) and LCVs (28 per cent).

Table 7.1: Proportion of light vehicles by fuel type, by states and territories, 2018

States/Territories	Fuel types			All fuel types
	Petrol	Diesel	LPG/ Dual fuel	
	Proportion (per cent)			
	Passenger vehicles			
New South Wales	87.5	11.6	0.9	100.0
Victoria	85.7	11.4	2.9	100.0
Queensland	85.0	14.3	0.7	100.0
South Australia	89.1	10.3	0.6	100.0
Western Australia	84.4	14.1	1.5	100.0
Tasmania	88.7	11.0	0.3	100.0
Northern Territory	79.5	20.0	0.5	100.0
Australian Capital Territory	87.6	11.6	0.7	100.0
	Light commercial vehicles			
New South Wales	35.5	61.9	2.7	100.0
Victoria	33.4	59.7	6.9	100.0
Queensland	32.4	66.2	1.3	100.0
South Australia	38.7	60.2	1.2	100.0
Western Australia	30.4	66.8	2.8	100.0
Tasmania	38.5	60.4	1.0	100.0
Northern Territory	28.3	71.2	0.5	100.0
Australian Capital Territory	38.1	58.8	3.1	100.0
	All light vehicle types			
New South Wales	79.6	19.2	1.2	100.0
Victoria	78.5	18.1	3.4	100.0
Queensland	74.5	24.7	0.8	100.0
South Australia	81.7	17.7	0.6	100.0
Western Australia	75.4	22.9	1.6	100.0
Tasmania	77.6	22.0	0.4	100.0
Northern Territory	65.3	34.3	0.5	100.0
Australian Capital Territory	82.8	16.2	1.0	100.0

a. Petrol-driven light vehicles include PVs, LCVs and motorcycles.
b. Diesel and LPG/Dual fuel-driven PVs and LCVs were included in total fuel category.
c. Motorcycles could not be disaggregated by fuel type as they overwhelmingly used petrol, but are included in 'All fuel types'.
d. Excludes electric/hybrid and other/unknown fuelled vehicles. Also, excludes external territories.
Source: BITRE analysis of ABS Motor Vehicle Census 2018 (TableBuilder Pro).

The proportion of diesel-driven PVs was highest for Northern Territory (20 per cent) and lowest for South Australia (just over 10 per cent). Two other jurisdictions (Queensland and Western Australia) also had relatively high proportions of diesel-driven PVs. Compared to the national average of 12 per cent of diesel-driven PVs (see Figure 5.2, in Section 5), New South Wales, Victoria, Tasmania and Australian Capital Territory had lower proportions.

The proportion of diesel-driven LCVs was highest for Northern Territory (71 per cent), followed by Western Australia (67 per cent) and Queensland (66 per cent), whilst the lowest proportions were observed in the Australian Capital Territory and Victoria (each had less than 60 per cent).

When comparing all jurisdictions, the proportions of LPG/dual fuel powered PVs and LCVs were much higher in Victoria (2.9 per cent and 6.9 per cent, respectively).

7.2 Capital cities and Regional areas

Table 7.2 provides information on the fuel type of light vehicles with respect to capital cities, regional areas, city sectors and different types of regions.

For PVs, the proportion of petrol-driven vehicles was higher in the capital cities (87.8 per cent) compared to Rest of State areas (83.1 per cent). On the other hand, the proportion of diesel-driven vehicles was lower in the capital cities (10.8 per cent) compared to Rest of State areas (15.4 per cent).

For LCVs, the proportions of petrol- and diesel-driven vehicles showed the same pattern as with PVs, with a higher proportion of petrol-driven vehicles in the capital cities (36.6 per cent) and lower in the Rest of State areas (31.3), and a lower proportion of diesel-driven vehicles in the capital cities (59.9 per cent) and higher in the Rest of State areas (66.1 per cent).

Both petrol-driven PVs and LCVs are concentrated in the middle sector, of the five major capital cities, whilst diesel-driven PVs and LCVs are concentrated in the inner sector (Table 7.2). However, LPG/Dual fuel-driven vehicles are concentrated in the outer sector of these cities. More generally, inland cities have the highest proportions of LPG/Dual fuel-driven PVs and LCVs.

7.3 Major cities

Table 7.3 provides information on the proportions of registered PVs and LCVs by fuel type (i.e. petrol, diesel and LPG/Dual fuel) for the 21 Australian major cities.

Among the 21 major cities, the top three major cities which have the largest concentrations of petrol-driven PVs were Adelaide (90.6 per cent), Launceston (89.7 per cent) and Sydney (89.4 per cent). On the other hand, the lowest proportions of petrol-driven PVs were registered in Darwin (81.7 per cent), Mackay (82.8 per cent) and Albury-Wodonga (83.3 per cent).

The top three major cities which have the largest concentrations of diesel-driven PVs were Darwin (17.9 per cent), Mackay (16.7 per cent) and Sunshine Coast (15.0), whilst the lowest proportions of diesel-driven PVs were registered in Adelaide (8.9 per cent), Sydney (9.7 per cent) and Bendigo (9.9 per cent).

The ordering for LCVs is generally similar to that for PVs. The top three major cities which have the largest concentrations of petrol-driven LCVs were Hobart (42.8 per cent), Adelaide (41.5 per cent) and Sydney (40.2 per cent). The lowest proportions of petrol-driven LCVs were registered in Mackay (29.3 per cent), Darwin (29.4 per cent) and Albury-Wodonga (30.2 per cent).

The top three major cities which have the largest concentrations of diesel-driven LCVs were Darwin (70.1 per cent), Mackay (70.0 per cent) and Townsville 68.0 (per cent), whilst the lowest proportions of diesel-driven LCVs were registered in Bendigo (52.4 per cent), Geelong (54.5 per cent) and Hobart (56.2 per cent).

Among the 21 major cities, the LPG/Dual fuel-driven PVs were concentrated in the Victorian cities. However, the regional Victorian cities (i.e. Ballarat, Bendigo and Geelong) tend to have a higher proportion of vehicles using LPG/Dual fuels than Melbourne (Table 7.3).

The proportions of LPG/Dual fuel-driven LCVs were higher (more than double) in Victorian cities compared to PVs. As shown in Table 7.3, the highest proportions of LPG/Dual fuel-driven LCVs were for the Victorian cities of Bendigo (8.9 per cent), Geelong (8.6 per cent), Ballarat (8.3 per cent) and Melbourne (7.0 per cent).

Table 7.2: Proportion of light vehicles by fuel type, by capital cities and regional areas, 2018

Geographic locations	Fuel type			All fuel types
	Petrol	Diesel	LPG/Dual fuel	
	Proportion (per cent)			
	Private vehicles			
Sector of capital city				
Five major capital cities	87.9	10.7	1.4	100.0
Inner	86.3	12.9	0.8	100.0
Middle	88.7	10.0	1.2	100.0
Outer	87.6	10.6	1.8	100.0
Three small capital cities	87.5	11.9	0.5	100.0
Regional areas by types				
Capital city	87.8	10.8	1.4	100.0
Rest of states	83.1	15.4	1.5	100.0
Coastal city	85.4	13.4	1.2	100.0
Inland city	83.7	14.2	2.2	100.0
Coastal country	82.9	15.6	1.5	100.0
Inland country	80.3	17.8	2.0	100.0
Remote	72.9	26.4	0.8	100.0
	Light commercial vehicles			
Sector of capital city				
Five major capital cities	36.4	59.8	3.7	100.0
Inner	29.7	68.1	2.2	100.0
Middle	37.6	58.8	3.5	100.0
Outer	37.2	58.7	4.1	100.0
Three small capital cities	38.4	60.1	1.5	100.0
Regional areas by types				
Capital city	36.6	59.9	3.6	100.0
Rest of states	31.3	66.1	2.6	100.0
Coastal city	34.5	63.2	2.3	100.0
Inland city	32.1	63.7	4.2	100.0
Coastal country	31.6	65.9	2.5	100.0
Inland country	29.2	67.7	3.0	100.0
Remote	23.3	76.0	0.7	100.0
	All light vehicle types			
Sector of capital city				
Five major capital cities	81.5	16.8	1.7	100.0
Inner	80.1	19.0	0.9	100.0
Middle	83.3	15.3	1.5	100.0
Outer	80.6	17.4	2.1	100.0
Three small capital cities	79.7	19.6	0.7	100.0
Regional areas by types				
Capital city	81.4	16.9	1.6	100.0
Rest of states	71.5	26.8	1.7	100.0
Coastal city	76.5	22.2	1.3	100.0
Inland city	72.5	25.0	2.5	100.0
Coastal country	71.3	27.1	1.6	100.0
Inland country	66.1	31.7	2.2	100.0
Remote	56.2	43.1	0.7	100.0

a. Five major capital cities are: Sydney, Melbourne, Brisbane, Adelaide and Perth, while three small cities are: Hobart, Darwin and Canberra.
b. Number of light vehicles by types were downloaded by 2018 Postcodes, which were then concorded to Statistical Area Level 2 (SA2) and then to city sectors (Inner, Middle and Outer) of the five major capital cities and to the six region types (i.e. Capital cities, Coastal cities, Inland cities, Coastal country areas, Inland country areas and Remote areas). For details of city sectors and region types, see Appendix B and Appendix A, respectively.
c. Inner, Middle and Outer suburbs defined by BITRE based on SA2 boundaries and are visually shown in Appendix B.
d. For details of region types, i.e. Capital cities, Coastal cities, Inland cities, Coastal country areas, Inland country areas and Remote areas, see Appendix A.
e. Petrol driven light vehicles include PVs, LCVs and motorcycles.
f. Diesel and LPG/Dual fuel driven PVs and LCVs were included in total fuel.
g. Motorcycles could not be disaggregated by fuel type, but included in petrol fuel type of 'All fuel types'.
h. Excludes electric and other/unknown fuelled vehicles. Also, excludes external territories.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

Table 7.3: Proportion of registered passenger vehicles and light commercial vehicles by fuel type, by major cities, 2018

Major cities	Fuel type			All fuel types
	Petrol	Diesel	LPG/Dual fuel	
	Proportion (per cent)			
	Private vehicles			
Sydney	89.4	9.7	0.8	100.0
Melbourne	87.0	10.4	2.6	100.0
Brisbane	86.4	12.9	0.7	100.0
Adelaide	90.6	8.9	0.5	100.0
Perth	86.3	12.2	1.5	100.0
Hobart	89.3	10.4	0.2	100.0
Darwin	81.7	17.9	0.4	100.0
Canberra	87.6	11.7	0.7	100.0
Albury - Wodonga	83.3	14.8	1.9	100.0
Ballarat	84.3	11.8	3.9	100.0
Bendigo	86.6	9.9	3.6	100.0
Cairns	86.1	13.4	0.5	100.0
Geelong	85.2	11.5	3.4	100.0
Gold Coast - Tweed Heads	88.0	11.3	0.7	100.0
Launceston	89.7	10.0	0.3	100.0
Mackay	82.8	16.7	0.5	100.0
Newcastle - Maitland	86.9	12.1	1.0	100.0
Sunshine Coast	84.2	15.0	0.9	100.0
Toowoomba	84.9	14.4	0.7	100.0
Townsville	85.2	14.2	0.6	100.0
Wollongong	87.4	11.4	1.2	100.0
	Light commercial vehicles			
Sydney	40.2	56.6	3.2	100.0
Melbourne	34.4	58.5	7.0	100.0
Brisbane	34.4	64.1	1.6	100.0
Adelaide	41.5	57.2	1.3	100.0
Perth	33.9	62.8	3.4	100.0
Hobart	42.8	56.2	1.0	100.0
Darwin	29.4	70.1	0.5	100.0
Canberra	38.5	58.4	3.1	100.0
Albury - Wodonga	30.2	65.3	4.5	100.0
Ballarat	35.0	56.7	8.3	100.0
Bendigo	38.7	52.4	8.9	100.0
Cairns	34.6	64.8	0.6	100.0
Geelong	36.9	54.5	8.6	100.0
Gold Coast - Tweed Heads	40.0	58.1	1.9	100.0
Launceston	39.1	59.9	1.1	100.0
Mackay	29.3	70.0	0.7	100.0
Newcastle - Maitland	35.8	61.5	2.7	100.0
Sunshine Coast	33.6	64.7	1.7	100.0
Toowoomba	32.0	66.9	1.0	100.0
Townsville	31.2	68.0	0.7	100.0
Wollongong	39.1	57.3	3.6	100.0

a. Major cities with populations over 80 000 people, which consist of a total of 21 cities including 8 capital cities (defined based on GCCSAs) and 13 non-capital major cities (defined based on SUAs).
b. Petrol driven total light vehicles include PVs, LCVs and motorcycles.
c. Diesel and LPG/Dual fuel driven PVs and LCVs were included in total fuel.
d. Excludes electric and other/unknown fuelled vehicles. Also, excludes external territories.
e. Number of vehicles by fuel types were downloaded by 2018 Postcodes, which were then concorded to 2016 ASGS GCCSAs and SUAs.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

7.4 Statistical Area Level 3 (SA3)

Looking at more disaggregated areas (SA3) allows us to get a more detailed picture of the spatial variation in the proportion of petrol- and diesel-driven PVs and LCVs. The SA3s with the highest and lowest proportions of petrol-driven PVs, LCVs and total light vehicles are presented in Table 7.4.

Of the top 25 SA3s with the largest concentrations of petrol-driven PVs within Australia, 23 SA3s are located in four major capital cities, namely Sydney, Brisbane, Adelaide and Hobart. The two SA3s with the highest proportion of petrol-driven PVs (93 per cent or more) are Campbelltown (SA) and Salisbury (SA). The 25 SA3s with the smallest representation of petrol driven PVs are all located in regional or rural Australia.

Table 7.4: Share of petrol driven light vehicles, top and bottom ten Statistical Area Level 3, Australia, 2018

Top 10 Statistical Area Level 3 (SA3)	Share (per cent)	Bottom 10 Statistical Area Level 3 (SA3)	Share (per cent)
Passenger vehicles (PVs)			
Campbelltown (SA)	93.2	East Arnhem (NT)*	51.8
Salisbury (SA)	93.0	Daly - Tiwi - West Arnhem (NT)*	63.6
Mount Druitt (NSW)	92.9	Outback - South (QLD)	64.3
Playford (SA)	92.8	Far North (QLD)	65.0
Fairfield (NSW)	92.8	Kimberley (WA)	65.4
Port Adelaide - East (SA)	92.5	West Pilbara (WA)	66.3
Canterbury (NSW)	92.4	East Pilbara (WA)	67.5
Marion (SA)	92.2	Barkly (NT)*	68.2
Charles Sturt (SA)	92.1	Outback - North (QLD)	69.3
West Torrens (SA)	92.1	Katherine (NT)	69.5
Light commercial vehicles (LCVs)			
Marrickville - Sydenham - Petersham (NSW)	51.0	East Arnhem (NT)*	13.3
Canterbury (NSW)	50.6	Brisbane Inner - West (QLD)	14.8
Campbelltown (SA)	49.6	Brisbane Inner (QLD)	17.6
Kogarah - Rockdale(NSW)	49.2	Melbourne City (VIC)	17.7
Hurstville (NSW)	48.4	Adelaide City (SA)	17.7
Norwood - Payneham - St Peters (SA)	47.0	Ku-ring-gai (NSW)	19.0
Darebin - South (VIC)	47.0	Darwin City (NT)	19.5
Eastern Suburbs - North (NSW)	46.8	Kimberley (WA)	19.5
Hobart - North West (TAS)	46.5	Esperance (WA)	20.0
Salisbury (SA)	46.5	Outback - South (QLD)	20.1
Total light vehicles			
Campbelltown (SA)	89.5	East Arnhem (NT)*	37.4
Marrickville - Sydenham - Petersham (NSW)	88.6	Outback - South (QLD)	45.0
Canterbury (NSW)	88.5	Daly - Tiwi - West Arnhem (NT)*	46.9
Salisbury (SA)	88.1	Far North (QLD)	49.1
Kogarah - Rockdale (NSW)	87.9	Barkly (NT)*	51.4
Hurstville (NSW)	87.9	Outback - North (QLD)	51.9
Fairfield (NSW)	87.7	Moree - Narrabri (NSW)	52.6
Carlingford (NSW)	87.6	Kimberley (WA)	53.6
Mount Druitt (NSW)	87.4	Bourke - Cobar - Coonamble (NSW)	53.7
Eastern Suburbs - South (NSW)	87.4	Katherine (NT)	53.7

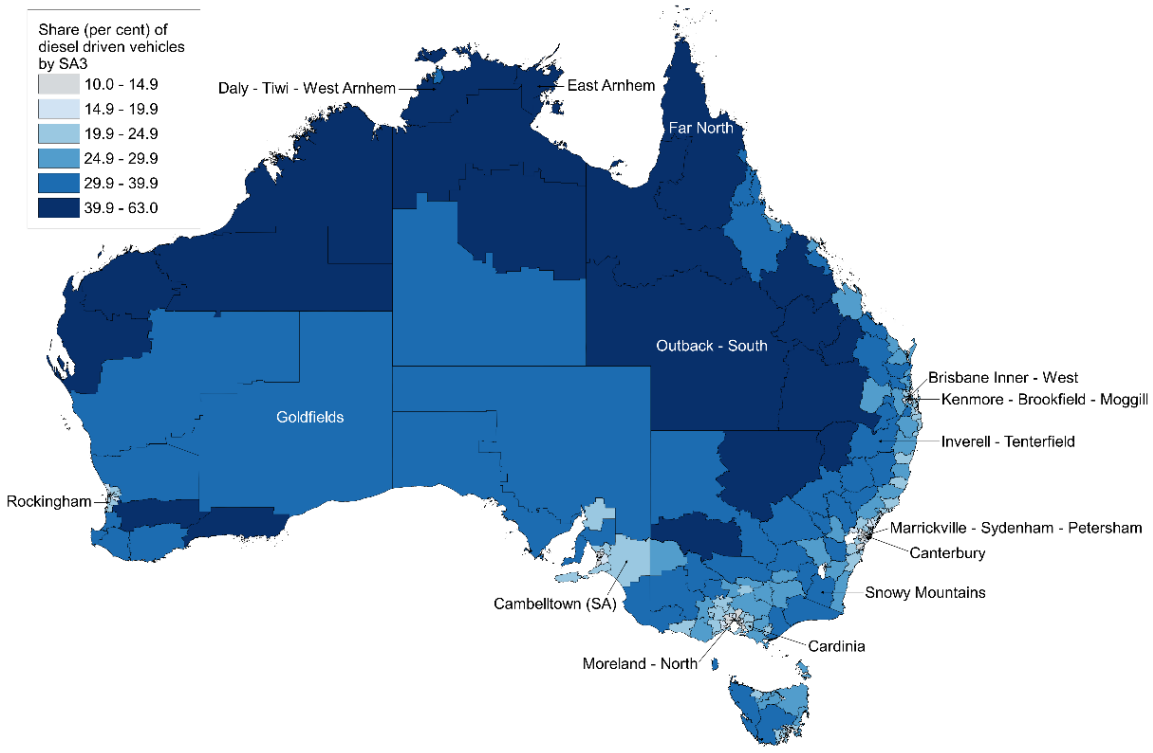
a. Petrol driven total light vehicles include PVs, LCVs and motorcycles.
b. Diesel and LPG/Dual fuel driven PVs and LCVs were included in total fuel.
c. Excludes electric and other/unknown fuelled vehicles.
d. Excludes external territories.
e. Number of vehicles by fuel types were downloaded by 2018 Postcodes, which were then concorded to 2016 ASGS SA3s.
f. The SA3s with asterisks (*) were rated 'poor' by ABS. Note that the quality of the postcode to SA3 concordance was rated by ABS as either 'good', 'acceptable' or 'poor' for all SA3s. For a list of all poorly rating SA3s, see Footnote 5.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

Of the top 25 SA3s with the largest concentrations of petrol-driven LCVs within Australia, 22 SA3s are located in four major capital cities, namely Sydney, Brisbane, Adelaide and Hobart. The other three SA3s are located in Tasmania (Hobart - North West and Hobart - North East in Greater Hobart, and Huon - Bruny Island in regional Tasmania. The two SA3s with the highest proportion of petrol-driven LCVs (more than 50 per cent) are Marrickville - Sydenham - Petersham and Canterbury (both in Sydney). The 25 SA3s with the lowest concentrations of petrol-driven LCVs are all located in regional or rural Australia, apart from Brisbane Inner - West (QLD).

When all three types of light vehicles are combined, the four SA3s with the highest proportion of petrol driven light vehicles (more than 88 per cent) are in Campbelltown (SA), Marrickville-Sydenham-Petersham (NSW), Canterbury (NSW) and Salisbury (SA). The smallest SA3 concentrations of petrol driven light vehicles are all located in regional or rural Australia. The SA3s with the lowest proportion of petrol driven light vehicles tend to be in remote areas, such as Outback-South (QLD) and Far North (QLD).

Map 7.1 illustrates the proportion of diesel-driven light vehicles (both PVs and LCVs) at the SA3 scale across Australia in 2018. It reveals that the highest proportions of diesel-driven light vehicles are concentrated in regional and remote Australia. Several jurisdictions, such as New South Wales, Queensland, Western Australia and the Northern Territory, have a number of SA3s with an estimated share of diesel-driven PVs and LCVs of 41 per cent or more. There are only a few SA3s in regional and remote Australia which have diesel driven vehicle shares of less than 17 per cent (e.g. Geelong in Victoria, Surfers Paradise and Robina in Queensland, and Dapto - Port Kembla in NSW). The lowest proportions of diesel-driven PVs and LCVs are in the capital cities. However, there are some SA3s in Greater Brisbane that have relatively high proportions (more than 36 per cent) of diesel-driven PVs and LCVs. Basically, Map 7.1 is more or less a mirror image of Table 7.4.

Map 7.1: Proportion of diesel-driven light vehicles by Statistical Area Level 3, Australia, 2018



a. Diesel-driven vehicles include passenger vehicles (PVs) and Light commercial vehicles (LCVs).
b. Petrol- and LPG/Dual fuel-driven PVs and LCVs were included in total fuel.
c. Excludes SA3s with less than 100 diesel driven light vehicles.
d. Excludes electric and other/unknown fuelled vehicles. Also, excludes external territories.
e. Number of light vehicles (both PVs and LCVs) by fuel types were downloaded by 2018 postcodes, which were then concorded to 2016 ASGS SA3s.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

At the SA3 level, the LPG/Dual fuel driven light vehicles (both PVs and LCVs) are concentrated in regional and rural Victoria as well as in Greater Melbourne. The seven SA3s with the highest proportions of LPG/Dual fuel driven light vehicles (ranging from 5.0 per cent to 5.5. per cent of total light vehicles) are all located in

regional areas and include: Creswick - Daylesford - Ballan, Heathcote - Castlemaine - Kyneton, Baw Baw, Maryborough - Pyrenees, Gippsland - South West and Upper Goulburn Valley (data not shown). The regional Victorian SA3s tend to have a higher proportion of vehicles using LPG/Dual fuels than Melbourne SA3s. The strong representation of Victorian SA3s reflects the much higher use of LPG/Dual fuel in Victoria, compared to the other states (BITRE 2017).

8 Spatial differences in light vehicle fleet by average age

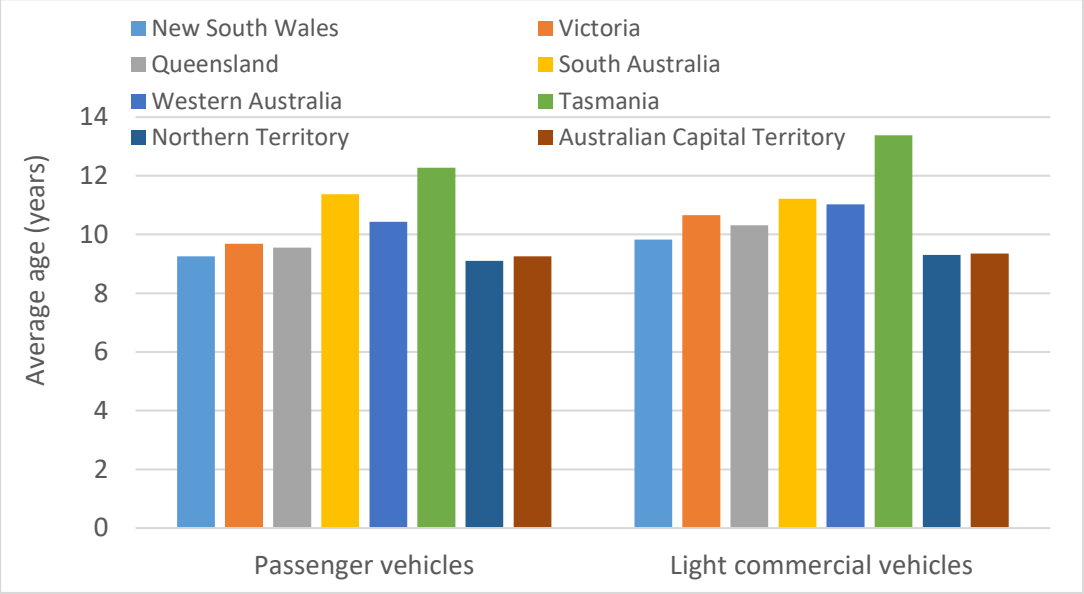
The following sub-sections discuss the average age of light vehicles across different types of regions, primarily focusing on PVs and LCVs. In addition, a comparison of the average age of PVs and the road fatality rate is provided for Australia's major cities in a breakout box at the end of this section (Box 8.1).

8.1 States and Territories

The estimated average age of PVs and LCVs by states and territories is shown in Figure 8.1. Across the states and territories, Tasmania has by far the oldest PVs and LCVs—Tasmanian PVs have an average age of 12.3 years and LCVs have an average age of 13.4 years.

Both PVs and LCVs are also relatively old in South Australia and Western Australia. On the other hand, Northern Territory (average age of 9.1 years) and the Australian Capital Territory (average age of 9.3 years) had the newest PVs. For LCVs, there is no difference in the average age between the two territories (both 9.3 years). For the three largest states (i.e. New South Wales, Victoria and Queensland), the average age of PVs is lower (one year or less) than the LCVs.

Figure 8.1: Average age of passenger vehicles and light commercial vehicles by states and territories, 2018



a. Years of manufacture from 1901 to 2018.
b. Average age of vehicles is calculated using the individual years of manufacture of vehicles registered in the *Motor Vehicle Census* (for details, refer Data sources and methodology).
c. Number of light vehicles by types were downloaded by 2018 state of registration.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

Among states and territories, Tasmania had the highest proportions of vehicles manufactured in 2001 and earlier for both PVs (27 per cent) and LCVs (33 per cent). It was followed by South Australia, with 23 per cent of older PVs and also 23 per cent of older LCVs. New South Wales and Northern Territory had the more recent PVs (manufactured between 2012 and 2018) as well as LCVs, accounting for a 40 per cent share in each of the four situations (data not presented).

8.2 Capital cities and Regional areas

Table 8.1 shows the average age of PVs and LCVs by sector of capital cities and type of regional areas in Australia.

When considering capital cities, the average age is lower in the five major capital cities (combined) compared to the three small capital cities, in terms of both PVs (9.3 years versus 10.1 years) and LCVs (9.4 years versus 10.9 years) (Table 8.1). For the five major capital cities, the outer sector has the older vehicles, whereas the newer vehicles are concentrated in the inner sector.

When considering regional areas, the average age of both PVs and LCVs is lower in capital cities than in regional areas (9.4 years versus 10.7 years for PVs, and 9.5 years versus 11.5 years for LCVs). Table 8.1 also shows that LCVs are comparatively older than PVs throughout regional Australia, whereas there is minimal difference for the capital cities. Within regional Australia, the average age of PVs and LCVs is lowest for coastal cities (10.1), a bit higher for inland cities (10.7), and higher again for coastal country (11.3), inland country (11.1) and remote areas (11.5). While remote areas have the oldest PVs, inland country has the oldest LCVs.

Table 8.1: Average age of passenger vehicles and light commercial vehicles by sector of capital cities and types of regional areas, Australia

Geographic locations	Average age (years)	
	Passenger vehicles	LCVs
Capital cities by sectors		
Five major capital cites	9.3	9.4
Inner	7.9	7.3
Middle	9.0	8.9
Outer	9.9	10.0
Three minor capital cities	10.1	10.9
Regional areas by types		
Capital cities	9.4	9.5
Rest of states	10.7	11.5
Coastal city	10.1	10.5
Inland city	10.7	11.2
Coastal country	11.3	12.0
Inland country	11.1	12.1
Remote	11.5	11.9

a. Five major capital cities are: Sydney, Melbourne, Brisbane, Adelaide and Perth, while three small cities are: Hobart, Darwin and Canberra.
b. Number of light vehicles by types were downloaded by 2018 Postcodes, which were then concorded to Statistical Area Level 2 (SA2) and then to city sectors (Inner, Middle and Outer) of the five major capital cities and to the six region types (i.e. Capital cities, Coastal cities, Inland cities, Coastal country areas, Inland country areas and Remote areas). For details of city sectors and region types, see Appendix B and Appendix A, respectively.
c. Inner, Middle and Outer suburbs defined by BITRE based on SA2 boundaries and are visually shown in Appendix B.
d. For details of region types, i.e. Capital cities, Coastal cities, Inland cities, Coastal country areas, Inland country areas and Remote areas, see Appendix A.
e. Years of manufacture from 1901 to 2018.
f. Average age is calculated using the individual years of manufacture of vehicles registered in the *Motor Vehicle Census* (for details, refer Data sources and methodology).
g. Excluding Norfolk Island, Christmas Island and Migratory - Offshore - Shipping.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

8.3 Major cities

Figure 8.2 shows the estimated average age of PVs and LCVs for the 21 major cities, based on ABS (2018a). The key results that emerged are summarised below:

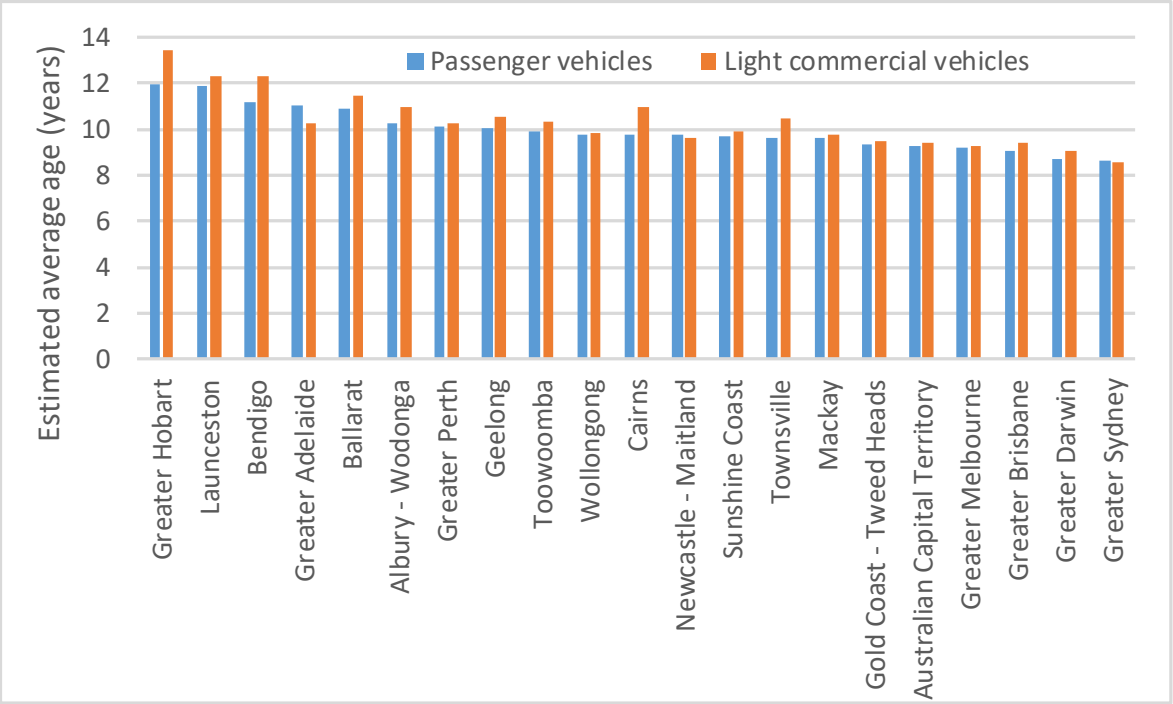
- Among the 21 major cities, the estimated average age of LCVs is consistently higher than that of PVs, except for Adelaide, Newcastle-Maitland and Sydney.
- Generally, Greater Hobart and Launceston in Tasmania and Bendigo in Victoria had the oldest vehicles (both PVs and LCVs).

- The average age of vehicles was lowest for Sydney, Darwin, Brisbane, Melbourne and Canberra, for both PVs and LCVs.

Further analysis of the year of manufacture data for major cities reveals that (data not shown):

- Hobart, Launceston and Bendigo had the highest proportion of older PVs manufactured in 2002 or earlier (22-26 per cent), whilst Sydney, Darwin and Brisbane had the highest proportion of newer PVs manufactured between 2012 and 2018 (40-43 per cent).
- Similarly, Hobart, Launceston and Bendigo had the highest proportions of older LCVs (27-32 per cent), whilst Sydney, Melbourne and Brisbane had the highest proportions of newer LCVs (42-46 per cent).

Figure 8.2: Estimated average age of passenger vehicles and light commercial vehicles by major cities, Australia, 2018



a. Major cities with populations over 80 000 people, which consist of a total of 21 cities including the 8 capital cities (defined based on GCCSAs) and 13 non-capital major cities (defined based on SUAs).
b. Years of manufacture from 1901 to 2018.
c. Average age is calculated using the individual years of manufacture of vehicles registered in the *Motor Vehicle Census* (for details, refer Data sources and methodology).
d. Sorted by PVs.
e. Number of passenger and LCVs were downloaded by 2018 Postcodes, which were then concorded to 2016 ASGS GCCSAs and SUAs.
f. Excluding Norfolk Island, Christmas Island and Migratory - Offshore - Shipping.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018, using TableBuilder Pro.

8.4 Statistical Area Level 3 (SA3)

This section provides SA3-scale estimates[7] of average age for both PVs and LCVs. Looking at more disaggregated areas (i.e. SA3s) allows us to get a more detailed picture of the way that vehicle age differs geographically.

Average age of passenger vehicles by SA3

BITRE's SA3 level estimates of the average age of PVs ranged between 4.2 years and 15.0 years. Table 8.2 presents the estimated average age of PVs for the top 10 and bottom 10 SA3s.

Among the top 10 SA3 with the highest average age of PVs, seven SA3s are located in Tasmania, and South Australia, Western Australia and Queensland have one SA3 each (Table 8.2). Eight of these SA3s are located

[7] See Footnote 6 for details.

in regional areas, with the remaining two located in Greater Hobart (i.e. Brighton and Sorell-Dodges Ferry). The 10 SA3s which have the newest PVs are all located in the capital cities, principally in the inner and middle suburbs.

Table 8.2: Estimated average age of passenger vehicles, top and bottom 10 Statistical Area Level 3s, Australia, 2018

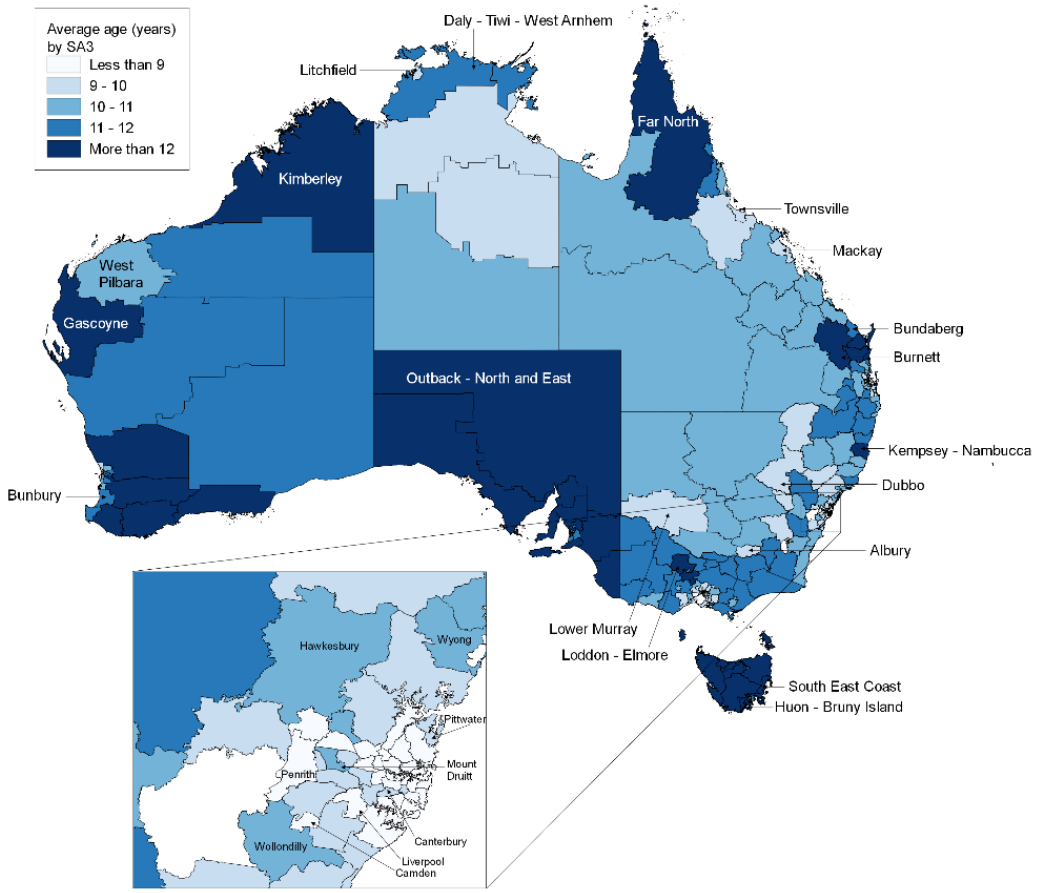
SA3 names	Average age (years)	SA3 names	Average age (years)
Top 10 SA3s		Bottom 10 SA3s	
South East Coast (TAS)	15.0	Nundah (QLD)*	4.2
Huon - Bruny Island (TAS)	13.9	Adelaide City (SA)	6.0
Meander Valley - West Tamar (TAS)	13.9	Melbourne City (VIC)	6.0
Brighton (TAS)	13.7	Brisbane Inner (QLD)	6.1
Sorell - Dodges Ferry (TAS)	13.6	Ku-ring-gai (NSW)	6.4
Central Highlands (TAS)*	13.5	Chatswood - Lane Cove (NSW)	6.7
Murray and Mallee (SA)	13.3	Ryde - Hunters Hill (NSW)	6.9
West Coast (TAS)	13.3	Darwin City (NT)	6.9
Manjimup (WA)	13.1	Brisbane Inner - West (QLD)	6.9
Far North (QLD)	13.1	Yarra (VIC)	7.0

a. Years of manufacture from 1901 to 2018.
b. Average age is calculated using the individual years of manufacture of vehicles registered in the *Motor Vehicle Census* (for details, refer Data sources and methodology).
c. Number of PVs were downloaded by 2018 Postcodes, which were then concorded to 2016 ASGS SA3s.
d. Excluding Norfolk Island, Christmas Island and Migratory - Offshore - Shipping.
e. The SA3s with asterisks (*) were rated as 'poor' by ABS. Note that the quality of the postcode to SA3 concordance was rated by ABS as either 'good', 'acceptable' or 'poor' for all SA3s. For a list of all poorly rating SA3s, see Footnote 5.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018, using TableBuilder Pro.

Map 8.1 illustrates the estimated average age of PVs for SA3s across Australia in 2018 (Greater Sydney is shown as an inset). It reveals that all SA3s in Tasmania had an average age of more than 12 years. There were a total of 41 SA3s where PVs had an average age of 12 years or more, covering several jurisdictions (Tasmania, South Australia, Western Australia, Queensland, New South Wales and Victoria). Apart from four SA3s in Greater Hobart (Brighton, Sorell-Dodges Ferry, Hobart North West and Hobart South and West), there are several other SA3s in the capital cities which had PV fleets with an average age of 12 years or more (e.g. Playford in Greater Adelaide, Armadale and Mundaring in Greater Perth). All are located in the outer sector of their respective capital city.

In addition to the SA3s listed in Table 8.2, which had PVs with an average age of at least 13 years, there are a few additional SA3s with an average vehicle age of 13 years or more, including Yorke Peninsula (SA), Eyre Peninsula and South West (SA), Gascoyne (WA), Wheat Belt South (WA) and North East (Tasmania). In addition to the Tasmanian cluster of SA3s with a particularly old PV fleet, Map 8.1 reveals there are some additional clusters of SA3s with relatively old passenger vehicle fleets in regional South Australia, the West Australian Wheatbelt, and the Wide Bay - Burnett region of Queensland. A number of relatively remote SA3s also have a relatively old passenger vehicle fleet (e.g. Far North Queensland, and the Kimberley and Gascoyne regions of Western Australia).

Map 8.1: Estimated average age of passenger vehicles by Statistical Area Level 3, Australia



a. Years of manufacture from 1901 to 2018.
b. Average age is calculated using the individual years of manufacture of vehicles registered in the *Motor Vehicle Census* (for details, refer Data sources and methodology).
c. Number of PVs were downloaded by 2018 postcodes, which were then concorded to 2016 ASGS SA3s.
d. Excluding Norfolk Island, Christmas Island and Migratory - Offshore - Shipping.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018, using TableBuilder Pro.

Average age of LCVs by SA3

BITRE's SA3 level estimates of the average age of LCVs ranged between 4.5 years and 16.1 years. Table 8.3 presents the estimated average age of LCVs for the top 10 and bottom 10 SA3s. Among the top 10 SA3s with the highest average age of LCVs, nine SA3s are located in Tasmania, and one in Queensland. Five SA3s are located in regional Tasmania (e.g. Huon - Bruny Island, South East Coast and North East) and the others in Greater Hobart (e.g. Brighton, Hobart - North West). The 10 SA3s which had the newest LCV fleets are all located in the capital cities, principally in the inner and middle suburbs.

Map 8.2 illustrates the estimated average age of LCVs for SA3s across Australia. It reveals that all SA3s in Tasmania had an average age of more than 12 years. There were a total of 76 SA3s where LCVs had an average age of 12 years or more, covering all six states. In addition to the SA3s listed in Table 8.3 which had LCVs with an average age of at least 13.9 years, there are several other SA3s with an average light commercial vehicle age of 13.5 years or more, including Devonport (TAS), Heathcote - Castlemaine - Kyneton (VIC), West Coast (TAS), Wheat Belt - South (WA) and Wheat Belt - North (WA). In addition to the Tasmanian cluster of SA3s with a particularly old light commercial vehicle fleet, Map 8.2 reveals there are some additional SA3s with a relatively old LCV fleets in regional South Australia, regional Victoria, outback Queensland and the West Australian Wheatbelt. A number of remote SA3s also have a relatively old LCV fleet (e.g. Kimberley and Gascoyne SA3s in Western Australia).

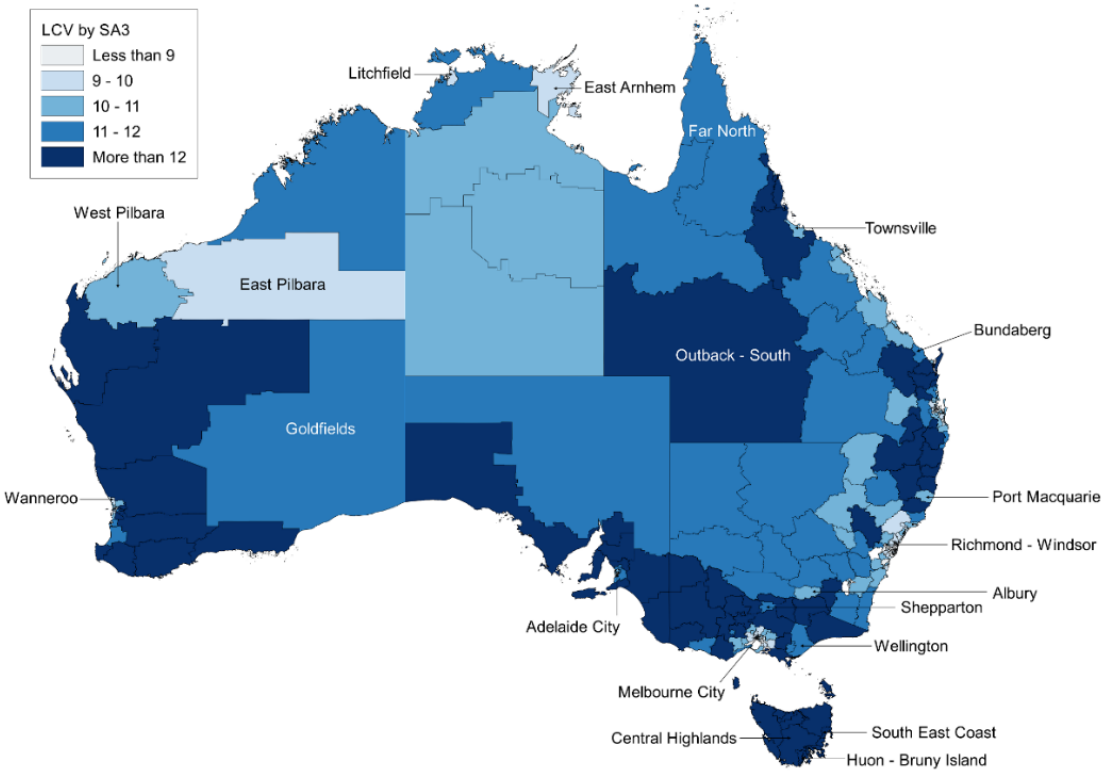
There are 51 SA3s which had LCVs aged between 11 and 12 years (on average), whilst another 72 SA3s had LCVs aged between 10 and 11 years. There are 66 SA3s that had LCVs aged between 9 and 10 years and another 61 SA3s had LCV fleets that were less than 9 years old, on average.

Table 8.3: Estimated average age of light commercial vehicles, top and bottom 10 Statistical Area Level 3s, Australia

SA3 names	Average age (years)	SA3 names	Average age (years)
Top 10 SA3s		**Bottom 10 SA3s**	
Huon - Bruny Island (TAS)	16.1	Melbourne City (VIC)	4.5
South East Coast (TAS)	16.1	Adelaide City (SA)	4.5
Central Highlands (TAS)*	15.6	Richmond - Windsor (NSW)*	4.5
Brighton (TAS)	15.1	Brisbane Inner - West (QLD)	4.7
North East (TAS)	14.5	Ku-ring-gai (NSW)	4.9
Meander Valley - West Tamar (TAS)	14.4	Ryde - Hunters Hill (NSW)	5.2
Sorell - Dodges Ferry (TAS)	14.3	Chatswood - Lane Cove (NSW)	5.2
Beaudesert (QLD)*	14.0	Nundah (QLD)*	5.2
Hobart - North West (TAS)	14.0	Brisbane Inner (QLD)	5.2
Hobart - South and West (TAS)	13.9	Yarra (VIC)	5.6

a. Years of manufacture from 1901 to 2018.
b. Average age is calculated using the individual years of manufacture of vehicles registered in the *Motor Vehicle Census* (for details, refer Data sources and methodology).
c. Number of LCVs were downloaded by 2018 postcodes, which were then concorded to 2016 ASGS SA3s.
d. Excluding Norfolk Island, Christmas Island and Migratory - Offshore - Shipping.
e. The SA3s with asterisks (*) were rated as 'poor' by ABS. Note that the quality of the postcode to SA3 concordance was rated by ABS as either 'good', 'acceptable' or 'poor' for all SA3s. For a list of all poorly rating SA3s, see Footnote 5.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018, using TableBuilder Pro.

Map 8.2: Estimated average age of light commercial vehicles by Statistical Area Level 3, Australia



a. Years of manufacture from 1901 to 2018.
b. Average age is calculated using the individual years of manufacture of vehicles registered in the *Motor Vehicle Census* (for details, refer Data sources and methodology).
c. Number of LCVs were downloaded by 2018 Postcodes, which were then concorded to 2016 ASGS SA3s.
d. Excluding Norfolk Island, Christmas Island and Migratory - Offshore - Shipping.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018, using TableBuilder Pro.

Box 8.1 Comparison of average age of passenger vehicles and road fatalities

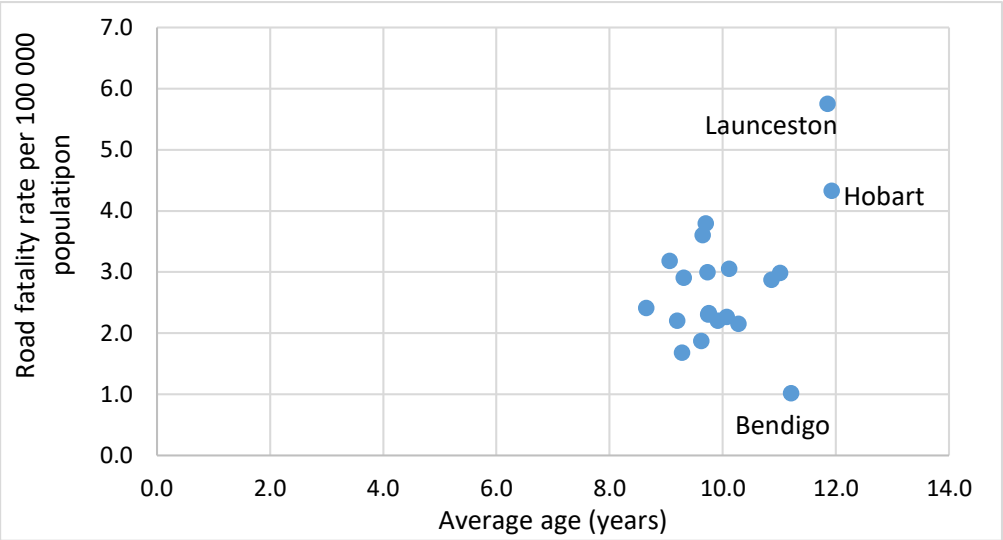
The age of the vehicle is a factor that influences the rate of vehicle crash injuries (Blows et al. 2003). The literature indicates that there is a modest, but measurable, road safety benefit associated with reducing the vehicle fleet age. The benefits of reducing the age of Australia's light vehicle fleet are highlighted by Potterton and Ockwell (2017a). They found that if the average age of the Australian light vehicle fleet was reduced by one year over a period of four years, there would be significant safety, economic and environmental benefits over the longer term.

This Box compares the average age of PVs to the road fatality rate (expressed per 100 000 population)[8] for the major cities in Australia. Across Australia's 21 major cities, the average age of PVs ranges from lows of 8.6 years in Sydney and 8.7 years in Darwin to highs of 11.8 years for Launceston and 11.9 years for Hobart. The road fatality rate ranges from a low of 1.0 deaths per 100 000 population in Bendigo to a high of 8.7 deaths per 100 000 population in Darwin, with most cities having a road fatality rate in the range of 2 to 5 deaths per 100 000 population.[9]

One thing to note is that Darwin has a particularly high road fatality rate compared to the other cities. This reflects factors that are unique to the Northern Territory, such as high alcohol usage, low seatbelt uses and high vehicular speeds (Read 2015). Also, Darwin has a relatively new PV fleet, so its high road fatality rate is unlikely to be due to vehicle age. As the inclusion of Darwin tends to obscure any underlying relationship across the remaining cities, Darwin has been treated as an outlier, and excluded from the remaining analysis.

A scatter diagram showing the relationship between the road fatality rate and the average age of PVs across the 20 Major cities (i.e. excluding Darwin) is provided in Figure B8.1. It shows a positive correlation (of 0.44) between the road fatality rate and vehicle age across these cities, which is statistically significant at the 5 per cent probability level. While the analysis is not causal nor conclusive (and does not control for the many other factors that can influence road fatality rates), it does suggest that places that have a very old vehicle fleet—such as the cities of Hobart or Launceston, and the regional areas highlighted in dark blue in Map 8.2—are at particular risk of having a high road fatality rate.

Figure B8.1: Scatter diagram showing relationship between average age of passenger vehicles and road fatality rate for the 20 major cities



a. Years of manufacture from 1901 to 2018.
b. Road fatality rate per 100 000 population data: average for 2017 and 2018.
c. The road fatality rate in Bendigo reflects zero fatalities occurring in one of the two years.
d. Average age is calculated using the individual years of manufacture of vehicles registered in the ABS *Motor Vehicle Census* (for details, refer Data sources and methodology).
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro) and BITRE (2019b).

[8] Note that road fatalities per 100 000 population is the measure specified in the United Nations (UN) Sustainable Development Goals (Indicator 3.61) to monitor road crash trauma (cited in BITRE 2019b).

[9] Note that there can be considerable year to year volatility in road fatality rates, particularly for smaller cities. BITRE has used a 2-year average fatality rate to limit the effect of volatility on results, but it may still be an issue for less populated cities.

9 Spatial differences in passenger vehicles and light commercial vehicles by number of cylinders

The following sub-sections provide information on how the number of cylinders of light vehicles varies across States/Territories, cities, regions and small areas.

9.1 States and Territories

Table 9.1 provides data on the distribution of light vehicles by the number of cylinders in the states and territories, using the ABS *Motor Vehicle Census* 2018.

The proportion of PVs having four or less cylinders was highest in the Australian Capital Territory (76.6 per cent) and lowest in South Australia (67.7 per cent). The proportion of LCVs having four or less cylinders was highest in the Northern Territory (81.1 per cent) and lowest in Western Australia (71.9 per cent). Eight or more cylinder LCVs are most prominent in Western Australia (7.5 per cent), while 8 or more cylinder PVs are most prominent in the Northern Territory (7.1 per cent).

Table 9.1: Proportion of registered light vehicles by number of cylinders, states and territories, 2018

States/Territories	Number of cylinders				All cylinders
	1 to 3	4	6	8 or more	
	Proportion (per cent)				
	Passenger vehicles				
New South Wales	0.7	73.7	22.0	3.7	100.0
Victoria	0.4	68.9	26.5	4.2	100.0
Queensland	1.0	73.1	21.6	4.3	100.0
South Australia	0.7	67.1	27.6	4.7	100.0
Western Australia	0.7	68.2	25.0	6.0	100.0
Tasmania	0.7	73.4	22.5	3.4	100.0
Northern Territory	0.8	70.9	21.2	7.1	100.0
Australian Capital Territory	0.8	75.8	20.2	3.2	100.0
	Light commercial vehicles				
New South Wales	0.1	77.1	18.7	4.1	100.0
Victoria	0.1	72.1	22.8	5.0	100.0
Queensland	0.1	77.1	18.9	4.0	100.0
South Australia	0.2	76.3	18.9	4.6	100.0
Western Australia	0.1	71.7	20.6	7.5	100.0
Tasmania	0.1	76.4	19.4	4.1	100.0
Northern Territory	0.0	81.0	14.0	4.9	100.0
Australian Capital Territory	0.2	76.1	19.5	4.1	100.0
	All light vehicle types				
New South Wales	4.5	71.5	20.5	3.6	100.0
Victoria	3.9	67.1	24.9	4.1	100.0
Queensland	5.3	70.8	19.9	4.0	100.0
South Australia	0.7	68.4	26.3	4.7	100.0
Western Australia	5.6	65.7	22.8	5.9	100.0
Tasmania	3.5	72.1	21.0	3.4	100.0
Northern Territory	4.5	71.1	18.2	6.2	100.0
Australian Capital Territory	4.3	73.3	19.3	3.2	100.0

a. Excludes 'Other - Not elsewhere specified' which includes rotary powered and other or not stated) from cylinder category.
b. Motorcycles are included in 'All light vehicle types', but not shown separately.
c. Number of PVs, LCVs and motorcycles were downloaded by 2018 state of registration.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

9.2 Capital cities and Regional areas

Table 9.2 provides information on the proportion of light vehicles with different cylinder engines (1 to 3, 4, 6 and 8 or more) in the capital cities, regional Australia, city sectors and different types of regions. The key results that emerged are summarised below:

- Vehicles with four cylinders or less are not as common in the five major capital cities (75.2 per cent) compared to the three minor capital cities (77.3 per cent), whilst 6 or more cylinder engine vehicles are more common in the five major capital cities (24.8 per cent) than the three minor capital cities (22.7 per cent).
- In the five major capital cities (combined), light vehicles with 4 cylinder or less engines are highly concentrated in the inner sector, followed by the middle sector and with a relatively low concentration in the outer sector. The opposite pattern is evident for light vehicles with 6 or more cylinder engines.
- Light vehicles with 4 or less cylinder engines are most common in capital cities (75.3 per cent) and coastal cities (74.5 per cent), and less common in remote areas (62.9 per cent). Light vehicles with 6 or more cylinder engines showed the opposite pattern.

9.3 Major cities

Table 9.3 shows the composition of PVs and LCVs by number of cylinders for the 21 major cities, based on ABS *Motor Vehicle Census* 2018. The key results that emerged are summarised below:

- Among the 21 major cities, there are six cities (i.e. Brisbane, Sydney, Hobart, Canberra, Wollongong and Cairns) which had high proportions of PVs (75 per cent or more) with 4 and less cylinders, and three cities (Bendigo, Ballarat and Albury-Wodonga) which had low proportions (of less than 66 per cent).
- Higher proportions (more than 29 per cent) of 6 cylinder PVs were located in Bendigo, Ballarat and Albury - Wodonga, whilst Darwin, Brisbane and Cairns had the lowest proportions (less than 20 per cent).
- In terms of PVs with 8 or more cylinders, Mackay had the highest proportion (6.6 per cent), followed by Darwin (5.7 per cent) and Perth (5.2 per cent). Hobart had the lowest proportion (3.0 per cent) of PVs with 8 or more cylinders, followed by Launceston and Sydney (each 3.2 per cent).
- Among the 21 major cities, Darwin and Brisbane had the highest proportions (80 per cent or more) of LCVs with 4 or less cylinders and consequently, had the lowest proportions of LCVs with 6 cylinders (Darwin at 13.4 per cent and Brisbane at 16.8 per cent).
- Bendigo and Geelong had the lowest proportion of LCVs with 4 or less cylinders (65 per cent and 67 per cent, respectively) and the highest proportions of 6 cylinder LCVs.
- In terms of LCVs with 8 or more cylinders, Perth had the highest proportion (7.1 per cent). Three cities in Victoria (i.e. Bendigo, Geelong and Ballarat) had a relatively large share of LCVs with 8 or more cylinders (5.1 per cent or more). Several cities in regional Queensland (i.e. Sunshine Coast, Toowoomba, Cairns and Townsville) and Brisbane as well as Gold Coast-Tweed had low proportions of LCVs with 8 or more cylinders (3.7 per cent or less).

Table 9.2: Proportion of passenger vehicles, light commercial vehicles and total light vehicles by number of cylinders, by capital cities and regional areas, 2018

Geographic locations	Number of cylinders				All cylinders
	1 to 3	4	6	8 or more	
	Proportion (per cent)				
	Passenger vehicles				
Sector of capital city					
Five major capital cities	0.7	73.1	22.5	3.8	100.0
Inner	0.8	76.9	18.8	3.5	100.0
Middle	0.6	75.4	20.9	3.1	100.0
Outer	0.7	70.3	24.7	4.4	100.0
Three small capital cities	0.8	75.4	20.2	3.6	100.0
Regional areas by types					
Capital city	0.7	73.2	22.4	3.8	100.0
Rest of states	0.7	67.0	27.0	5.4	100.0
Coastal city	0.8	71.4	23.4	4.4	100.0
Inland city	0.5	64.2	29.9	5.4	100.0
Coastal country	0.6	66.6	27.5	5.3	100.0
Inland country	0.5	62.1	31.0	6.4	100.0
Remote	0.5	55.8	33.2	10.5	100.0
	Light commercial vehicles				
Sector of capital city					
Five major capital cities	0.1	76.8	18.6	4.5	100.0
Inner	0.1	83.8	12.2	3.9	100.0
Middle	0.1	79.4	17.1	3.4	100.0
Outer	0.1	73.9	20.8	5.3	100.0
Three small capital cities	0.1	77.4	18.1	4.4	100.0
Regional areas by types					
Capital city	0.1	76.8	18.6	4.5	100.0
Rest of states	0.1	73.8	21.1	5.0	31.9
Coastal city	0.1	76.3	19.2	4.4	100.0
Inland city	0.1	72.1	22.4	5.4	100.0
Coastal country	0.1	74.5	20.8	4.6	100.0
Inland country	0.1	72.1	22.6	5.1	100.0
Remote	0.1	69.2	23.5	7.1	100.0
	All light vehicle types				
Sector of capital city					
Five major capital cities	3.9	71.3	21.1	3.7	100.0
Inner	4.6	74.8	17.2	3.4	100.0
Middle	3.1	74.0	19.9	3.0	100.0
Outer	4.3	68.3	23.0	4.3	100.0
Three small capital cities	4.0	73.3	19.1	3.6	100.0
Regional areas by types					
Capital city	3.9	71.4	21.0	3.7	100.0
Rest of states	5.1	65.7	24.2	5.0	100.0
Coastal city	5.4	69.1	21.4	4.1	100.0
Inland city	5.0	63.2	26.7	5.1	100.0
Coastal country	5.1	65.6	24.5	4.8	100.0
Inland country	4.9	62.4	27.0	5.7	100.0
Remote	4.4	58.5	28.3	8.8	100.0

a. Five major capital cities are: Sydney, Melbourne, Brisbane, Adelaide and Perth, while three small cities are: Hobart, Darwin and Canberra.
b. Number of light vehicles by types were downloaded by 2018 Postcodes, which were then concorded to Statistical Area Level 2 (SA2) and then to city sectors (Inner, Middle and Outer) of the five major capital cities and to the six region types (i.e. Capital cities, Coastal cities, Inland cities, Coastal country areas, Inland country areas and Remote areas). For details of city sectors and region types, see Appendix B and Appendix A, respectively.
c. Inner, Middle and Outer suburbs defined by BITRE based on SA2 boundaries and are visually shown in Appendix B.
d. For details of region types, i.e. Capital cities, Coastal cities, Inland cities, Coastal country areas, Inland country areas and Remote areas, see Appendix A.
e. Excludes 'Other - Not elsewhere specified' which includes rotary powered and other or not stated) from cylinder category.
f. Motorcycles are included in 'All light vehicle types', but not shown separately.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

Table 9.3: Proportion of passenger vehicles and light commercial vehicles by number of cylinders, by major cities, 2018

Major cities	Number of cylinders				All cylinders
	1 to 3	4	6	8 or more	
	Proportion (per cent)				
	Passenger vehicles				
Greater Sydney	0.7	75.7	20.4	3.2	100.0
Greater Melbourne	0.4	71.3	24.6	3.7	100.0
Greater Brisbane	1.0	76.0	19.6	3.4	100.0
Greater Adelaide	0.7	69.9	25.2	4.2	100.0
Greater Perth	0.7	70.6	23.4	5.2	100.0
Greater Hobart	0.7	75.6	20.7	3.0	100.0
Greater Darwin	0.8	74.4	19.1	5.7	100.0
Canberra	0.8	75.5	20.3	3.4	100.0
Albury - Wodonga	0.5	65.7	29.2	4.6	100.0
Ballarat	0.4	65.1	29.7	4.7	100.0
Bendigo	0.4	64.9	30.7	4.0	100.0
Cairns	1.3	75.0	19.8	3.9	100.0
Geelong	0.5	67.6	27.9	4.0	100.0
Gold Coast - Tweed Heads	0.9	74.0	21.2	3.9	100.0
Launceston	0.9	73.9	22.0	3.2	100.0
Mackay	1.1	68.5	23.8	6.6	100.0
Newcastle - Maitland	0.7	74.4	21.4	3.5	100.0
Sunshine Coast	0.9	74.7	20.4	3.9	100.0
Toowoomba	0.9	73.5	21.2	4.4	100.0
Townsville	1.2	73.4	21.2	4.3	100.0
Wollongong	0.7	75.0	20.6	3.8	100.0
	Light commercial vehicles				
Greater Sydney	0.1	78.8	17.3	3.8	100.0
Greater Melbourne	0.1	73.9	21.3	4.7	100.0
Greater Brisbane	0.1	80.0	16.8	3.2	100.0
Greater Adelaide	0.2	77.5	17.8	4.5	100.0
Greater Perth	0.1	73.4	19.4	7.1	100.0
Greater Hobart	0.1	75.4	20.2	4.3	100.0
Greater Darwin	0.0	82.2	13.4	4.4	100.0
Canberra	0.3	75.6	19.7	4.4	100.0
Albury - Wodonga	0.1	72.4	22.5	5.0	100.0
Ballarat	0.1	68.8	26.0	5.1	100.0
Bendigo	0.1	65.2	28.8	5.9	100.0
Cairns	0.1	79.2	17.1	3.7	100.0
Geelong	0.1	67.4	27.1	5.4	100.0
Gold Coast - Tweed Heads	0.1	77.9	18.4	3.7	100.0
Launceston	0.1	74.8	20.6	4.5	100.0
Mackay	0.0	77.5	18.0	4.5	100.0
Newcastle - Maitland	0.1	77.5	18.5	3.9	100.0
Sunshine Coast	0.1	79.6	17.1	3.2	100.0
Toowoomba	0.0	78.4	17.9	3.6	100.0
Townsville	0.1	78.8	17.4	3.7	100.0
Wollongong	0.1	76.3	19.0	4.6	100.0

a. Major cities with populations over 80 000 people, which consist of a total of 21 cities including the 8 capital cities (defined based on GCCSAs) and 13 non-capital major cities (defined based on SUAs).
b. Excludes 'Other - Not elsewhere specified' which includes rotary powered and other or not stated) from cylinder category.
c. Motorcycles are included in 'All light vehicle types', but not shown separately.
d. Number of PVs and LCVs were downloaded by 2018 postcodes, which were then concorded to 2016 ASGS GCCSAs and SUAs.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

9.4 Statistical Area Level 3 (SA3)

Table 9.4 provides information on the proportion of the PV and LCV fleet that have 6 or more cylinder engines by Statistical Area Level 3 (SA3). There are two SA3s where six or more cylinder vehicles comprised more than half of the PV fleet, namely Outback - North and East (SA) and Wheat Belt - South (WA). More generally, the pattern is for agriculturally-based regions to have a high proportion of six or more cylinder vehicles, presumably reflecting a high proportion of 4WD vehicles used in these locations. The same pattern is also demonstrated in LCVs. The top five SA3s which had the highest proportions of LCVs with 6 or more cylinder engines (35 per cent or more) were: Outback - South (QLD), Sunbury (VIC), Wheat Belt - North (WA), Macedon Ranges (VIC) and Wheat Belt - South (WA).

Chiefly, it is the inner and middle suburban SA3s within our capital cities that have the lowest proportion of six or more cylinder vehicles. Examples of SA3s with 18 per cent or less of six plus cylinder PVs include Marrickville - Sydenham - Petersham in Sydney Inner, Sherwood-Indooroopilly in Brisbane Middle, Eastern Suburbs - South in Sydney Inner, Holland Park - Yeronga in Brisbane Inner and Brisbane Inner - North.

Table 9.4: SA3s with a particularly high and low proportion of six or more-cylinder passenger vehicles and light commercial vehicles, 2018

SA3 name	Proportion (per cent), six or more cylinders	SA3 name	Proportion (per cent), six or more cylinders
High proportion		**Low proportion**	
Passenger vehicles			
Outback - North and East (SA)	53.3	Marrickville - Sydenham - Petersham (NSW)	16.1
Wheat Belt - South (WA)	52.8	Sherwood - Indooroopilly (QLD)	17.0
Far North (QLD)	49.8	Eastern Suburbs - South (NSW)	17.4
Wheat Belt - North (WA)	48.9	Holland Park - Yeronga (QLD)	17.6
Loddon - Elmore (VIC)*	48.4	Brisbane Inner - North (QLD)	18.0
Light commercial vehicles			
Outback - South (QLD)	39.4	Nundah (QLD)*	8.7
Sunbury (VIC)	37.4	Darwin City (NT)	10.3
Wheat Belt - North (WA)	36.6	Adelaide City (SA)	10.5
Macedon Ranges (VIC)	35.6	Melbourne City (VIC)	10.5
Wheat Belt - South (WA)	35.5	Brisbane Inner - West (QLD)	10.6

a. Excludes 'Other - Not elsewhere specified' which includes rotary powered and other or not stated) from cylinder category.
b. External territories and Lord Howe Island are excluded.
c. Number of PVs and LCVs were downloaded by 2018 Postcodes, which were then concorded to ABS 2016 SA3s.
d. The SA3s with asterisks (*) were rated as 'poor' by ABS. Note that the quality of the postcode to SA3 concordance was rated by ABS as either 'good', 'acceptable' or 'poor' for all SA3s. For a list of all poorly rating SA3s, see Footnote 5.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

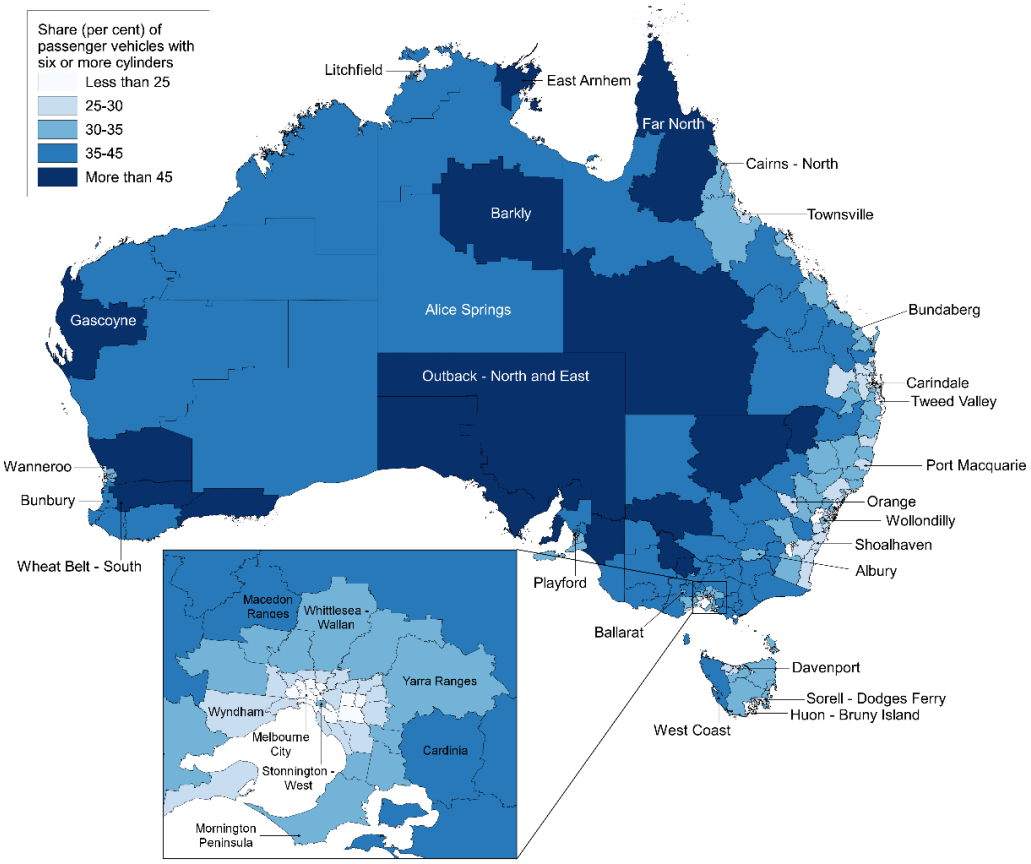
Map 9.1 illustrates the proportion of PVs with 6 or more cylinders by SA3 across Australia in 2018. Greater Melbourne is shown as an inset. There were 18 SA3s which had 45 per cent or more PVs with 6 or more cylinders, and these SA3s were located in regional and remote areas across five major states (New South Wales, Victoria, Queensland, South Australia and Western Australia) and the Northern Territory. In addition to the SA3s listed in Table 9.4 which had the highest proportions of PVs with 6 or more cylinders, other SA3s that exceeded 45 per cent included Outback - South (QLD), Eyre Peninsula and South West (SA), Murray and Mallee (SA), Gascoyne (WA) and Esperance (WA).

There are 57 SA3s which had 35 to 45 per cent of PVs with 6 or more cylinders. Of these 57 SA3s, six SA3s are located in capital cities and the rest are in regional and remote areas. The six capital city SA3s are Playford and Gawler - Two Wells in Adelaide, Macedon Ranges and Cardinia in Melbourne, and Serpentine – Jarrahdale and Mandurah in Perth. All are outer suburban SA3s.

In addition, there are 101 SA3s which had less than 25 per cent of PVs with 6 or more cylinders. Only 15 of these SA3s are located in regional and remote areas, whilst the rest are located in capital cities.

The inset map of Melbourne shows that SA3s with such low rates of PVs with 6 or more cylinders are concentrated in the inner suburbs of Melbourne, and there is a general tendency for the representation of 6 or more cylinder vehicles to increase as you move further away from the CBD.

Map 9.1: Proportion of passenger vehicles with six or more cylinders by Statistical Area Level 3, Australia, 2018



a. Excludes 'Other - Not elsewhere specified' which includes rotary powered and other or not stated) from cylinder category.
b. External territories and Lord Howe Island are excluded.
c. Number of PVs were downloaded by 2018 Postcodes, which were then concorded to ABS 2016 SA3s.
d. The quality of the postcode to SA3 concordance was rated by ABS as either 'good', 'acceptable' or 'poor' for all SA3s. For a list of all poorly rating SA3s, see Footnote 5.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

10 Spatial differences in average and median tare weights of passenger vehicles and light commercial vehicles

Only New South Wales, Victoria, Western Australia and the Australian Capital Territory report tare weights in a reasonably comprehensive manner in ABS (2018a). These jurisdictions had more than a 98 per cent response rate for both PVs and LCVs. In addition to the above four jurisdictions, Queensland and South Australia also had more than 98 per cent response rate of LCVs, but not PVs. Thus, average and median tare weight[10] data are analysed for the different geographies, based on only a subset of jurisdictions.

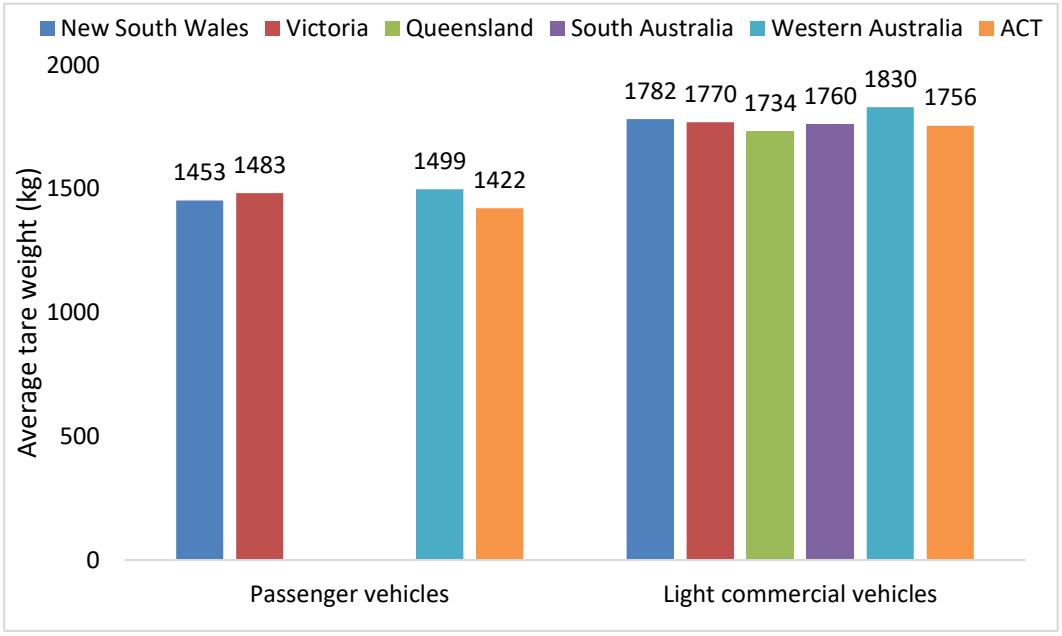
[10] Average and median tare weights were calculated using the categorical tare weights registered in ABS (2018a). For median tare weight, a specific point estimate within the median tare weight category is derived using a simple pro-rata approach. The approach to estimating average tare weight involved excluding registrations where tare weight was 'Not stated' and assigning an average value to each tare weight category. The average value was set as the midpoint of the tare weight range for all categories, apart from the top tare weight category, where the average was set at 1.5x lower band of the top tare weight category (i.e. 30 000). BITRE has previously used the same approach for estimating median and average income (see BITRE 2014).

10.1 Selected states and territory

Figure 10.1 shows the average tare weights of PVs for New South Wales, Victoria, Western Australia and the Australian Capital Territory, whilst average tare weights of LCVs are presented for New South Wales, Victoria, Queensland, South Australia, Western Australia and the Australian Capital Territory,

As expected, average tare weight of PVs are always lower than that of LCVs, with the same pattern evident in each state/territory (see Figure 10.1). However, when comparing the four jurisdictions (common for both PVs and LCVs), average tare weights of PVs and LCVs were higher for Western Australian vehicles (1499 kg and 1830 kg, respectively) and lowest for the Australian Capital Territory vehicles (1424 kg for PVs and 1756 kg for LCVs). On average, PVs in New South Wales had lower tare weight than those in Victoria (1453 kg versus 1483 kg), whilst LCVs in New South Wales had slightly higher (1782 kg) tare weights than Victorian LCVs (1770 kg). In Queensland and South Australia, average tare weights of LCVs were 1734 kg and 1760 kg, respectively.

Figure 10.1: Average tare weights of passenger vehicles and light commercial vehicles in various jurisdictions, 2018



a. In 2018, only New South Wales, Victoria, Western Australia and the Australian Capital Territory report tare weights of PVs in a reasonably comprehensive manner. These jurisdictions had more than a 98 per cent response rate. For LCVs, New South Wales, Victoria, Queensland, South Australia, Western Australia and the Australian Capital Territory also had more than 98 per cent response rate.
b. Number of PVs and LCVs by tare weights were downloaded by States and Territories.
c. ACT stands for Australian Capital Territory.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

10.2 Capital cities by sectors

Table 10.1 shows the average and median tare weights (kg) of PVs in Sydney, Melbourne and Perth by sectors, whilst Table 10.2 shows the average tare weights (kg) of LCVs in Sydney, Melbourne and Perth by sectors. Information on median tare weights of LCVs by sectors are not provided, since the median tare weights of LCVs in the three capital cities, irrespective of sectoral areas, did not differ, possibly because of the wider range (i.e. 1601-2000 kg).

The key results that emerged from Table 10.1 are summarised below:

- Across the three capital cities, average tare weight of PVs was lower in Sydney (1439 kilograms) than Melbourne (1473 kilograms) and Perth (1475 kilograms).
- Average tare weights of PVs were higher in inner and outer sectors of Melbourne and Perth compared to the middle sector. In Sydney, the average tare weight of PVs is higher in the outer sector, followed by the middle sector and lowest in the inner sector.

- Median tare weights of PVs are lower in Sydney than the other two capital cities. There is limited variation in median tare weights within cities, although Perth's middle sector has a lower median tare weight than the city's inner and outer sectors.

Table 10.1: Average and median tare weights of passenger vehicles in Sydney, Melbourne and Perth by sectors, 2018

Greater capital city	Sector			All sectors
	Inner	Middle	Outer	
	Average tare weight (kg)			
Sydney	1430	1435	1443	1439
Melbourne	1484	1461	1483	1473
Perth	1476	1449	1487	1475
	Median tare weight (kg)			
Sydney	1301-1400	1301-1400	1301-1400	1301-1400
Melbourne	1401-1500	1401-1500	1401-1500	1401-1500
Perth	1401-1500	1301-1400	1401-1500	1401-1500

a. In 2018, only New South Wales, Victoria, Western Australia and the Australian Capital Territory report tare weights of PVs in a reasonably comprehensive manner. These jurisdictions had more than a 98 per cent response rate.
b. Number of PVs by tare weights were downloaded by 2018 postcodes, then concorded to 2016 ASGS SA2s, which were then concorded to BITRE city sectors (Inner, Middle and Outer), which are described in Appendix B.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

Table 10.2 shows that:

- Across the five capital cities, average tare weight of LCVs was lowest in Brisbane (1728 kg) and highest in Perth (1809 kg). The other three capital cities have similar tare weights (ranging from 1761 kg to 1780 kg).
- Average tare weights of LCVs varied across sectors. Average tare weight was lower in outer Sydney compared to the inner and middle sectors. In Melbourne, average tare weight was much higher in the inner sector and lowest in the middle sector. Average tare weights of LCVs in Brisbane, Adelaide and Perth were highest in the inner sectors, followed by the middle sectors and lowest in the outer sectors.

Table 10.2: Average tare weights of light commercial vehicles in Sydney, Melbourne, Brisbane, Adelaide and Perth by sectors, 2018

Greater capital city	Sector			All sectors
	Inner	Middle	Outer	
	Average tare weight (kilograms)			
Sydney	1774	1771	1759	1764
Melbourne	1829	1758	1785	1780
Brisbane	1805	1728	1716	1728
Adelaide	1838	1752	1745	1761
Perth	1871	1822	1789	1809

a. For LCVs, New South Wales, Victoria, Queensland, South Australia, Western Australia and the Australian Capital Territory had more than a 98 per cent response rate in 2018.
b. Number of LCVs by tare weights were downloaded by 2018 postcodes, then concorded to 2016 ASGS SA2s, which were then concorded to BITRE city sectors (Inner, Middle and Outer), which are described in Appendix B.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

10.3 Region types

Table 10.3 shows the average and median tare weights of PVs for three states (New South Wales, Victoria and Western Australia) and the Australian Capital Territory by region type, whilst Figure 10.2 shows the average tare weights of LCVs in those three states by region types.

The key results in Table 10.3 include:

- Both average and median tare weights of PVs tended to be higher in remote areas compared to other regional areas.

- Average tare weights of PVs were higher in regional areas (1503 kg) compared to capital cities (1460 kg).
- Among regional areas, average tare weight of PVs were lowest in coastal cities (1472 kg) and highest in remote areas (1689 kg).
- Median tare weights of PVs are in the same range (1401-1500 kg) in all regional areas, except remote areas, where median tare weights are higher and ranged between 1601-2000 kg.

Table 10.3: Average and median tare weight of passenger vehicles in selected states (New South Wales, Victoria, Western Australia and the Australian Capital Territory) by regional areas, 2018

Regional areas	Tare weight (kg)	
	Average	Median
Capital city	1460	1401-1500
Regional areas	1503	1401-1500
Coastal city	1472	1401-1500
Inland city	1499	1401-1500
Coastal country	1496	1401-1500
Inland country	1536	1401-1500
Remote	1689	1601-2000

a. In 2018, only New South Wales, Victoria, Western Australia and the Australian Capital Territory report tare weights of PVs in a reasonably comprehensive manner. These jurisdictions had more than a 98 per cent response rate.
b. Number of PVs by tare weights were downloaded by 2018 postcodes, then concorded to 2016 ASGS SA2s, which were then aggregated to six region types (i.e. Capital cities, Coastal cities, Inland cities, Coastal country areas, Inland country areas and Remote areas). For details of region types, see Appendix A.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

Similarly, Figure 10.2 shows that:

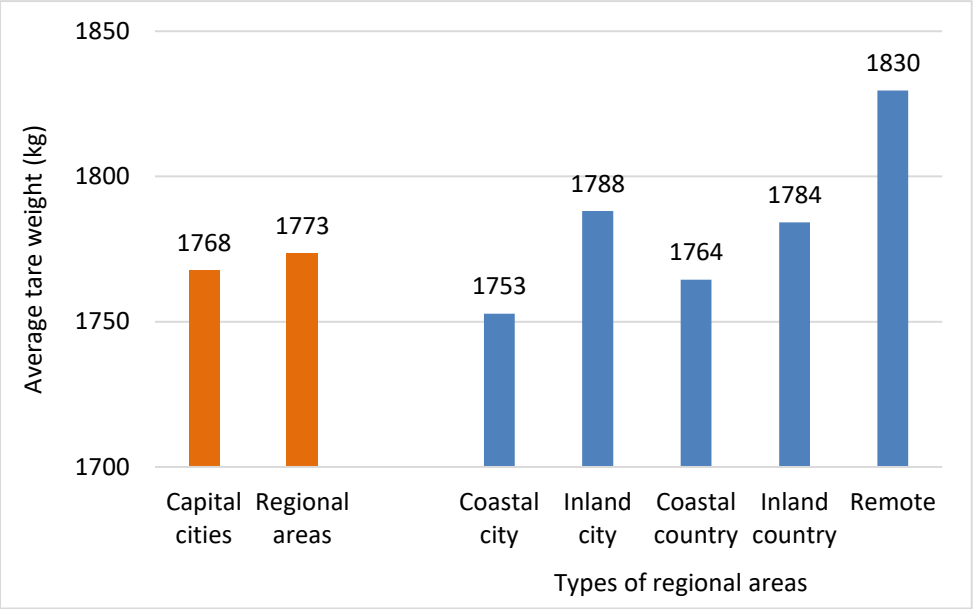
- Average tare weights of LCVs tended to be higher in remote areas (1830kg) than other regional areas.
- Average tare weights of LCVs were slightly higher in regional areas (1773 kg) compared to capital cities (1768 kg).

10.4 Major cities

Since there is not much difference in median tare weights, this sub-section provides only average tare weights for both PVs and LCVs for 10 major cities located in New South Wales, Victoria and Western Australia and Australian Capital Territory. Note that there are 21 major cities in Australia (see earlier sections).

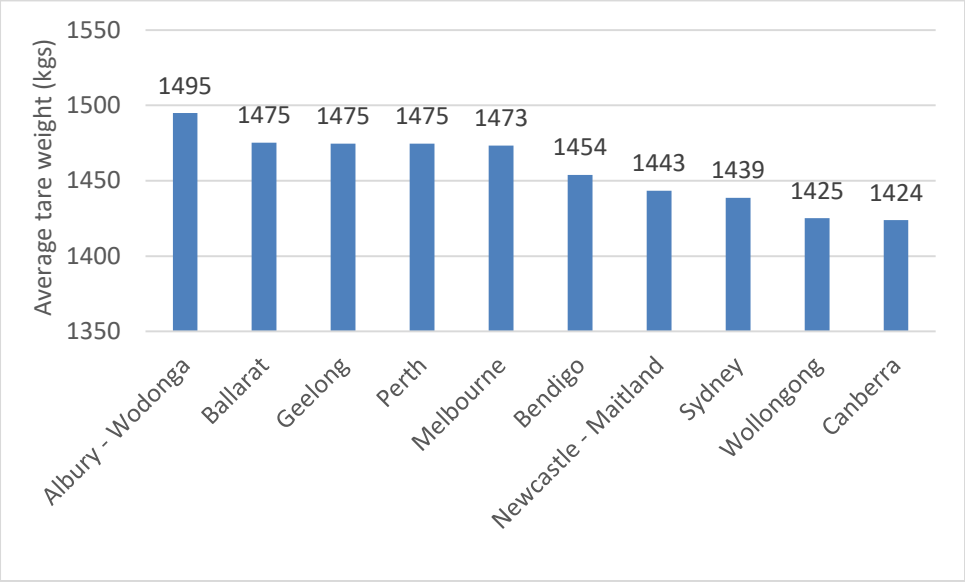
Figure 10.3 shows the average tare weight of PVs for 10 major cities, whilst Figure 10.4 shows the average tare weight of LCVs in those 10 major cities. In terms of PVs, Albury-Wodonga had the highest average tare weight (1495 kg), followed by Ballarat, Geelong and Perth (at 1475 kg each). Canberra and Wollongong had the lowest average tare weights (1424 and 1425 kg, respectively).

Figure 10.2: Average tare weight of light commercial vehicles in selected states (New South Wales, Victoria, Queensland, South Australia, Western Australia and Australian Capital Territory) by regional areas, 2018



a. For LCVs, New South Wales, Victoria, Queensland, South Australia, Western Australia and the Australian Capital Territory had more than a 98 per cent response rate in 2018.
b. Number of LCVs by tare weights were downloaded by 2018 postcodes, then concorded to 2016 ASGS SA2s, which were then aggregated to eight capital cities (GCCSA) and six region types (i.e. Capital cities, Coastal cities, Inland cities, Coastal country areas, Inland country areas and Remote areas). For details of region types, see Appendix A.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

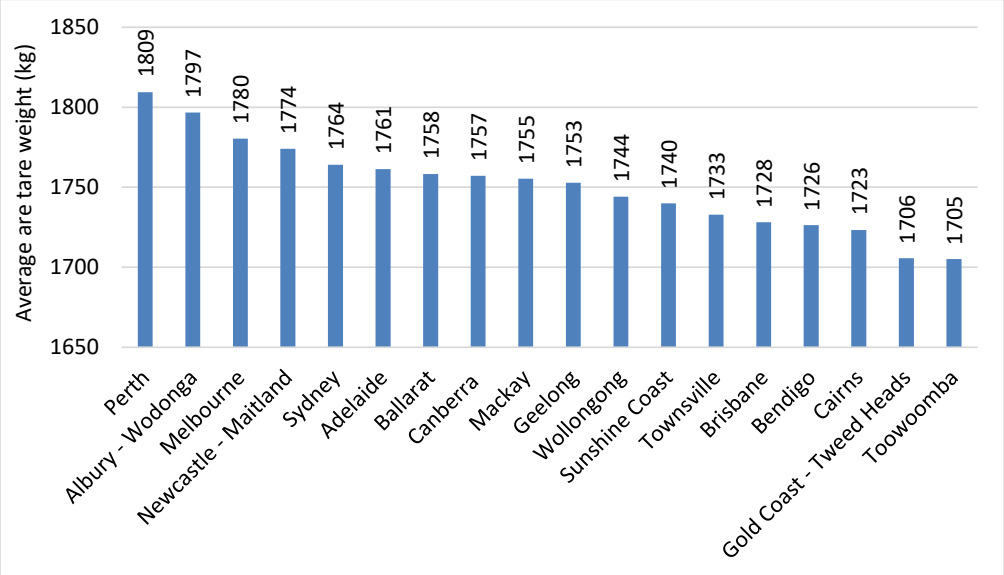
Figure 10.3: Average tare weight of passenger vehicles in 10 major cities, 2018



a. In 2018, only New South Wales, Victoria, Western Australia and the Australian Capital Territory report tare weights in a reasonably comprehensive manner. These jurisdictions had more than a 98 per cent response rate.
b. Number of PVs by tare weights were downloaded by 2018 Postcodes, then concorded to 2016 ASGS GCCSAs and SUAs.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

Among the 18 major cities in the six jurisdictions for which data is available, Perth had the highest average tare weights of LCVs (1809 kg), followed by Albury - Wodonga (1797 kg) and Melbourne (1780 kg), while tare weights were lowest in Gold Coast - Tweed Heads (1706 kg) and Toowoomba (1705 kg) (Figure 10.4).

Figure 10.4: Average tare weight of light commercial vehicles in 18 major cities, 2018



a. For LCVs, New South Wales, Victoria, Queensland, South Australia, Western Australia and the Australian Capital Territory had also more than 98 per cent response rate in 2018.
b. Number of LCVs by tare weights were downloaded by 2018 Postcodes, then concorded to 2016 ASGS GCCSAs and SUAs.
Source: BITRE analysis of ABS Motor Vehicle Census 2018 (TableBuilder Pro).

10.5 Statistical Area Level 3 (SA3)

This sub-section provides average tare weights for both PVs and LCVs by Statistical Area Level 3 (SA3)[11]. Table 10.4 shows the SA3 which have the highest and lowest average tare weights of PVs, with the analysis restricted to SA3s in New South Wales, Victoria, Western Australia and the Australian Capital Territory. The key results include:

- The West Pilbara SA3 in regional Western Australia had the heaviest PVs with an average tare weight of 1730 kg, whilst Marrickville - Sydenham - Petersham in Greater Sydney had the lowest average tare weight (1356 kg).
- Of the ten SA3s having high average tare weights of PVs, seven SA3s are in regional Western Australia and three in the rest of New South Wales. The three highest PV average tare weights are located in regional Western Australia, with the West Pilbara having the highest tare weight, followed by East Pilbara and Kimberley (all having more than 1700 kg).
- Of the ten SA3s having the lowest PV average tare weights, five in Greater Sydney, three in Greater Melbourne and two in the ACT.

Similarly, Table 10.5 presents data on average tare weights for LCVs by the top 10 and bottom 10 SA3s. The key results include:

- The top four SA3s with the greatest average tare weight for LCVs are located in capital cities. The average tare weights of LCVs in these four SA3s lie between 1944 and 1969 kg. In addition to these three SA3s, there are three other SA3s which had LCVs with average tare weights of more than 1900 kg: East Pilbara and West Pilbara in regional WA and Moree - Narrabri in regional NSW.
- Of the ten SA3s having the highest LCV average tare weights, six SA3s are located in regional areas (five in regional WA and one in regional NSW).
- Of the ten SA3s having the lowest LCV average tare weights, five are located on the Gold Coast, three in Greater Brisbane (Springwood - Kingston, Ipswich Inner and Nathan), one in Greater Melbourne (Darebin South) and one in Greater Sydney (Marrickville - Sydenham - Petersham).

[11] See Footnote 6 for details.

Table 10.4: SA3s with a particularly high or low average tare weight of passenger vehicles, 2018

SA3 name	Average tare weight (kg)	SA3 name	Average tare weight (kg)
Top 10 SA3s		**Bottom 10 SA3s**	
West Pilbara (WA)	1731	Marrickville - Sydenham - Petersham (NSW)	1356
East Pilbara (WA)	1713	North Canberra (ACT)	1381
Kimberley (WA)	1710	Eastern Suburbs - South (NSW)	1393
Moree - Narrabri (NSW)	1690	Canterbury (NSW)	1399
Bourke - Cobar - Coonamble (NSW)	1681	Darebin - South (VIC)	1401
Gascoyne (WA)	1675	Darebin - North (VIC)	1405
Esperance (WA)	1671	Blue Mountains (NSW)	1407
Wheat Belt - South (WA)	1653	Kogarah - Rockdale (NSW)	1409
Lower Murray (NSW)	1636	Belconnen (ACT)	1410
Goldfields (WA)	1622	Maribyrnong (VIC)	1410

a. In 2018, only New South Wales, Victoria, Western Australia and the Australian Capital Territory report tare weights in a reasonably comprehensive manner. These jurisdictions had more than a 98 per cent response rate.
b. Number of PVs by tare weights were downloaded by 2018 postcodes, which were then concorded to 2016 ASGS SA3s.
c. External territories and Lord Howe Island are excluded.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

Table 10.5: SA3s with a particularly high or low average tare weight of light commercial vehicles, 2018

SA3 name	Average tare weight (kgs)	SA3 name	Average tare weight (kgs)
Top 10 SA3s		Bottom 10 SA3s	
Richmond - Windsor (NSW)*	1969	Darebin - South (VIC)	1671
Ku-ring-gai (NSW)	1961	Marrickville - Sydenham - Petersham (NSW)	1674
Adelaide City (SA)	1946	Coolangatta (QLD)	1679
Perth City (WA)	1944	Springwood - Kingston (QLD)	1682
East Pilbara (WA)	1921	Ipswich Inner (QLD)	1683
West Pilbara (WA)	1912	Broadbeach - Burleigh (QLD)	1684
Moree - Narrabri (NSW)	1906	Gold Coast Hinterland (QLD)*	1689
Kimberley (WA)	1898	Gold Coast - North (QLD)*	1691
Wheat Belt - South (WA)	1897	Robina (QLD)	1692
Goldfields (WA)	1893	Nathan (QLD)*	1693

a. For LCVs, New South Wales, Victoria, Queensland, South Australia, Western Australia and the Australian Capital Territory had also more than 98 per cent response rate in 2018.
b. Number of LCVs by tare weights were downloaded by 2018 postcodes, which were then concorded to 2016 ASGS SA3s.
c. The SA3s with asterisks (*) were rated as 'poor' by ABS. Note that the quality of the postcode to SA3 concordance was rated by ABS as either 'good', 'acceptable' or 'poor' for all SA3s. For a list of all poorly rating SA3s, see Footnote 5.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

11 Most popular light vehicle makes and models in different types of regions

This section presents data on the most popular makes and models of both PVs and LCVs, based on ABS *Motor Vehicle Census* 2018, and shows how that varies across different types of regions. In addition to the national level, the following geographic areas are used:

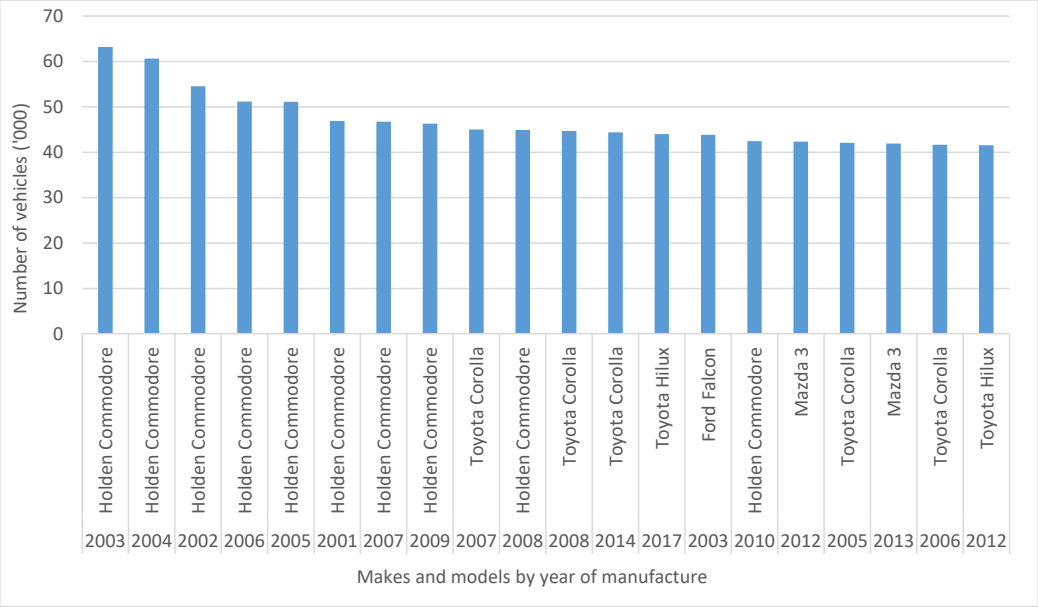
- States and Territories,
- Major cities,
- Five major capital cities by sectors,
- Regional areas by types, and
- Statistical Area Level 3s (SA3s).

11.1 Australia

Figure 11.1 shows the most common makes and models in Australia's light vehicle fleet (PVs and LCVs) as of 2018. The Holden Commodore dominates the top 20 list, with 9 of the 10 most popular makes and models in Australia being Holden Commodores manufactured between 2001 and 2009 (Figure 11.1). Some further information on these Holden Commodores is provided in Box 11.1.

Toyota Corolla is the next most prominent vehicle type, with five models in the top 20 list, followed by Mazda 3 (two models), whilst only two models of LCVs are included (i.e. Toyota Hilux 2012 and 2017).

Figure 11.1: Top 20 makes/models of passenger and light commercial vehicles, Australia, 2018



Note: Light vehicles include PVs and LCVs.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

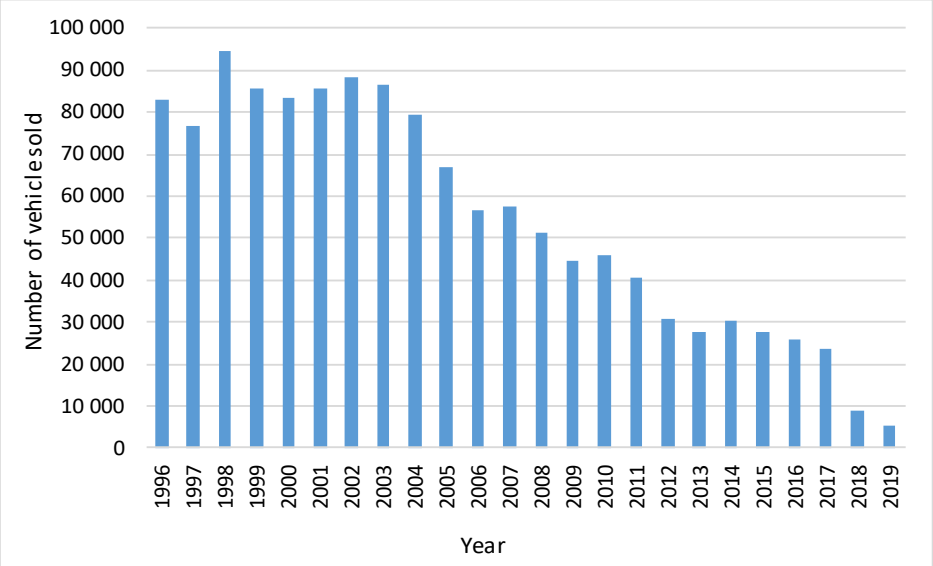
Box 11.1 Prevalence of older Holden Commodore models in Australia's current vehicle fleet

This breakout box provides some information on older Holden Commodore models which are still prevalent in the national vehicle fleet.

VFACTS data shows that back in 2002-2005 the Holden Commodore made up a large proportion of vehicle sales. For example, the 2003 Holden Commodore (both sedans and station wagons), which is the most prevalent make/model/year in Australia's current vehicle fleet, had 86 553 sales in 2003 or 9.5 per cent of total car, truck and bus sales in that year (VFACTS). There are still around 63 000 of them in the vehicle fleet as of 2018, showing strong longevity. In contrast, the most prevalent make/model in 2017 was the Toyota Hilux which only sold 47 000 (or 4 per cent of vehicle sales in 2017). The vehicle fleet has become a lot more diverse, with a greater range of makes and models available, where no single model dominates sales as in the mid-2000s (VFACTS 2017).

Figure B11.1 shows the number of Holden Commodores sold in Australia. The Holden Commodore's sales peaked in the late 1990s and early 2000s. However, the model's best year was 1998 with 94 642 registrations in 12 months. Since 2000, Holden Commodore sales were highest in 2002 and then gradually declined as the Australian market shifted more towards smaller vehicles. Holden announced in December 2013 that local production would cease by the end of 2017. By 2018, less than 10 000 Holden Commodores were sold in a single year in Australia.

Figure B11.1: Holden Commodore's sales, Australia, 1996-2019



Source: Vegners (2020) and Wikipedia.

Picture B11.1: An example of the 2003 Holden Commodore model

Source: Reproduced with permission from Redbook Website (https://www.redbook.com.au).

11.2 States and Territories

Table 11.1 shows the top three makes/models of light vehicles for each state and territory. Across the states and territories, the Holden Commodore (2003) is the most common vehicle in Victoria, South Australia and Tasmania, while the Toyota Hilux (various years) ranks as the top vehicle in Queensland, Western Australia and the Northern Territory. The Toyota Corolla (2008) is the most common vehicle in New South Wales and the Mazda 3 (2012) in the Australian Capital Territory. However, the Holden Commodore (2002-2004) is often the second and/or third most common vehicle across the jurisdictions. The Mazda 3 (various years) occupies the top three makes/models in the Australian Capital Territory.

Table 11.1: Top three makes/models of light vehicles registered in 2018 by states/territories

States/Territories	Most common vehicle		2nd most common vehicle		3rd most common vehicle	
	Make/model (year)	Number	Make/model (year)	Number	Make/model (year)	Number
New South Wales	Toyota Corolla (2008)	16 553	Commodore (2003)	16 292	Toyota Corolla (2007)	16 180
Victoria	Commodore (2003)	19 229	Commodore (2004)	18 186	Commodore (2002)	17 358
Queensland	Toyota Hilux (2008)	12 429	Toyota Hilux (2012)	11 956	Toyota Hilux (2017)	11 807
South Australia	Commodore (2003)	7 287	Commodore (2004)	6 837	Commodore (2002)	6 374
Western Australia	Toyota Hilux (2012)	7 352	Commodore (2004)	6 928	Commodore (2003)	6 334
Tasmania	Commodore (2003)	1 301	Commodore (2004)	1 177	Commodore (2002)	1 144
Northern Territory	Toyota Hilux (2014)	1 356	Toyota Hilux (2013)	1 192	Toyota Hilux (2017)	1 123
ACT	Mazda 3 (2012)	961	Mazda 3 (2014)	952	Mazda 3 (2013)	893

a. Light vehicles include PVs and LCVs.
b. Commodore denotes Holden Commodore.
c. Year of manufacture in bracket.
d. Excludes 'Not applicable' makes/models.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

11.3 Major cities

Table 11.2 provides the top three makes/models of light vehicles (both PVs and LCVs) registered in 2018 for the 21 major cities.

Among the 21 major cities, Holden Commodore (2003) is the most common vehicles in six cities (i.e. Melbourne, Adelaide, Ballarat, Gold Coast-Tweed Heads, Newcastle-Maitland and Wollongong), and the Holden Commodore (2004) is the most common vehicle in two cities (i.e. Albury-Wodonga and Geelong). The Toyota Hilux is the most common vehicle in six major cities in Queensland (i.e. Brisbane, Mackay, Toowoomba, Cairns, Sunshine Coast and Townsville) as well as in Perth and Darwin, although the year of manufacture varies across cities. In Sydney and Hobart, the most common vehicle is the Toyota Corolla (2008) and the Toyota Corolla (2005), respectively. The other three major cities have different makes/models as the most common vehicle, i.e. Mazda 3 (2012) in Canberra, Ford Falcon (2003) in Bendigo and Mitsubishi ASX (2016) in Launceston.

The Holden Commodore features frequently as the second or third most common make/model of light vehicles in many of the major cities. Toyota Hiluxes and Toyota Corollas also feature as the second or third most common make/model in multiple cities.

Table 11.2: Top three makes/models of light vehicles registered in 2018 by 21 major cities

Major cities	Most common vehicle		2nd most common vehicle		3rd most common vehicle	
	Make/model (year)	Number	Make/model (year)	Number	Make/model (year)	Number
Capital cities						
Sydney	Toyota Corolla (2008)	12 343	Toyota Corolla (2007)	11 690	Toyota Corolla (2014)	11 598
Melbourne	Commodore (2003)	11 854	Commodore (2004)	11 403	Commodore (2002)	10 786
Brisbane	Toyota Hilux (2017)	6 009	Toyota Corolla (2017)	5 126	Toyota Corolla (2014)	5 113
Adelaide	Commodore (2003)	4 994	Commodore (2004)	4 658	Commodore (2002)	4 388
Perth	Toyota Hilux (2012)	5 132	Commodore (2004)	4 820	Commodore (2006)	4 443
Hobart	Toyota Corolla (2005)	613	Toyota Corolla (2016)	555	Commodore (2003)	554
Darwin	Toyota Hilux (2014)	960	Toyota Hilux (2013)	830	Toyota Hilux (2017)	787
Canberra	Mazda 3 (2012)	961	Mazda 3 (2014)	952	Mazda 3 (2013)	893
Other major cities						
Albury-Wodonga	Commodore (2004)	339	Commodore (2003)	329	Commodore (2001)	293
Ballarat	Commodore (2003)	489	Commodore (2002)	429	Commodore (2004)	418
Bendigo	Ford Falcon (2003)	451	Commodore (2003)	426	Commodore (2004)	406
Cairns	Toyota Hilux (2007)	477	Toyota Hilux (2008)	476	Toyota Hilux (2012)	409
Geelong	Commodore (2004)	979	Commodore (2003)	972	Commodore (2002)	905
Gold Coast-Tweed	Commodore (2003)	1 643	Hyundai i30 (2016)	1 643	Commodore (2004)	1 505
Launceston	Mitsubishi ASX (2016)	234	Commodore (2004)	217	Commodore (2002)	201
Mackay	Toyota Hilux (2012)	436	Toyota Hilux (2017)	388	Toyota Hilux (2008)	362
Newcastle-Maitland	Commodore (2003)	1 358	Commodore (2004)	1 284	Commodore (2002)	1 134
Sunshine Coast	Toyota Hilux (2008)	800	Commodore (2003)	719	Toyota Hilux (2017)	669
Toowoomba	Toyota Hilux (2012)	367	Toyota Hilux (2017)	360	Toyota Hilux (2013)	341
Townsville	Toyota Hilux (2008)	461	Ford Ranger (2016)	426	Toyota Hilux (2007)	415
Wollongong	Commodore (2003)	833	Commodore (2004)	778	Mazda 3 (2013)	739

a. Light vehicles include PVs and LCVs.
b. Major cities with populations over 80 000 people, which consist of a total of 21 cities including the 8 capital cities (defined based on GCCSAs) and 13 non-capital major cities (defined based on SUAs).
c. Commodore denotes Holden Commodore.
d. Year of manufacture in bracket.
e. Excludes 'Not applicable' make/model.
f. Canberra is the same as the Australian Capital Territory.
g. Number of PVs and LCVs were downloaded by 2018 postcodes, then concorded to 2016 ASGS GCCSA and SUA.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

11.4 Five major capital cities by sectors

To understand the distribution of both PVs and LCVs in terms of makes/models and year of manufacture, each of the five major cities (i.e. Sydney, Melbourne, Brisbane, Adelaide and Perth) has been divided into Inner, Middle and Outer sectors.

The Holden Commodore is not as dominant in Table 11.3. Nevertheless the 2003 Holden Commodore is the most common make/model in Outer Melbourne, Outer Brisbane, and Middle and Outer Adelaide, while the 2004 Holden Commodore is the most common make/model in Outer Perth. The Toyota Corolla (various years) is the most common make/model across all three sectors of Sydney. The Toyota Hilux (various years) is the most common make/model in Inner Brisbane and Inner and Middle Perth. The 2017 Toyota Camry is the most common make/model in Inner Melbourne and Inner Adelaide.

Although the makes/models differ substantially across the five major capital cities, newer vehicles are generally more common in the inner sector compared to the middle and outer sectors. Newer vehicles, especially those sold brand new, are usually more expensive and, therefore, are more likely to be purchased by those with a higher disposable income.

11.5 Regional areas by types

Table 11.4 shows the top three makes/models of light vehicles registered in 2018 by different types of regional areas. A key feature is that remote areas stand out as having light vehicles that are newer than other regional areas. In remote areas, Toyota dominated over Holden, whilst the opposite can be seen in all other regional areas. The three top makes/models of light vehicles in remote areas are Toyota Hilux (manufactured in 2012 and 2008) and the Toyota Land Cruiser (manufactured in 2017). Among other regional areas (excluding remote areas), the Holden Commodore (2003) is consistently the top vehicle make/model, followed by Holden Commodore (2004) and Holden Commodore (2002).

Table 11.3: Top three makes/models of light vehicles registered in 2018 by sectors, five major capital cities

Capital city and sector	Most common vehicle		2nd most common vehicle		3rd most common vehicle	
	Make/model (year)	Number	Make/model (year)	Number	Make/model (year)	Number
Sydney						
Inner	Toyota Corolla (2017)	3115	Toyota Corolla (2016)	2500	Volkswagen Golf (2015)	1792
Middle	Toyota Corolla (2008)	4358	Toyota Corolla (2014)	4260	Toyota Corolla (2007)	4196
Outer	Toyota Corolla (2008)	6640	Toyota Corolla (2007)	6259	Toyota Corolla (2014)	5936
Melbourne						
Inner	Toyota Camry (2017)	2209	Ford Ranger (2017)	1795	Holden Astra (2017)	1779
Middle	Mazda3 (2014)	4295	Toyota Corolla (2008)	4237	Toyota Corolla (2007)	4166
Outer	Commodore (2003)	7998	Commodore (2004)	7551	Commodore (2002)	7039
Brisbane						
Inner	Toyota Hilux (2017)	1463	Toyota Hilux (2016)	1243	Toyota Corolla (2017)	1238
Middle	Toyota Corolla (2017)	2906	Toyota Hilux (2017)	2427	Toyota Corolla (2016)	2387
Outer	Commodore (2003)	3006	Commodore (2004)	2632	Commodore (2002)	2616
Adelaide						
Inner	Toyota Camry (2017)	941	Holden Cruze (2015)	876	Ford Ranger (2016)	865
Middle	Commodore (2003)	1815	Commodore (2004)	1688	Commodore (2002)	1597
Outer	Commodore (2003)	2780	Commodore (2004)	2604	Commodore (2002)	2438
Perth						
Inner	Toyota Hilux (2012)	1048	Toyota Hilux (2014)	807	Toyota Hilux (2017)	775
Middle	Toyota Hilux (2012)	1712	Toyota Corolla (2017)	1504	Toyota Hilux (2017)	1499
Outer	Commodore (2004)	3508	Commodore (2006)	3130	Commodore (2003)	3108

a. Light vehicles include PVs and LCVs.
b. Commodore denotes Holden Commodore.
c. Year of manufacture in bracket.
d. Excludes 'Not applicable' make/model.
e. Number of PVs and LCVs were downloaded by 2018 postcodes, which were then concorded to 2016 ASGS SA2s and aggregated to city sectors. See Appendix B for details of the sectoral classification.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

Table 11.4: Top three makes/models of light vehicles (both PVs and LCVs) registered in 2018 by region types

Regional areas by types	Most common vehicle		2nd most common vehicle		3rd most common vehicle	
	Make/model (year)	Number	Make/model (year)	Number	Make/model (year)	Number
Capital city	Commodore (2003)	35 203	Commodore (2004)	33 878	Toyota Corolla (2008)	33 693
Coastal city	Commodore (2003)	11 457	Commodore (2004)	10 990	Commodore (2002)	9 762
Inland city	Commodore (2003)	4 439	Commodore (2004)	4 200	Commodore (2002)	3 833
Coastal country	Commodore (2003)	5 177	Commodore (2004)	4 778	Commodore (2002)	4 316
Inland country	Commodore (2003)	5 506	Commodore (2004)	5 316	Commodore (2002)	4 934
Remote	Toyota Hilux (2012)	1 718	Land Cruiser (2017)	1 583	Toyota Hilux (2008)	1 489

a. Light vehicles include PVs and LCVs.
b. Commodore denotes Holden Commodore.
c. Land Cruiser denotes Toyota Land Cruiser.
d. Year of manufacture in bracket.
e. Excludes 'Not applicable' make/model.
f. Number of PVs and LCVs were downloaded by 2018 postcodes, which were then concorded to 2016 ASGS SA2s, which were then aggregated to six regional areas i.e. Capital cities, Coastal cities, Inland cities, Coastal country areas, Inland country areas and Remote areas. For details, see Appendix A.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

11.6 Statistical Area Level 3 (SA3)

This sub-section provides small area estimates of the most common light vehicle makes and models in 2018 at the SA3 level.

There are 172 SA3s across Australia with a Holden Commodore as the most common vehicle in the SA3's light vehicle fleet. Among these, 89 SA3s had the 2003 Holden Commodore as the most common vehicle, followed by 37 SA3 with the 2004 Holden Commodore, and 14 SA3s with the 2008 Holden Commodore.

Among the 53 SA3s with the Toyota Corolla as the most common vehicle, 28 SA3s had older models (manufactured in 2010 and earlier). However, 12 SA3s had the 2017 Toyota Corolla as the most common

vehicle. Of these 12 SA3s, five SA3s are located in Greater Brisbane, three SA3s in Greater Sydney, one in Greater Perth and one in Canberra, whilst two SA3s are located in regional Queensland.

To explore further, three SA3s (Adelaide city, Wollongong and South East Coast in Tasmania) were chosen on the basis of the average age of PVs. The estimated average age of PVs in Adelaide city, Wollongong and South East Coast are 6.0 years, 9.5 years and 15.0 years, respectively.

Table 11.5 shows the top ten makes/models for Adelaide city, Wollongong and South East Coast in 2018.

The majority of the popular light vehicle makes and models in the Adelaide city SA3 in South Australia were relatively new, manufactured between 2015 and 2017. For example, the Holden Cruze (2015) ranked in the top position, with 789 vehicles registered in 2018. Other makes/models in the top 10 list include Holden Commodore and Ford Ranger.

The Wollongong SA3 in NSW sits in between in terms of the average age of PVs. The top five makes and models were manufactured between 2011 and 2016. Mazda 3 is the most common make/model (seven out of top 10 makes/models). The other three popular makes/models are Toyota Corolla and Holden Commodore, and are comparatively older.

In contrast, the South East Coast SA3 in Tasmania had older PVs and LCVs which were largely manufactured between the mid-1990s and early 2000s. The Toyota Hilux is the most common make/model, followed by the Holden Commodore.

Table 11.5: Top ten makes/models of light vehicles (both PVs and LCVs) for Adelaide city, Wollongong and South East Coast, 2018

Adelaide City (South Australia)		**Wollongong (New South Wales)**		**South East Coast (Tasmania)**	
Make/model (year)	Number	Make/model (year)	Number	Make/model (year)	Number
Holden Cruze (2015)	789	Mazda 3 (2013)	347	Toyota Hilux (2000)	31
Toyota Camry (2017)	697	Mazda 3 (2012)	340	Commodore (2001)	27
Ford Ranger (2016)	579	Mazda 3 (2014)	333	Commodore (2000)	26
Commodore (2017)	479	Mazda 3 (2011)	321	Toyota Hilux (2005)	26
Commodore (2016)	463	Mazda 3 (2016)	277	Toyota Hilux (1996)	25
Ford Ranger (2015)	448	Toyota Corolla (2006)	277	Toyota Hilux (2001)	25
Toyota Camry (2016)	420	Mazda 3 (2010)	276	Commodore (2003)	25
Ford Ranger (2017)	419	Commodore (2003)	272	Ford Ranger (2010)	25
Commodore (2015)	379	Mazda 3 (2015)	260	Toyota Hilux (1998)	24
Toyota Camry (2015)	307	Toyota Corolla (2006)	258	Toyota Hilux (2008)	24
Total light vehicles	28 791	Total light vehicles	83 589	Total light vehicles	6 765

a. No LCVs in top ten makes/models in Wollongong.
b. Commodore denotes Holden Commodore.
c. Year of manufacture in bracket.
d. Excludes Not applicable make/model and external territories.
e. Number of PVs and LCVs were downloaded by 2018 Post Codes, which were concorded to GCCSA 2016 ASGS SA3s.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

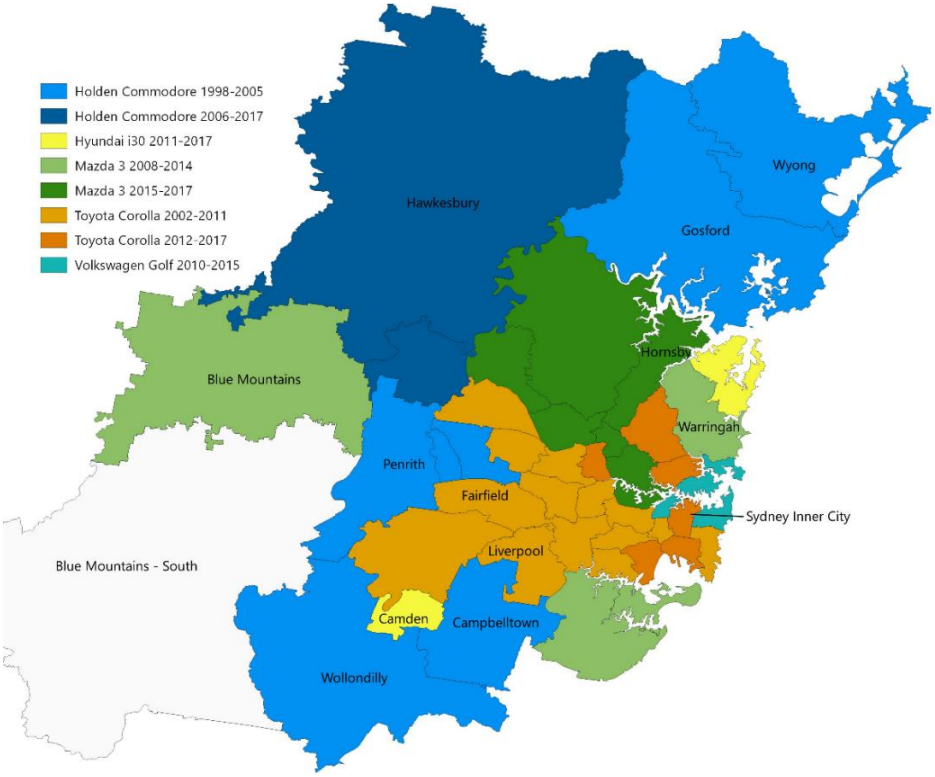
The rest of this subsection presents visual representation (in maps) of the most common makes/models of PVs by SA3s for the five major capital cities (i.e. Sydney, Melbourne, Brisbane, Adelaide and Perth), two regional areas (e.g. regional New South Wales and regional Western Australia) and one whole state (i.e. Tasmania). These are illustrated in Maps 11.1 to 11.8. Note that all five major capital cities show a general pattern of Holden Commodores (all years of manufacture) as the most common PVs in the outer sector.

In Sydney (Map 11.1), the Toyota Corolla (all models) and Volkswagen Golf (2010-2015) are the most common PVs in inner SA3s. Six inner Sydney SA3s (e.g. Eastern Suburbs - South, Chatswood - Lane Cove, Sydney Inner City) are dominated by Toyota Corolla, whilst three (Eastern Suburbs - North, Leichhardt and North Sydney - Mosman) are dominated by Volkswagen Golf. The Toyota Corolla is also the most common passenger vehicle in many middle sector SA3s (e.g. Bankstown, Canterbury, Kogarah - Rockdale and Ku-ring-gai). However, the Mazda 3 (2015-2017) is the most common PV in the Canada Bay, Ryde - Hunters Hill and Pennant Hills-Epping SA3s. Among outer SA3s, Holden Commodores (all years) are the most common PVs in several SA3s (e.g. Gosford, Penrith, Campbelltown and Wollondilly) and Mazda 3 (all models) is the most

common PV in Hornsby, Baulkham Hills and the Blue Mountains. In addition, older Toyota Corollas (2002-2011) are common in several SA3s (i.e. Liverpool, Blacktown and Fairfield), whilst the Hyundai i30 (2011-2017) is the most common make/model in the Pittwater and Camden SA3s.

The Sydney map shows a high degree of spatial clustering, with groups of neighbouring SA3s tending to have the same make/model as the most common vehicle in their fleet. However, for Melbourne (see Map 11.2) there are few large clusters, although there is a strong tendency for outer suburbs to have the Holden Commodore as the most common make and model.

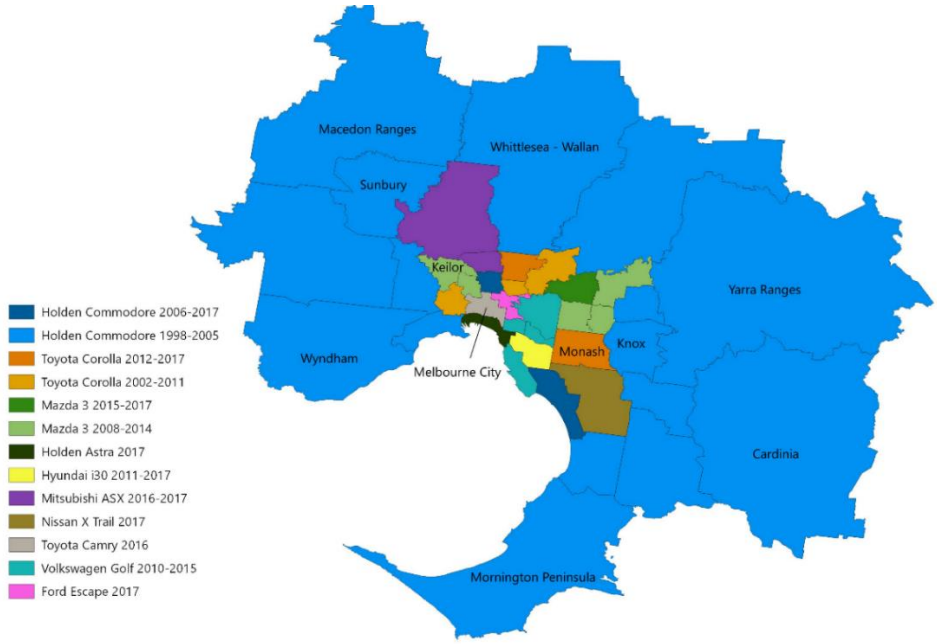
Map 11.1: Most common makes/models of passenger vehicles in SA3s, Greater Sydney



a. Number of PVs were downloaded by 2018 Postcodes, which were then concorded to ABS 2016 SA3s.
b. The quality of the postcode to SA3 concordance was rated by ABS as either 'good', 'acceptable' or 'poor' for all SA3s. For a list of all poorly rating SA3s, see Footnote 5.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

Map 11.2 for Melbourne shows that older Holden Commodore (1998-2005) are generally the most common PVs in outer SA3s (e.g. Knox, Mornington Peninsula, Whittlesea - Wallan and Macedon Ranges). There are three SA3s in the middle sector (i.e. Hobsons Bay, Brimbank and Wyndham) that also have older Holden Commodores as the most common make and model. The Toyota Corolla (all models) is the most common PV in middle SA3s (e.g. Monash, Maribyrnong and Banyule). By contrast, SA3s in inner Melbourne have considerable variation in what is the most common make/model. For example, the Ford Escape (2017) is the most common passenger vehicle in the Yarra SA3, Holden Astra in Port Phillip SA3, Mazda 3 (2008-2014) in Essendon SA3, Toyota Camry (2016) in Melbourne City and Volkswagen Golf (2010-2015) in Stonnington - West SA3.

Map 11.2: Most common makes/models of passenger vehicles in SA3s, Greater Melbourne

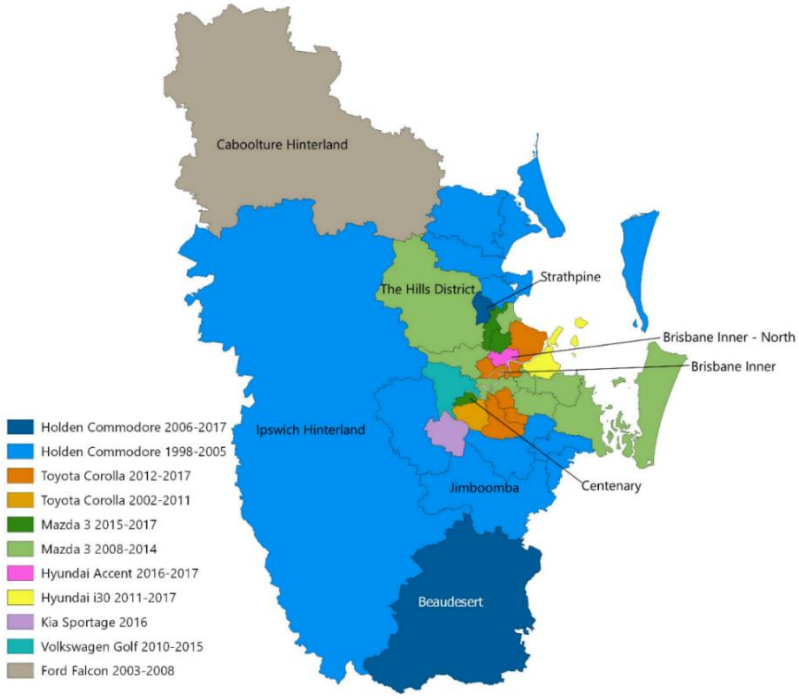


a. Number of PVs were downloaded by 2018 Postcodes, which were then concorded to ABS 2016 SA3s.
b. The quality of the postcode to SA3 concordance was rated by ABS as either 'good', 'acceptable' or 'poor' for all SA3s. For a list of all poorly rating SA3s, see Footnote 5.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

Map 11.3 shows that Brisbane's outer SA3s are particularly dominated by older Holden Commodores (1998-2005) (e.g. Ipswich Inner, Springwood-Kingston). Newer Holden Commodores (2006-2017) are the major passenger vehicle in two outer SA3s. However, other makes/models of PVs are common in other outer SA3s. For example, Ford Falcon (2003-2008) is the most common passenger vehicle in Caboolture Hinterland SA3, Kia Sportage (2016) in Springfield-Redbank SA3, and Mazda 3 (2008-2014) in Cleveland-Stradbroke and the Hill District SA3s. However, the Mazda 3 (2008-2014) is more common in middle SA3s (e.g. Capalaba, Sandgate, Carindale and Mt Gravatt). In addition, the Mazda 3 (2008-2014) is also the most common passenger vehicle in some inner SA3s (e.g. Holland Park - Yeronga). Newer Toyota Corollas (2012-2017) are the most common PVs in several inner and outer SA3s, whilst older Toyota Corollas (2002-2011) are common in the Forest Lake - Oxley SA3.

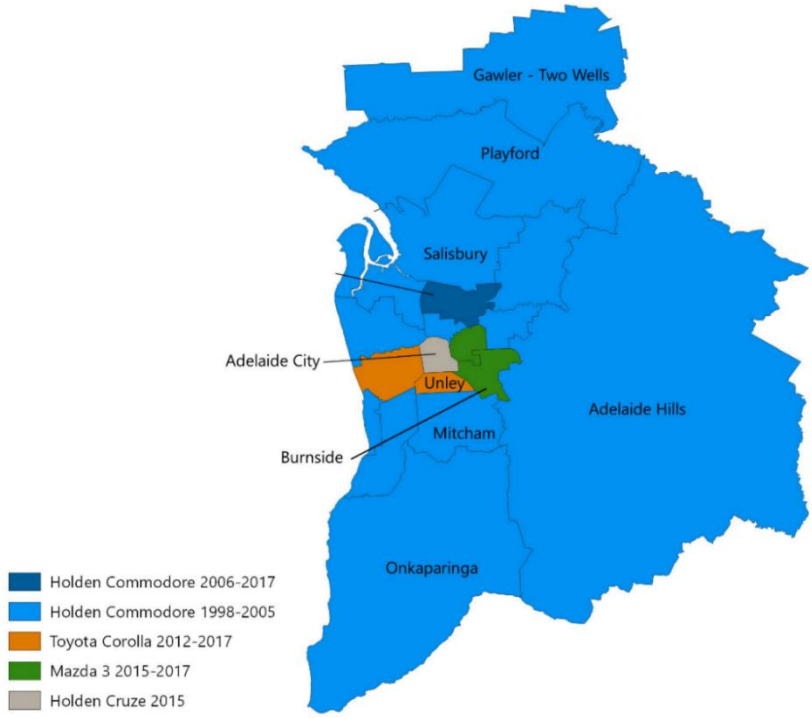
In Adelaide (Map 11.4), Holden Commodores are the most common make and model in a larger number of SA3s which cover the inner, middle and outer sectors. For example, older Holden Commodores (1998-2005) are the most common PVs in the Charles Sturt and Prospect-Walkerville SA3s in the inner sector, Salisbury and Tea Tree Gully SA3s in the middle sector, and Onkaparinga and Playford SA3s in the outer sector. Newer Holden Commodores (2006-2017) are common in Port Adelaide - East SA3. Several SA3s in Adelaide's inner sector have a different make/model as the most common vehicle (e.g. Holden Cruze (2015) in Adelaide City SA3 and Toyota Corolla (2012-2017) in Unley SA3).

Map 11.3: Most common makes/models of passenger vehicles in SA3s, Greater Brisbane



a. Number of PVs were downloaded by 2018 Postcodes, which were then concorded to ABS 2016 SA3s.
b. The quality of the postcode to SA3 concordance was rated by ABS as either 'good', 'acceptable' or 'poor' for all SA3s. For a list of all poorly rating SA3s, see Footnote 5.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

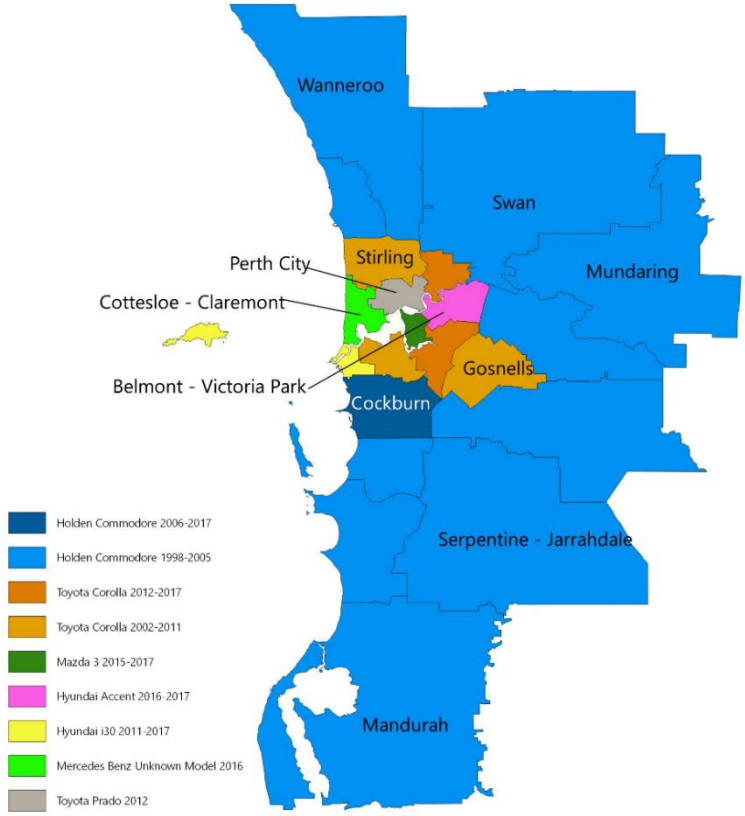
Map 11.4: Most common makes/models of passenger vehicles in SA3s, Greater Adelaide



a. Number of PVs were downloaded by 2018 Postcodes, which were then concorded to ABS 2016 SA3s.
b. The quality of the postcode to SA3 concordance was rated by ABS as either 'good', 'acceptable' or 'poor' for all SA3s. For a list of all poorly rating SA3s, see Footnote 5.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

Map 11.5 illustrates that a larger variety of PVs are represented as the most common light vehicle in Greater Perth, particularly in the inner and middle sectors. Holden Commodores (all models) are the most common PVs in the outer sector, except Gosnells SA3 where Toyota Corolla (2002-2011) is the most common passenger vehicle. In inner suburban Perth, there are several different makes/models featured. For example, Hyundai Accent (2016-2017) is the most common vehicle in Belmont - Victoria Park SA3, Hyundai i30 (2011-2017) in Fremantle, Mazda 3 (2015-2017) in South Perth, Mercedes Benz Unknown Model (2016) in Cottesloe - Claremont and Toyota Prado (2012) in Perth City. The Toyota Corolla (2002-2011) is the most common passenger vehicle in several middle sector SA3s (Stirling, Melville and Bayswater - Bassendean).

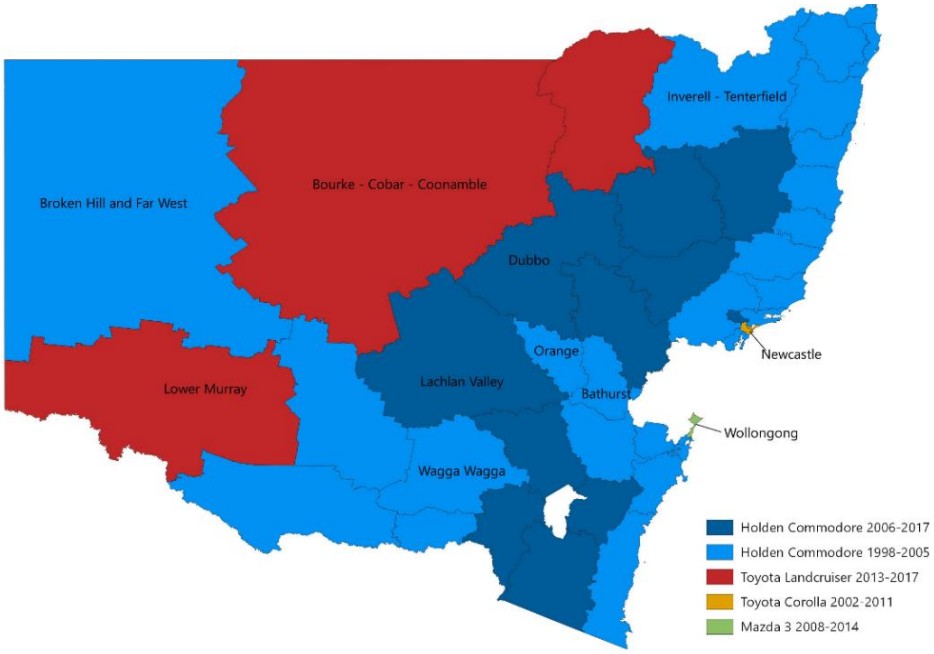
Map 11.5: Most common makes/models of passenger vehicles in SA3s, Greater Perth



a. Number of PVs were downloaded by 2018 Postcodes, which were then concorded to ABS 2016 SA3s.
b. The quality of the postcode to SA3 concordance was rated by ABS as either 'good', 'acceptable' or 'poor' for all SA3s. For a list of all poorly rating SA3s, see Footnote 5.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

Map 11.6 illustrates the most common makes/models of PVs in regional New South Wales. Older Holden Commodores (1998-2005) are the most common vehicles along the coast, whereas further inland in places such as Dubbo and the Snowy Mountains, newer Holden Commodore (2006-2017) are more common. The Toyota Corolla (2002-2011) is the most common vehicle in the Newcastle SA3, while the Mazda 3 (2008-2011) is the most common vehicle in the Wollongong SA3. The Toyota Landcruiser (2013-2017) is the most common make/model in both remote areas (e.g. Bourke – Cobar - Coonamble and Lower Murray SA3s) and Inland country areas (e.g. Moree - Narrabri SA3).

Map 11.6: Most common makes/models of passenger vehicles in SA3s, regional New South Wales

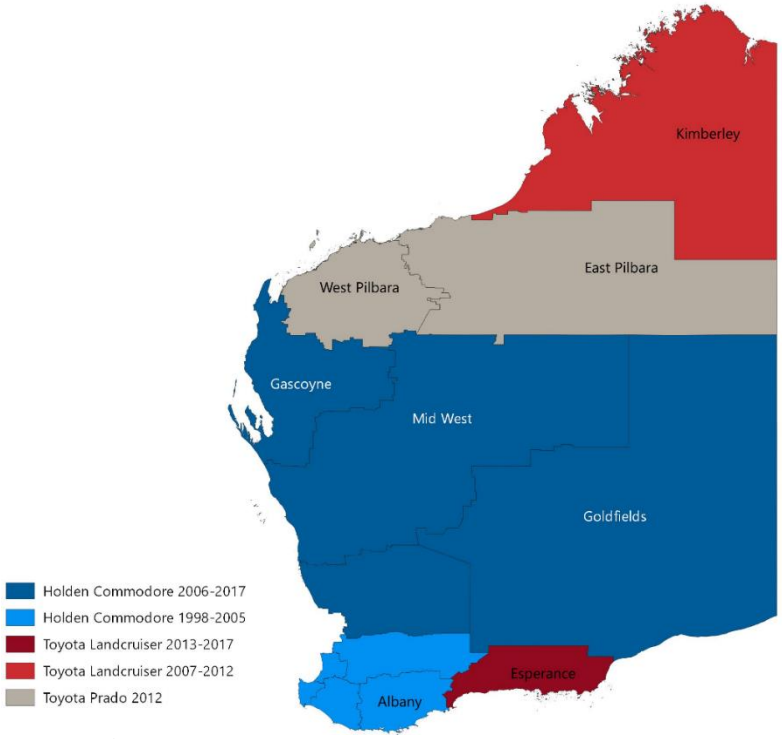


a. Number of PVs were downloaded by 2018 Postcodes, which were then concorded to ABS 2016 SA3s.
b. The quality of the postcode to SA3 concordance was rated by ABS as either 'good', 'acceptable' or 'poor' for all SA3s. For a list of all poorly rating SA3s, see Footnote 5.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

Map 11.7 illustrates the most common makes/models of PVs in regional Western Australia. The older Holden Commodore (1998-2005) is the most common make/model of PV in coastal country areas (e.g. Albany, Augusta - Margaret River - Busselton, Bunbury and Manjimup SA3s) as well as in Wheat Belt - South SA3. Newer Holden Commodores (1998-2005) are the most common PV in the Mid West SA3 (coastal city), Wheat Belt - North SA3 (inland country), Goldfields and Gascoyne SA3s (both in remote area). The Toyota Landcruiser (2007-2012) is the most common vehicle in the Kimberley SA3, while the Toyota Landcruiser (2013-2017) is the most common vehicle in the Esperance SA3. The Toyota Prado (2012) is the most common passenger vehicle in the Pilbara region (both East and West Pilbara SA3s).

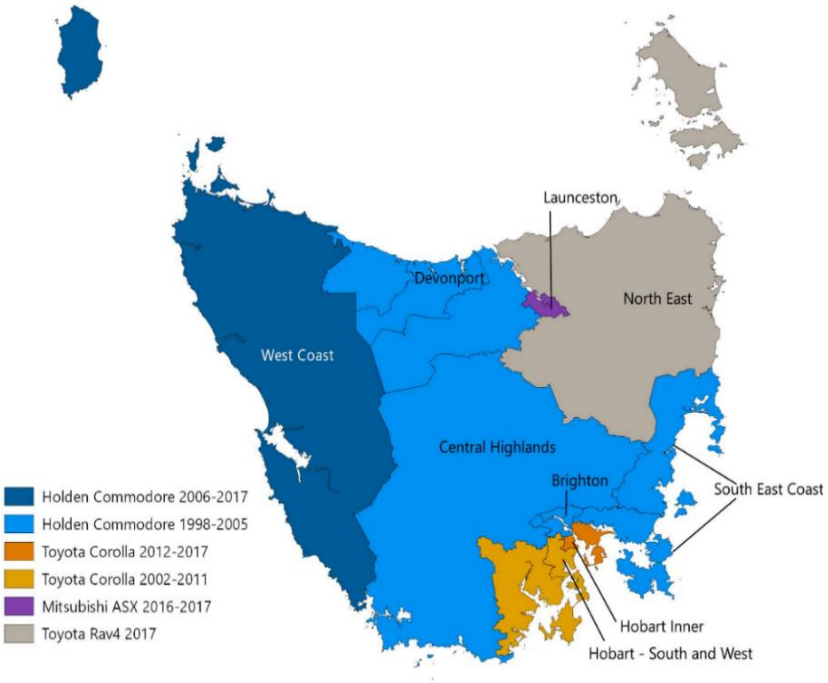
In Tasmania as a whole, eight SA3s (out of 15 SA3s) had the older Holden Commodore (1998-2005) as the most common make/model of passenger vehicle (see Map 11.8), including Hobart-North West, South East Coast, Burnie - Ulverstone and Devonport SA3s. The newer Holden Commodore (2006-2017) is the most common vehicle in the West Coast SA3. Newer Toyota Corollas (2012-2017) are common in Hobart Inner and Hobart North - East SA3s, while older Toyota Corollas (2002-2011) are the most common vehicles in Hobart-South and West SA3 and Huon - Bruny Island SA3.

Map 11.7: Most common makes/models of passenger vehicles in SA3s, regional Western Australia



a. Number of PVs were downloaded by 2018 Postcodes, which were then concorded to ABS 2016 SA3s.
b. The quality of the postcode to SA3 concordance was rated by ABS as either 'good', 'acceptable' or 'poor' for all SA3s. For a list of all poorly rating SA3s, see Footnote 5.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

Map 11.8: Most common makes/models of passenger vehicles in SA3s, Tasmania



a. Number of PVs were downloaded by 2018 Postcodes, which were then concorded to ABS 2016 SA3s.
b. The quality of the postcode to SA3 concordance was rated by ABS as either 'good', 'acceptable' or 'poor' for all SA3s. For a list of all poorly rating SA3s, see Footnote 5.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2018 (TableBuilder Pro).

12 Electric vehicles in Australia: status and distribution

12.1 Background

Electric vehicles (EVs) are at the forefront of a major transformation of the world's transport sector (Commonwealth of Australia 2019). EVs refer to cars or other vehicles with motors that are powered by electricity rather than liquid fuels. There are a broad range of views on what constitutes an EV. For example, Liao and others (2017) categorised them into 'hybrid electric vehicles' (HEVs) and 'plug-in electric vehicles' (PEVs). HEVs have a battery, which only provides an extra boost of power in addition to an internal combustion engine, with increased fuel efficiency due to recharging while braking. On the other hand, plug-ins can be powered solely by battery and have to be charged by plugging into a power outlet. Plug-ins can be further divided into 'plug-in hybrid electric vehicles' (PHEVs), which are powered by both a battery and/or engine, and full 'battery electric vehicles' (BEVs). The Senate Select Committee on Electric Vehicles (Commonwealth of Australia 2019) considered EVs includes BEVs, PHEVs and fuel cell electric vehicles (FCEVs). A brief description of different types of EVs available in Australia is provided in Appendix C.

EVs presently comprise only a small fraction of the Australian vehicle fleet, and the current uptake is lower than in other developed countries. However, the number of EVs is expected to grow significantly over the next decade and beyond. How quickly and to what level of market concentration this occurs is highly uncertain, and will depend on a number of factors including the arrival of cheaper models and availability of more charging infrastructure (for further details, see BITRE 2019a). In a National Electricity Forecasting Paper, AEMO and Energeia (2016) conclude that there is likely to be an increase in the coming years with the anticipated decline in costs, increased availability and capacity of new EV models, and assumed government and industry support.

The ABS' MVC includes many hybrid vehicles within its EV category, and as the Department's policy interest is focused on EVs, BITRE has developed an alternate approach to providing EV-specific information. Based on the literature and the most prominent EVs available to buy in Australia, BITRE has adopted the definition that two types of vehicles are considered EVs, namely BEVs and PHEVs. This definition is very similar to the definition of The Senate Select Committee on Electric Vehicles (Commonwealth of Australia 2019), but we have excluded fuel cell electric vehicles (FCEVs) which are typically fuelled by hydrogen gas (Liao and Others 2017) and were not commercially available in Australia as of 2020 (Gardner 2020). The definition of electric vehicles adopted in this current study is the same as that adopted in previous BITRE research on electric vehicles (i.e. BITRE 2019a).

BITRE used a list of BEV and PHEV makes and models from the Federal Chamber of Automotive Industries (FCAI) and Glasses Guide as a starting point. HEVs were excluded from the analysis[12], as were EVs manufactured prior to 2010. This reference list of EV makes and models was then assessed against the ABS 2020 MVC list of makes/models with a nominated 'electric' fuel type. Some EV makes/models, such as the Jaguar i-pace and Renault Zoe, were not separately listed in the ABS 2020 MVC, and so could not be separately enumerated. Others, such as the Mercedes-Benz E350 and Volvo C30, had an estimate of zero registered vehicles. For many of the vehicles identified as having an 'electric' fuel type in the ABS 2020 MVC, the specific model (and sometimes also the vehicle make) was unknown—these vehicles were generally excluded from BITRE's analysis of EVs as we could not verify they were actually electric.[13] These methodological choices mean that the overall estimate of EVs based on this methodology is quite conservative. All these exclusion criteria are summarised in Table 12.1. Further details of the method are provided in Appendix D.

For this current study, the focus is restricted to passenger vehicles (PVs) only.

[12] Many of the vehicles identified as having an 'electric' fuel type in the 2020 MVC are conventional hybrids/HEVs (e.g. Toyota Camry, Toyota Corolla, Toyota RAV4, Toyota Prius, Ford Mondeo), rather than BEVs or PHEVs.

[13] The exception was Tesla unknown models which were classified as EVs as Tesla only make EVs.

Table 12.1: Types of PVs included/excluded as EVs

Included	Excluded
1. Makes and models of BEVs and PHEVs (with 'electric' fuel type) listed in Table 12.2	1. FCEVs 2. Vehicles manufactured before 2010 3. Vehicle makes/models not listed in ABS's MVC 2020 or with zero count 4. Vehicles with 'unknown' makes/models (except Tesla unknown)

Table 12.2 identifies the 17 makes and models of EVs on BITRE's reference list that had a non-zero vehicle count in the 2020 MVC. Of those 17 makes/models of EVs, ten are classified as BEVs and the other seven as PHEVs.

Table 12.2: Electric vehicles by makes/models by EV type, Australia, 2020

EV makes/models	EV type	EV makes/models	EV type
BMW i3	BEV	Audi A3	PHEV
Hyundai Getz	BEV	BMW 330	PHEV
Hyundai Ioniq	BEV	BMW i8	PHEV
Hyundai Kona	BEV	Holden Volt	PHEV
Mitsubishi iMiEV	BEV	Mercedes Benz C350	PHEV
Nissan Leaf	BEV	Mitsubishi Outlander	PHEV
Tesla Model 3	BEV	Porsche Cayenne	PHEV
Tesla Model S	BEV		
Tesla Model X	BEV		
Tesla Unknown Model	BEV		

a. EV makes/models by type are selected using the FCAI and Glasses Guide and the ABS *Motor Vehicle Census*. Only makes/models with a non-zero count in the 2020 MVC are listed. EVs manufactured prior to 2010 are excluded. Conventional hybrids/HEVs are excluded (e.g. Toyota Prius). Details of method provided in Appendix D.
b. BEV - Battery electric vehicles and PHEV - Plug-in hybrid vehicles.
Source: BITRE analysis.

The following sub-sections present:

1. Brief account of new EV sales in Australia between 2010 and 2018.
2. Number of EVs and distribution in 2020 (based only on those vehicles that were manufactured between 2010 and 2020), including average age of selected EVs.

12.2 New electric vehicle sales in Australia, 2010-2020

In Australia, the first viable EV became available for purchase in 2008 with the Tesla Motors 'Roadster' model, which used lithium-ion battery cells. From 2011 onwards, EV sales started to gain traction coinciding with EV model availability.

According to the VFACTS National Reports (various years) of the Federal Chamber of Automotive Industries (FCAI), the total EVs sold in Australia since 2010 until March 2020 is just under 11 000 – including PHEVs, but excluding Tesla sales. Since Tesla do not provide annual sales figures to VFACTS, there is a significant gap between VFACTS data and actual numbers of EV sales nationwide.

The number of EVs sold in Australia grew substantially, from 112 in 2010 to 1769 in 2020. EV sales in 2020 are up 16 per cent on the previous year, but represent only 0.19 per cent of new cars sold (Dowling 2021).

12.3 Distribution of electric vehicles in Australia, 2020

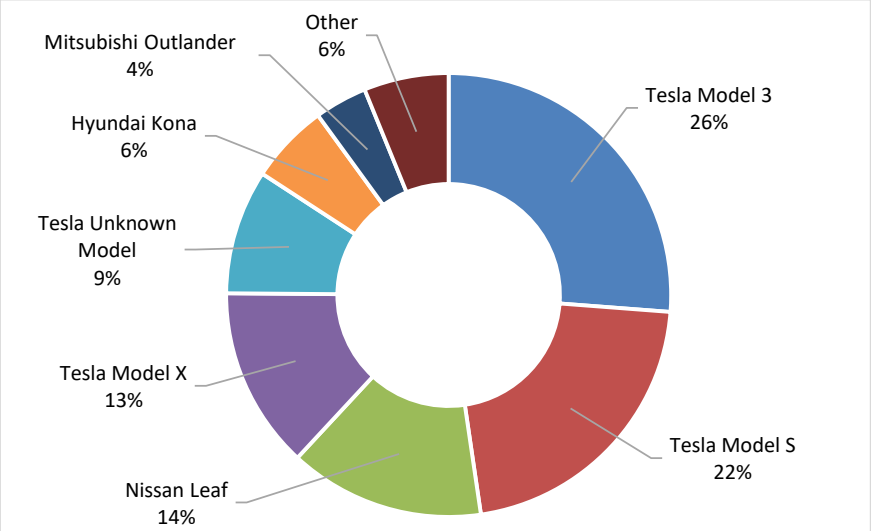
In this section, the composition of electric vehicles (i.e. BEVs and PHEVs) is described at the national level, and the geographic distribution of the EV composition across Australia is presented. This breakdown is based on BITRE's analysis of selected EV makes and models (as listed in Table 12.1) extracted from the ABS MVC 2020.

National level

Based on the ABS MVC, BITRE was able to identify a total of 7007 EVs that were registered in Australia as of January 2020 (and manufactured since 2010).[14] BITRE's MVC-based estimate is conservative, capturing only registered passenger vehicles that can be verified as being EVs based on make, model and fuel type information recorded on state government motor vehicle registries. The estimate was developed for the purposes of providing insight into the spatial distribution of EVs within Australia, which cannot be gained from other sources, such as VFACTS.

Figure 12.1 shows that Tesla occupied the top two spots (Tesla Model 3 with 26 per cent and Tesla Model S with 22 per cent), followed by the Nissan Leaf (14 per cent) and the Tesla Model X (13 per cent). However, Tesla Unknown Model also had a considerable proportion of all EVs (9 per cent). These are all BEVs. In addition, the Hyundai Kona and Mitsubishi Outlander accounted for a small proportion of EVs (6 per cent and 4 per cent, respectively). All other makes/models of EVs together accounted for 6 per cent of all EVs in Australia.

Figure 12.1: Proportion of electric vehicles registered, Australia, 2020



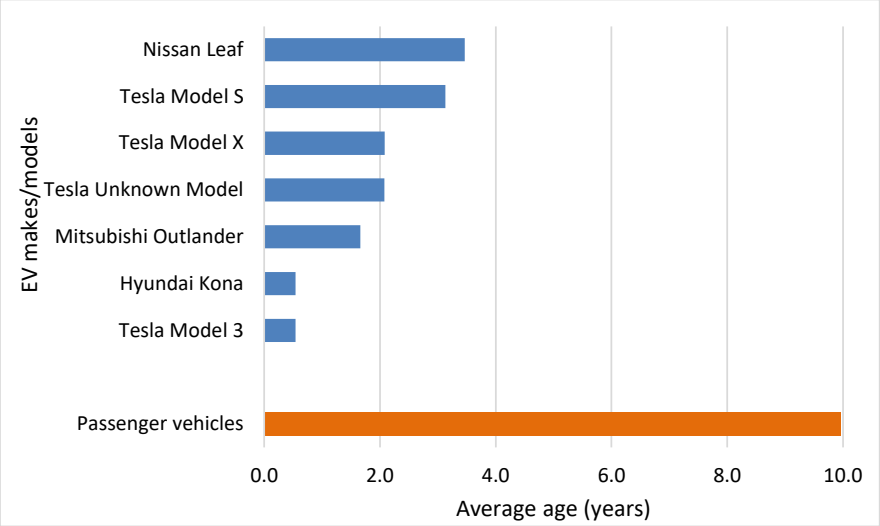
a. Based on EVs listed in Table 12.1 and covering 2010-2020 year of manufacture.
b. Details of methodology provided in Appendix D.
c. Due to small numbers (less than 130), 10 EVs (Hyundai Ioniq, BMW i3, Mitsubishi iMiEV, Holden Volt, Mercedes Benz C350, Porsche Cayenne, Audi A3, BMW i8, BMW 330 and Hyundai Getz) are combined as 'Others', whilst each of the other seven EVs have more than 220 vehicles.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2020 (TableBuilder Pro).

Figure 12.2 shows the estimated average age[15] of selected EVs, based on the market size. As expected, EVs are much newer than PVs as a whole. The average age of a passenger vehicle is 10 years. Among the selected EVs, the average age is highest for the Nissan Leaf (3.5 years), followed by Tesla Model S (3.1 years) and Tesla Model X and Tesla Unknown Model (both 2.1 years). The average age of other EVs ranged between 0.5 years (both Tesla Model 3 and Hyundai Kona) and 1.7 years (Mitsubishi Outlander).

[14] The EV data from these two key sources - ABS and VFACTS - cannot be easily reconciled. Some EVs sold between 2010 and 2020 may no longer be registered, others may not be nominated as electric on state government motor vehicle registries, and others may not have their make and/or model identified on state government motor vehicle registries (and so could not be verified as EVs by BITRE using the ABS MVC data). Timing differences may also explain some of the discrepancy. BITRE's MVC-based estimate is conservative as it is restricted to registered vehicles that can be verified as being BEVs or PHEVs based on the make and model being listed in Table 12.1 and fuel type being nominated as electric. Vehicles with incomplete or inconsistent motor registry information will not be identified as EVs under this method.

[15] Average age is calculated using the individual years of manufacture of vehicles registered in the ABS *Motor Vehicle Census* between 2010 and 2020. The average value was set as the midpoint of the age range for each year of manufacture.

Figure 12.2: Average age of selected electric vehicles, Australia



a. Excludes EVs which were manufactured before 2010.
b. Details of methodology provided in Appendix D.
c. Based on EVs of BEV/PHEV models which only covered 2010-2020 year of manufacture.
d. Average age is calculated using the individual years of manufacture of vehicles registered in the ABS *Motor Vehicle Census* between 2010 and 2020.
Source: BITRE analysis of ABS *Motor Vehicle Census* (various years) (TableBuilder Pro).

Geographic distribution of EVs

The aim of this sub-section is to present distributional estimates of EVs for various geographic locations across Australia.

In 2020, New South Wales had the highest numbers of registered EVs with 2986 vehicles, followed by Queensland (1710 vehicles) and Victoria (1162 vehicles). Table 12.3 shows the proportions of EVs (calculated using all PVs, i.e. both electric and non-electric as the denominator) for capital cities and states/territories for 2020.

Among the capital cities, Canberra had the highest proportion of EVs in its PV fleet (0.13 per cent), followed by Greater Sydney (0.09 per cent). Greater Brisbane, Greater Adelaide and Greater Hobart had shares of EVs between 0.05 and 0.07 per cent. Perth and Darwin had the lowest proportion of EVs at 0.02 per cent. A similar pattern is also evident for the relevant states and territories.

Table 12.3: Proportions of electric vehicles by capital cities and states/territories, Australia, 2020

Capital cities	Proportion of EV (per cent)	States/Territories	Proportion of EV (per cent)
Greater Sydney	0.09	New South Wales	0.07
Greater Melbourne	0.03	Victoria	0.03
Greater Brisbane	0.07	Queensland	0.06
Greater Adelaide	0.05	South Australia	0.04
Greater Perth	0.02	Western Australia	0.02
Greater Hobart	0.05	Tasmania	0.03
Greater Darwin	0.02	Northern Territory	0.02
Canberra	0.13	Australian Capital Territory	0.13
All capital cities	0.06	Total Australia	0.05

a. Excludes EVs which were manufactured before 2010, but includes those which were manufactured between 2010 and 2020.
b. Details of methodology provided in Appendix D.
c. Proportions of EVs are calculated using all PVs (i.e. both electric and non-electric) as denominator.
d. There were no EVs in regional Northern Territory.
e. Other territories excluded in total Australia.
f. States/territories include both capital cities and rest of states/territories, except Canberra which is considered the same as the Australian Capital Territory.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2020 (TableBuilder Pro).

Table 12.4 shows that in the major capital cities, the inner sector had the highest proportion (0.14 per cent) of EVs in the total PV fleet and the lowest proportion was in the outer sector (0.03 per cent) (Table 12.3). When considering individual capital cities, Sydney's inner sector had the highest proportion of EVs (0.23 per cent), followed by Brisbane's inner (0.16 per cent). Melbourne, Adelaide and Perth's inner sectors had similar proportions of EVs (0.07-0.09 per cent). Sydney's middle and outer sectors had higher EV shares than the respective sectors of the other four major capital cities.

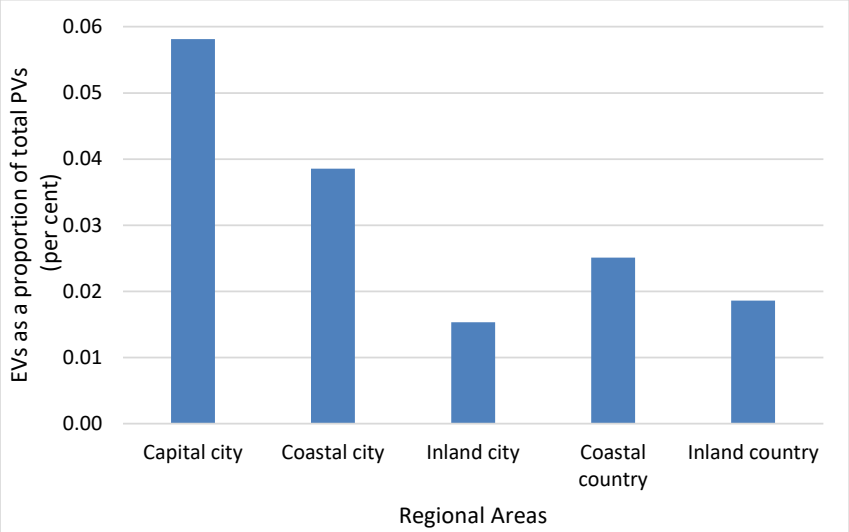
Table 12.4: Proportions of electric vehicles by sector of major capital cities, Australia, 2020

Capital cities	Inner sector	Middle sector	Outer sector
	EV as a proportion of total PV (per cent)		
Greater Sydney	0.23	0.10	0.05
Greater Melbourne	0.08	0.04	0.02
Greater Brisbane	0.16	0.09	0.04
Greater Adelaide	0.09	0.06	0.02
Greater Perth	0.07	0.02	0.01
All five cities	0.14	0.06	0.03

a. Excludes EVs which were manufactured before 2010, but includes those which were manufactured between 2010 and 2020.
b. Proportions of electric vehicles are calculated using all PVs (i.e. both electric and non-electric) as denominator.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2020 (TableBuilder Pro).

Among the various types of regional areas, coastal areas (both city and country) had higher proportions of EVs in the PV fleet compared to inland areas (both city and country), as shown in Figure 12.3. Coastal city areas had a 0.04 per cent share of EVs, while coastal country areas had a 0.03 per cent share of EVs. Remote areas had a very small number of EVs (less than 10) (data not shown).

Figure 12.3: Proportions of electric vehicles by types of regional areas, Australia, 2020



a. Excludes EVs which were manufactured before 2010, but includes those which were manufactured between 2010 and 2020.
b. Data for Remote area is not shown, due to very small number (less than 10).
c. Proportions of electric vehicles are calculated using all PVs (i.e. both electric and non-electric) as denominator.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2020 (TableBuilder Pro).

Table 12.5 shows that the SA4s with the highest number of EVs do not necessarily have the highest proportion of EVs (in terms of total PVs). For example, Sydney - North Sydney and Hornsby had the highest number of EVs, and the second highest proportion. The Gold Coast SA4 had the second highest number of EVs (along with Sydney - Eastern Suburbs), but is not in the top 10 SA4s in terms of the proportion. Another example is the Perth Inner SA4 in Western Australia which is included in the top ten SA4s in terms of proportion, but not in terms of the number of EVs.

Of the 10 SA4s with the highest number of EVs, four of them are located in New South Wales (Sydney - North Sydney and Hornsby, Sydney - Eastern Suburbs, Sydney - City and Inner South and Sydney - Northern Beaches), another four in Queensland (Gold Coast, Brisbane - West, Brisbane-South and Brisbane Inner City) and one each in Australian Capital Territory and Victoria (Melbourne-Inner).

Of the 10 SA4s that have the highest proportion of EVs (in terms of total PVs), six are located in New South Wales (Sydney-Eastern Suburbs, Sydney-North Sydney and Hornsby, Sydney-Northern Beaches, Sydney-City and Inner South, Sydney-Ryde and Sydney-Ryde), two in Queensland (Brisbane Inner City and Brisbane-West) and one each in Australian Capital Territory and Western Australia (Perth-Inner).

Table 12.5: Top 10 Statistical Areas 4's with highest number and highest proportions of EVs, Australia, 2020

SA4 name	Number of EVs	SA4 name	Proportion of EV (per cent)
Sydney - North Sydney and Hornsby (NSW)	567	Sydney - Eastern Suburbs (NSW)	0.38
Gold Coast (QLD)	355	Sydney - North Sydney and Hornsby (NSW)	0.23
Sydney - Eastern Suburbs (NSW)	355	Sydney - Northern Beaches (NSW)	0.17
Sydney - City and Inner South (NSW)	331	Brisbane Inner City (QLD)	0.16
Australian Capital Territory (ACT)	308	Sydney - City and Inner South (NSW)	0.16
Melbourne - Inner (VIC)	274	Brisbane - West (QLD)	0.15
Sydney - Northern Beaches (NSW)	260	Sydney - Ryde (NSW)	0.14
Brisbane - West (QLD)	238	Australian Capital Territory (ACT)	0.13
Brisbane - South (QLD)	230	Sydney - Inner West (NSW)	0.11
Brisbane Inner City (QLD)	188	Perth - Inner (WA)	0.09

a. Excludes EVs which were manufactured before 2010, but includes those which were manufactured between 2010 and 2020.
b. Proportions of electric vehicles are calculated using all PVs (i.e. both electric and non-electric) as denominator.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2020 (TableBuilder Pro).

In conclusion, there are several key results that emerged from this section. These include:

- Three models of Tesla (Model S, Model X and Model 3) and Nissan Leaf dominated the EV market share.
- Nissan Leaf is the oldest EV in the Australian passenger vehicle fleet (average age of 3.5 years).
- Canberra had the highest proportion of EVs in the passenger vehicle fleet, followed by Greater Sydney.
- Sydney's inner sector had the higher proportion of EVs in the passenger vehicle fleet of all the city sectors of the five largest cities.
- Capital cities and Coastal cities had a higher proportion of EVs than other regional areas.
- The North Sydney and Hornsby SA4 had the largest number of EVs of all SA4s in Australia, but Sydney's Eastern Suburbs SA4 had the highest proportion of EVs in its PV fleet (0.38 per cent).

13 Changes in vehicle characteristics over time

13.1 Background

This section presents information on how key vehicle characteristics have changed over time, focusing mainly on the 2013 to 2018 period. In addition to looking at changes in the vehicle characteristics already considered in this paper (e.g. fuel type, vehicle age, cylinders, tare weight), it also looks at trends in two key types of light vehicles, namely, Sport Utility Vehicles (SUVs) and Utilities (Utes).

In recent years, the popularity of SUVs[16] has greatly increased. One of the main reasons for people choosing SUVs is that the vehicles have high roof, low floor and a wagon which gives headroom, legroom and storage space. In addition, people can drive SUVs on good roads or bad roads. However, the other side of the coin is that late-model SUVs appear to be more likely to kill pedestrians than cars, according to a recent US study conducted by the Insurance Institute for Highway Safety (IIHS 2020). Also, another drawback is that conventional SUVs consume more fuel (25 per cent) per kilometre, and have higher carbon dioxide (CO_2) emissions than medium-sized cars (IEA 2019).

Utilities are considered the most versatile vehicles on the road. They also offer great cargo space access due to their open-top nature and thus have greater utility for the tradesman or business owner. In addition, ground

[16] The FCAI criteria for classifying SUV vehicles is based on a 2/4 door wagon body style and elevated ride height, and also feature some form of 4WD or AWD (where a 2WD variant of a model is available, it is included in the appropriate segment to that model) (https://www.fcai.com.au/sales/segmentation-criteria).

clearance for utilities is generally better than vans, which means they are more capable when travelling over rough worksites or if there is ever a need to go off-road. A brief account of the profile of selected utilities/pickups is provided in a break-out box (Box13.1).

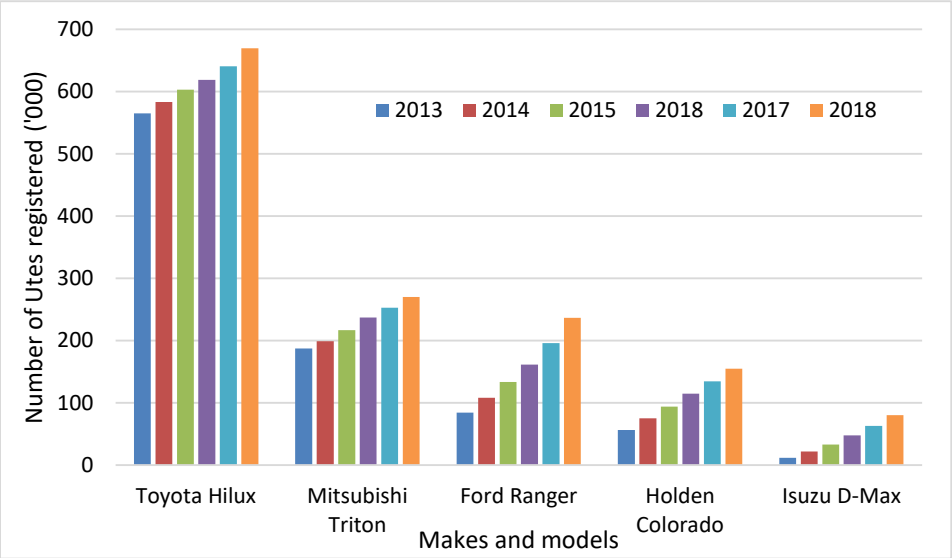
Box 13.1 Profile of selected utilities, Australia

In order to profile Utilities, the top five makes/models were chosen based on national VFACTS figures (produced by the Federal Chamber of Automotive Industries or FCAI) for total 2018 new vehicle sales in Australia. These are: Toyota Hilux, Ford Ranger, Mitsubishi Triton, Holden Colorado and Isuzu D-Max.

Nationally, there were around 2.8 million utilities (all makes/models) registered in 2018, accounting for 16.0 per cent of all PVs and LCVs. Since 2013, this proportion has increased by 1.2 percentage points, from 14.8 per cent. Between 2013 and 2018, the average annual growth rate of utilities was much faster than the growth of total PVs and LCVs (3.7 per cent versus 2.2 per cent).

Figure B13.1 shows the vehicle counts for the top five utilities in Australia (based on ABS 2018a). The Toyota Hilux has the highest number of registered utilities, followed by Mitsubishi Triton, Ford Ranger, Holden Colorado and Isuzu D-Max. The number of registered utilities has increased for all five makes and models.

Figure B13.1: Number of vehicles for top five utilities registered in Australia, 2013 to 2018



Note: Top five utilities were chosen based on national VFACTS data (produced by FCAI) for total 2018 new vehicle sales in Australia. b. Statistics relating to vehicles which were registered on 31st January each year with a motor vehicle registration authority.
Source: BITRE analysis of ABS Motor Vehicle Census, various years (2013 to 2018) (TableBuilder Pro).

Between 2013 and 2018, the average growth rate of the Toyota Hilux was only 3.5 per cent per annum, compared to the Mitsubishi Triton at 7.6 per cent per annum. The average annual growth rates of the Ford Ranger and Holden Colorado were around 23 per cent, whilst the growth rate was much faster for Isuzu D-Max (47 per cent per annum), off a much smaller base.

Between 2013 and 2018, the Toyota Hilux's proportion of total utilities remained very similar (at 24 per cent) (Figure B13.2). The proportions of registered Ford Rangers, Holden Colorados and Isuzu D-Max's increased sharply during the same period, whilst the increase in the proportions of registered Mitsubishi Tritons was modest (from 8.0 per cent to 9.7 per cent).

(Continued on next page)

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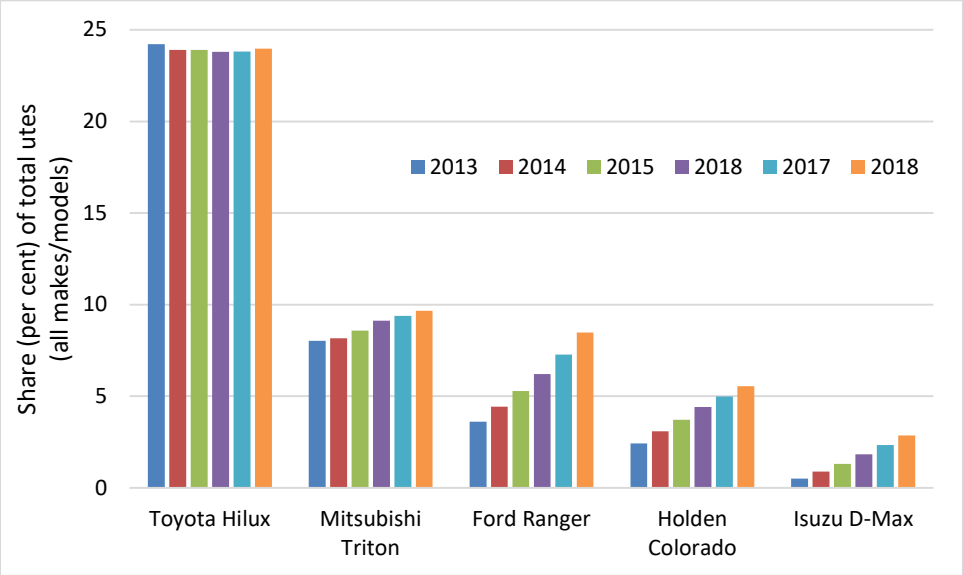
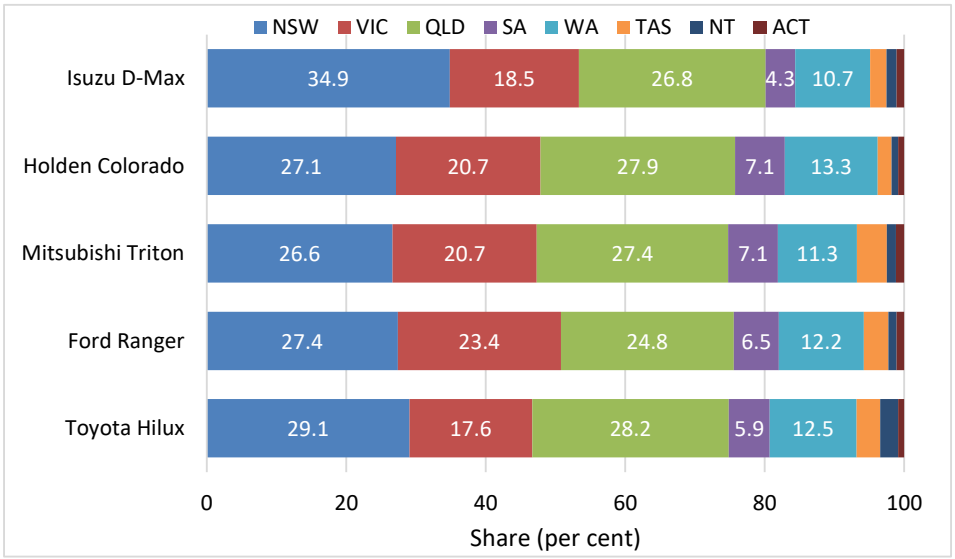
The distribution of the top five makes/models of utilities by states and territories in Figure B10.3 shows that each type of utility is distributed fairly similarly across the States and Territories. However, the Isuzu D-Max is more heavily represented in New South Wales than the other types of utility. The Ford Ranger has higher representation in Victoria and lesser representation in Queensland (compared to the other types of utility).

Figure B13.2: Top five utilities as a proportion of total PVs and LCVs in Australia between 2013 and 2018



a. Top five makes/models of utilities were chosen based on national VFACTS data (produced by FCAI) for total 2018 new vehicle sales in Australia.
b. Statistics relating to vehicles which were registered on 31st January each year with a motor vehicle registration authority.
Source: BITRE analysis of ABS Motor Vehicle Census, various years (2013 to 2018) (TableBuilder Pro).

Figure B13.3: Distribution of top five utilities registered in 2018 by states and territories



a. Top five makes/models of utilities were chosen based on national VFACTS data (produced by FCAI) for total 2018 new vehicle sales in Australia.
b. Statistics relating to vehicles which were registered on 31st January each year with a motor vehicle registration authority.
Source: BITRE analysis of ABS Motor Vehicle Census, 2018 (TableBuilder Pro).

13.2 Changes in number of Sport Utility Vehicles (SUVs)

To identify the significance of SUVs in the light vehicle fleet (both PVs and LCVs), this section provides results on:

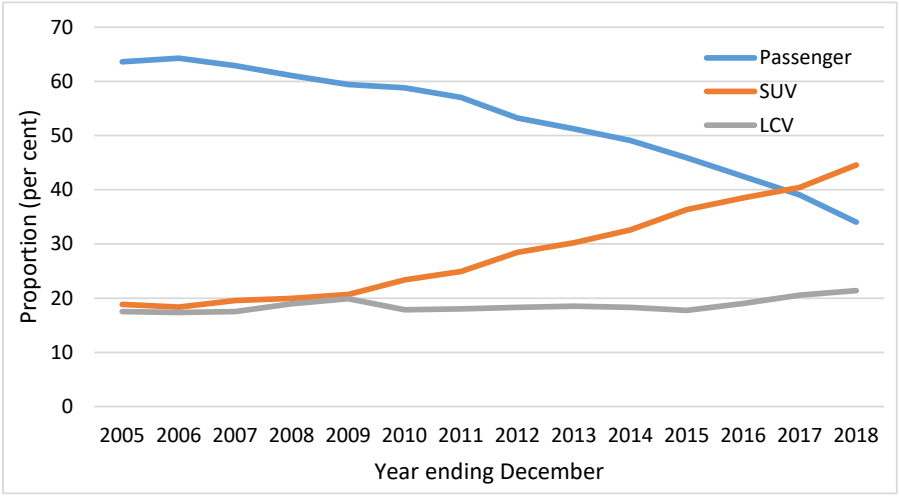
1. SUV sales at the national level between 2005 and 2018, and

2. Registered SUVs as the proportions of total PVs and LCVs by states and territories for 2013 and 2018.

Sales of SUVs

Based on VFACTS National Report data, produced by the Federal Chamber of Automobile Industries (FCAI), the proportions of SUV sales increased from 19 per cent of total vehicle sales (excluding heavy commercial vehicles) in 2005 to 45 per cent in 2018 (Figure 13.1). In contrast, PV sales showed the opposite pattern, decreasing from 64 per cent in 2005 to 34 per cent in 2018. LCV sales marginally increased by 3.9 percentage points during this period.

Figure 13.1: Proportion of new vehicle sales by vehicle type, Australia, 2005-2018



a. Vehicles (makes/models) identified as SUVs using VFACTS (from 2005 to 2018) and Glass's Guide (from 2016 to 2018).
b. SUV - Sport Utility Vehicle, PV - Passenger Vehicle and LCV - Light Commercial Vehicle.
c. Excludes heavy commercial vehicles.
Source: Federal Chamber of Automobile Industries (FCAI), VFACTS National Report (various years).

Registered SUVs

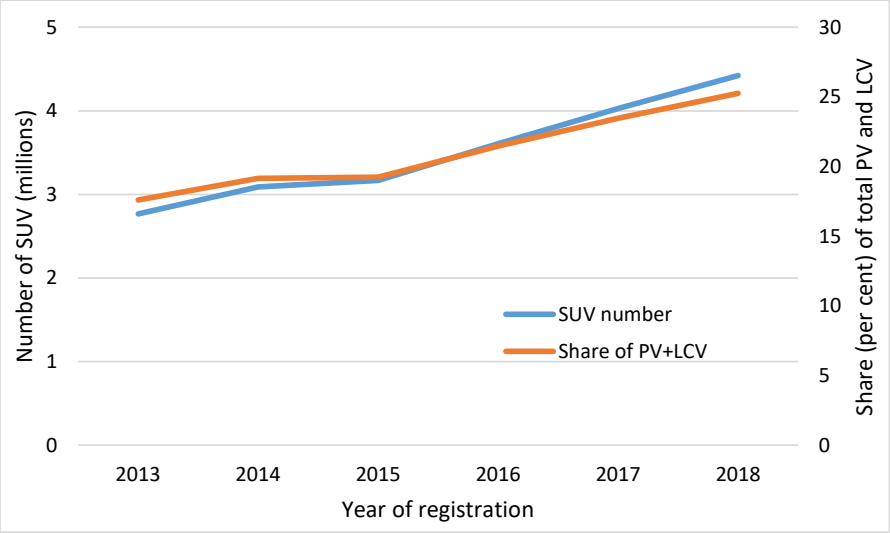
SUVs are not specifically identified as a category in the ABS MVC. However, given the significance of the trend towards SUVs, it is important to define and identify which PVs and LCVs belong to the SUV category so we can better understand the trends and the spatial distribution of SUVs. For this purpose, SUV makes/models were compiled from the national VFACTS lists (from 2005 to 2018) and the Glass's Guide (from 2016 to 2018).

Based on the final list, there were 155 SUV makes/models which were matched with MVC makes/models (using the ABS (2018a)) and for which relevant data could be obtained from the MVC (i.e non-zero estimates). Of these SUV makes/models, 126 were included from VFACTS and the rest (29) added from the Glass's Guide.

This section provides the number of SUVs extracted from the ABS MVC (using TableBuilder Pro) for each year between 2013 and 2018. As mentioned earlier, ABS produced data on registered motor vehicles in Australia as at 31 January each year.

Between 2013 and 2018, the number of SUVs registered in Australia grew much faster than the total number of PVs and LCVs (average annual growth rate of 9.8 per cent versus 2.2 per cent) (Figure 13.2). Nationally, the number of SUVs registered increased from nearly 2.8 million in 2013 to more than 4.4 million in 2018. Similarly, the proportions of SUVs registered in Australia (in terms of total PVs and LCVs) continued to increase from 17.6 per cent in 2013 to 25.3 per cent in 2018.

Figure 13.2: Number and share of SUVs relative to total passenger and light commercial vehicles, Australia, 2013–2018



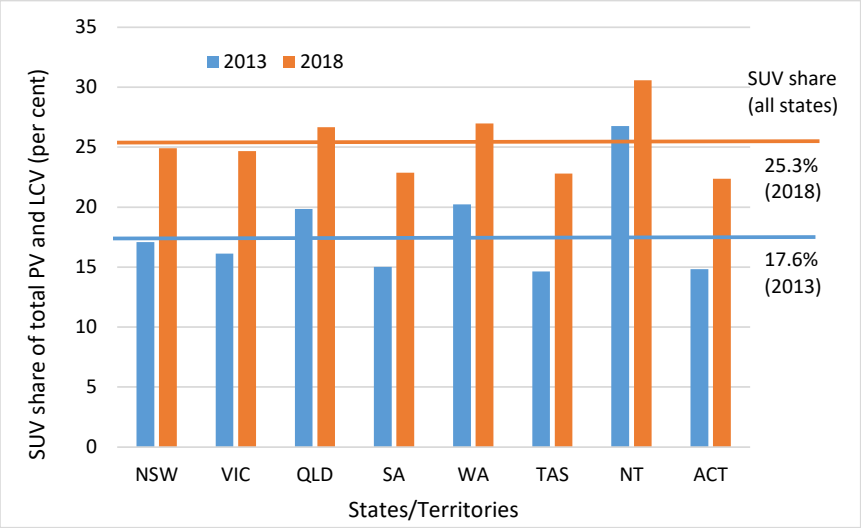
a. Vehicles (makes/models) identified as SUVs using VFACTS (from 2005 to 2018) and Glass's Guide (from 2016 to 2018). No SUVs manufactured before 2005 were captured within BITRE's definition of SUVs.
b. SUV - Sport Utility Vehicle, PV - Passenger Vehicle and LCV - Light Commercial Vehicle.
Source: BITRE analysis of ABS *Motor Vehicle* Census, 2013 to 2018 (TableBuilder Pro).

Based on data extracted from the ABS MVC, the result shows that the proportion that SUVs make up of total PVs and LCVs increased strongly in all states and territories from 2013 to 2018 (Figure 13.3).

Comparing with the proportion of SUVs at the national level, Northern Territory, Western Australia and Queensland had higher proportions, whilst the other five jurisdictions had lower proportions in 2013 and 2018.

Between 2013 and 2018, Victoria (8.6 percentage points) and Tasmania (8.1 percentage points) recorded relatively fast increases in the SUV share of total PVs and LCVs. The Northern Territory recorded a much slower increase (3.8 percentage points), possibly due to the already very high share of SUVs in 2013. The number of SUV registrations grew fastest in Victoria and the Australian Capital Territory (each 11.5 per cent per annum). Tasmania, South Australia and New South Wales also showed strong growth (more than 10 per cent per annum). The growth of SUV registrations was slowest in the Northern Territory (4.8 per cent per annum).

Figure 13.3: Number and share of SUVs by States/Territories, 2013 and 2018



Note: Vehicles (makes/models) identified as SUVs using VFACTS (from 2005 to 2018) and Glass's Guide (from 2016 to 2018). SUV models manufactured before 2005 are not included in the data.
Source: BITRE analysis of ABS Motor Vehicle Census 2019 (TableBuilder Pro).

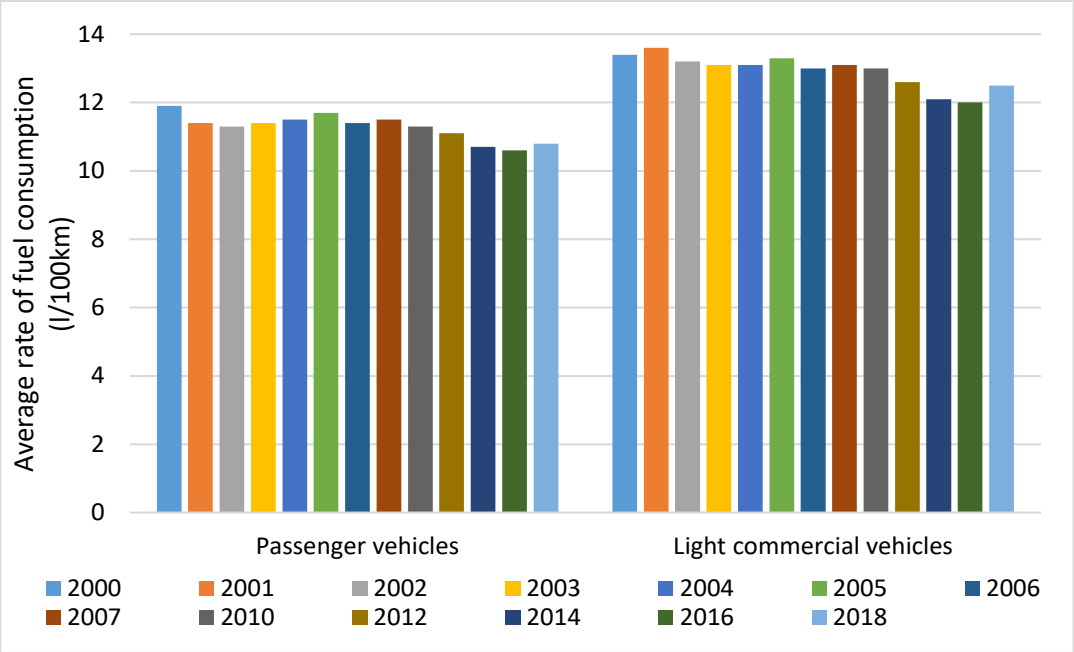
13.3 Average rate of fuel consumption

This section explains changes in the average rate of fuel consumption at the national level from 2000 to 2018 for PVs and LCVs. It also presents data on fuel efficiency by key vehicle characteristics.

The average rate of fuel consumption across all Australian vehicles in 2018 was 13.4 l/100km, which is slightly higher than in 2016 (13.1 l/100 km). However, this fuel consumption rate includes buses and trucks which are overwhelmingly used for business purposes.[17] Given that this study is focused on light vehicles, Figure 13.4 presents the average rate of fuel consumption for two types of light vehicles, namely PVs and LCVs.

Figure 13.4 reveals that the average rate of fuel consumption of PVs was 11.9 l/100km in 2000 and has shown a trend decline since then to reach 10.6 l/100km in 2016, followed by an increase in 2018 (10.8 l/100km). Like PVs, the average rate of fuel consumption of LCVs has displayed a very similar pattern of gradual decline over the 2000 to 2016 period, and then a small increase in 2018. This increase in the 2018 values is possibly an artefact of the estimations being survey results.

Figure 13.4: Average rate of fuel consumption by passenger vehicles and light commercial vehicles, Australia, 2000 to 2018



Source: BITRE analysis of ABS *Survey of Motor Vehicle Use*, Australia, 12 months ended 30 June 2018 and earlier issues of this publication (Cat No. 9208.0).

Despite the 2016-2018 upturn in the SMVU, the long run trends is definitely a trend of declining rates of fuel consumption for both PVs and LCVs. Table 13.1 shows changes in the fuel efficiency of PVs and LCVs by fuel type. The data shows year-to-year volatility, making longer term trends difficult to discern. However, for LPG/dual fuel PVs there has been a significant decline in the average rate of fuel consumption. This could be explained by the ABS data including conventional hybrids (e.g. Prius, Camry Hybrid) in the dual fuel category, as conventional (non-plug-in) hybrids are now the powertrain of choice for taxi fleets (in place of LPG).

Table 13.2 shows that, irrespective of fuel types, newer PVs (those were manufactured in 2013 and after) tend to be more fuel efficient than older (pre-2002) PVs (10.5 l/100 km versus 12.0 l/100 km).

[17] Business use comprises 96 to 100 per cent of total kilometres travelled by buses, rigid trucks, articulated trucks and non-freight carrying trucks.

For LCVs, vehicles that were manufactured between 2003 and 2012 tend to be less fuel efficient (12.8 l/100 km) than pre-2002 (12.5 l/100 km) and post-2013 (12.2 l/100 km) vehicles.

Further, Table 13.2 shows that petrol-driven PVs tend to be more fuel efficient than diesel-driven PVs. For older PVs, average rates of fuel consumption are significantly higher for diesel-driven PVs than for petrol-driven PVs (14.8 l/100km versus 11.8 l/100km).

On the other hand, for LCVs, post-2002 model diesel vehicles tend to be more fuel efficient than post-2002 petrol vehicles.

Table 13.1: Average rate of fuel consumption by fuel type, passenger vehicles and light commercial vehicles, Australia, 2002 to 2018

Year of survey	Petrol	Diesel	LPG	Total fuel
	Average fuel consumption rate (l/100 km)			
Passenger Vehicles				
2002	10.8	12.0	17.1	11.3
2006	11.2	12.5	15.5	11.4
2010	11.1	11.4	13.6	11.3
2014	10.5	10.5	14.3	10.7
2018	10.7	11.5	11.8	10.8
Light Commercial Vehicles				
2002	13.1	12.6	16.1	13.2
2006	13.2	12.3	15.0	13.0
2010	13.6	12.2	15.1	13.0
2014	13.0	11.4	14.7	12.1
2018	12.8	12.3	16.8	12.5

a. Data are presented at four years' interval.
b. LPG includes LPG/CNG/dual fuel/hybrid and other fuel type.
Source: BITRE analysis of ABS *Survey of Motor Vehicle Use*, Australia, 12 months ended 30 June 2018 and earlier issues of this publication (Cat No. 9208.0).

Table 13.2: Average rate of fuel consumption by year of manufacture by fuel type, passenger vehicles and light commercial vehicles, Australia, 2018

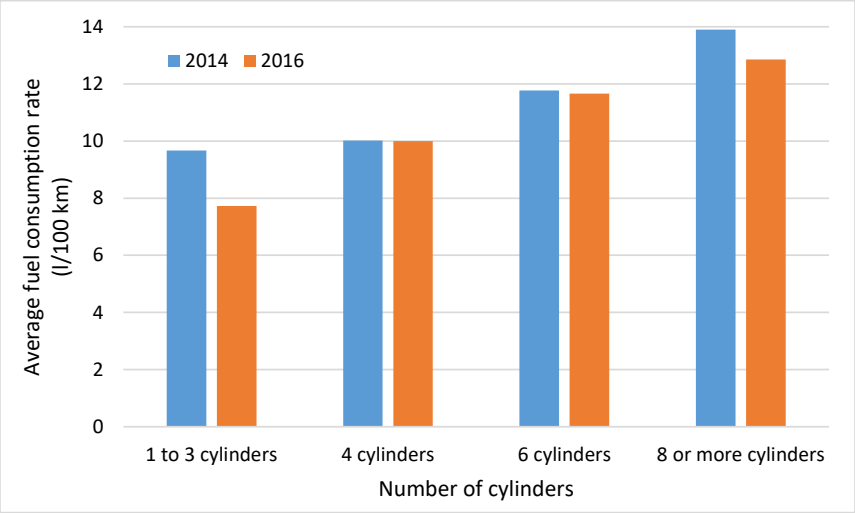
Year of manufacture	Petrol	Diesel	LPG	Total fuel
	Average fuel consumption rate (l/100km)			
Passenger Vehicles				
2002 and earlier	11.8	14.8	11.9	12.0
2003-2012	10.6	11.3	12.5	10.8
2013 and after	10.4	11.4	9.2	10.5
Light Commercial Vehicles				
2002 and earlier	12.2	12.1	16.9	12.5
2003-2012	13.0	12.5	16.7	12.8
2013 and after	12.9	12.1	na	12.2

* Nil or rounded to zero (including null cells) (Table 14, ABS Survey of Motor Vehicle Use, Australia, 12 months ended 30 June 2018, Cat No. 9208.0).
a. LPG includes LPG/CNG/dual fuel/hybrid and other fuel type.
b. 2013 and after includes up to 2018.
c. na denotes not available.
Source: BITRE analysis of ABS *Survey of Motor Vehicle Use*, Australia, 12 months ended 30 June 2018 and earlier issues of this publication (Cat No. 9208.0).

Figure 13.5 shows the average rate of fuel consumption of PVs by number of cylinders at the national level for 2014 and 2016. PVs with more cylinders tend to be less fuel efficient in both years. For example, vehicles with eight or more cylinder engines have an average rate of fuel consumption of 13.9 l/100 km in 2014 and 12.9

l/100 km in 2016, compared to four cylinder engines (the major category of passenger vehicle) which have the same average rate of fuel consumption in both years (10.0 l/100 km).

Figure 13.5: Average rate of fuel consumption by number of cylinders, passenger vehicles and light commercial vehicles, Australia, 2014 and 2016



Note: Year ended October 2014 and June 2016.
Source: BITRE analysis of ABS Survey of Motor Vehicle Use, Australia, 12 months ended 30 June 2018 and earlier issues of this publication (Cat No. 9208.0).

13.4 Changes in light vehicle characteristics between 2013 and 2018, Australia

In this section, changes in characteristics of PVs and LCVs at the national level are examined between 2013 and 2018 in terms of:

- Fuel type,
- Number of cylinders,
- Average tare weights, and
- Average age of vehicles.

Fuel type

In Australia, the proportion of petrol-driven PVs declined by 3.3 percentage points, from 89.6 per cent in 2013 to 86.3 per cent in 2018, whilst the proportion of diesel-driven PVs increased by 4.4 percentage points during the same period (Table 13.3).

For LCVs, there was a very pronounced 14.0 percentage point shift away from petrol-fuelled LCVs, together with a 15.9 percentage point shift towards diesel-fuelled LCVs between 2013 and 2018. Both LPG/Dual fuel-driven PVs and LCVs showed a decline (less than two percentage points) from the already very low 2013 share.

The shift away from petrol towards diesel vehicles will have contributed to increased rates of fuel consumption for PVs, since diesel PVs are less fuel efficient than petrol PVs (see Table 13.2). However, diesel LCVs tend to be more fuel efficient than petrol LCVs, meaning the shift towards diesel LCVs will have contributed to lower rates of fuel consumption for LCVs, and that the overall effect of the shift towards diesel-fuelled light vehicles on the fuel efficiency of the light vehicle fleet is ambiguous in direction.

Table 13.3: Changes in proportions of passenger vehicles and light commercial vehicles by fuel type between 2013 and 2018, Australia

Vehicle type	Fuel type	Share of total fuel (per cent)		Change (2013-2018)
		2013	2018	(percentage points)
Passenger vehicles (PVs)	Petrol	89.6	86.3	-3.3
	Diesel	7.9	12.3	4.4
	LPG/Dual fuel	2.5	1.4	-1.1
	Total Fuel	100.0	100.0	
Light commercial vehicles (LCVs)	Petrol	47.9	33.9	-14.0
	Diesel	47.2	63.1	15.9
	LPG/Dual fuel	5.0	3.1	-1.9
	Total Fuel	100.0	100.0	
Total (PVs and LCVs)	Petrol	82.3	76.7	-5.6
	Diesel	14.7	21.6	6.8
	LPG/Dual fuel	2.9	1.7	-1.2
	Total Fuel	100.0	100.0	

a. Excludes electric and other/unknown fuelled vehicles.
b. Due to rounding, total may not add to 100.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2013 and 2018 (TableBuilder Pro).

Number of cylinders

Table 13.4 shows the changes in proportions of PVs and LCVs by number of cylinders in Australia between 2013 and 2018. Between 2013 and 2018, the proportions of both PVs and LCVs having 4 cylinders showed a very similar positive changes (7.2 per cent and 8.0 per cent, respectively). PVs and LCVs with 6 cylinders, decreased by a similar magnitude (-7.7 percent and -6.8 per cent, respectively). There were only modest changes for vehicles having 1 to 3 cylinders and vehicles having 8 or more cylinders.

The shift towards 4 cylinder vehicles and away from 6 cylinder vehicles may have contributed to improved fuel efficiency of the light vehicle fleet, as 4 cylinder vehicles have significantly lower rates of fuel consumption (see Figure 13.5).

Table 13.4: Changes in proportions of passenger vehicles and light commercial vehicles by number of cylinders between 2013 and 2018, Australia

Vehicle type	Number of cylinders	Share of total fuel (per cent)		Change (2013-2018)
		2013	2018	(percentage points)
Passenger Vehicles (PVs)	1 to 3 cylinders	0.5	0.7	0.2
	4 cylinders	63.9	71.2	7.2
	6 cylinders	31.6	23.9	-7.7
	8 or more cylinders	4.0	4.3	0.3
	All cylinders	100.0	100.0	
Light Commercial Vehicles (LCVs)	1 to 3 cylinders	0.2	0.1	-0.1
	4 cylinders	67.4	75.3	8.0
	6 cylinders	26.7	19.8	-6.8
	8 or more cylinders	5.8	4.7	-1.1
	All cylinders	100.0	100.0	
Total (PVs and LCVs)	1 to 3 cylinders	0.4	0.6	0.1
	4 cylinders	64.5	71.9	7.4
	6 cylinders	30.7	23.2	-7.6
	8 or more cylinders	4.3	4.4	0.1
	All cylinders	100.0	100.0	

a. Excludes 'Other - Not elsewhere specified' which includes rotary powered and other or not stated) from cylinder category.
b. Due to rounding, total may not add to 100.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2013 and 2018 (TableBuilder Pro).

Average tare weights of PVs and LCVs

Table 13.5 shows that there was an increased tare weight of more than 100 kg for LCVs between 2013 and 2018, but for PVs, this increase was around 60 kg.

Table 13.5: Changes in average tare weights of light vehicles between 2013 and 2018, selected jurisdictions

Year of registration	Average tare weights (kg)		Change (2013-2018)
	2013	2018	(percentage points)
Passenger Vehicles (PVs)	1411	1473	62
Light Commercial Vehicles (LCVs)	1663	1770	108
Total (PVs and LCVs)	1463	1539	76

a. For average tare weight calculation, see Footnote 11.
b. Aggregate PV data are for four jurisdictions (New South Wales, Victoria, Western Australia and the Australian Capital Territory). Aggregate LCV data are for six jurisdictions (New South Wales, Victoria, Queensland, South Australia, Western Australia and the Australian Capital Territory).
Source: BITRE analysis of ABS *Motor Vehicle Census* 2013 and 2018 (TableBuilder Pro).

Average age of vehicles

Table 13.6 shows that there was a small increase in the average age of LCVs, from 10.34 years in 2013 to 10.48 years in 2018, whilst PVs showed virtually no change during the same period. Table 13.6 also shows that LCVs are relatively older than PVs.

Table 13.6: Changes in average age of PVs and LCVs between 2013 and 2018, Australia

Vehicle type	Average age (years)		Change (2013-2018)
	2013	2018	(years)
Passenger Vehicles (PVs)	9.76	9.79	0.03
Light Commercial Vehicles (LCVs)	10.34	10.48	0.14
Total (PVs and LCVs)	9.86	9.92	0.06

a. Average age of vehicles is calculated using the individual years of manufacture of vehicles registered in the *Motor Vehicle Census* (for details, refer Data sources and methodology).
b. Years of manufacture from 1901 to 2013 for 2013 data, whilst year of manufacture from 1901 to 2018 for 2018.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2013 and 2018 (TableBuilder Pro).

13.5 Trends in PVs and LCVs, capital cities and rest of states/territories, 2013 to 2018

This section provides information on changes in PVs, LCVs and sport utility vehicles (SUVs) between 2013 and 2018 for the capital cities, rest of states/territories and total states/territories. Since fuel type and number of cylinders showed some notable changes between 2013 and 2018 at the national level, these two characteristics of vehicles are the focus. This section is structured as:

- Changes in PVs by fuel type,
- Changes in PVs by number of cylinders,
- Changes in LCVs by fuel type,
- Changes in LCVs by number of cylinders,
- Changes in sport utility vehicles by fuel type, and
- Changes in sport utility vehicles by number of cylinders.

Changes in passenger vehicles by fuel type

Between 2013 and 2018, the proportion of petrol-driven PVs in Australia decreased by 3.3 percentage points, from 89.6 per cent to 86.3 per cent (Table 13.7). The proportion of LPG/Dual fuel-driven PVs also decreased by 1.1 percentage points. The proportions of diesel-driven PVs increased by 4.4 percentage points, from 7.9 per cent in 2013 to 12.3 per cent in 2018.

Table 13.7 shows that the change in the proportions of petrol- and diesel-driven PVs are less pronounced in capital cities than in regional areas. The petrol-driven PVs in capital cities declined by 2.9 percentage points between 2013 and 2018 (from 90.7 per cent to 87.8 per cent), whilst diesel-driven PVs in capital cities increased by 4.0 percentage points (6.7 per cent to 10.8 per cent) during the same period. The proportions of petrol- and diesel-driven PVs in regional Australia also showed the same pattern, but the magnitudes were larger, with a 5.2 percentage point shift to diesel PVs in regional Australia. The proportions of LPG/Dual fuel-driven PVs declined by around 1 percentage point in capital cities and regional Australia.

Table 13.7: Changes in proportions of passenger vehicles by fuel type, capital cities and regional Australia, 2013 to 2018

Geographic areas/Year	Unit	Passenger vehicles - Fuel types			
		Petrol	Diesel	LPG/ Dual fuel	Total fuel
All capital cities					
2013	Per cent	90.7	6.7	2.5	100.0
2018	Per cent	87.8	10.8	1.4	100.0
Change (2013 to 2018)	Percentage points	-2.9	4.0	-1.1	
Regional Australia					
2013	Per cent	87.3	10.3	2.5	100.0
2018	Per cent	83.1	15.4	1.5	100.0
Change (2013 to 2018)	Percentage points	-4.2	5.2	-1.0	
Australia					
2013	Per cent	89.6	7.9	2.5	100.0
2018	Per cent	86.3	12.3	1.4	100.0
Change (2013 to 2018)	Percentage points	-3.3	4.4	-1.1	

a. Excludes electric and other/unknown fuelled vehicles.
b. Excludes 'Other territories and not identified' in total Australia.
c. Due to rounding, total may not add to 100.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2013 and 2018 (TableBuilder Pro).

Table 13.8 shows that the decrease in the proportion of petrol-driven PVs was greater in the minor capital cities (i.e. Hobart, Darwin and Canberra) (3.9 to 4.0 percentage points) and smaller in the major capital cities (i.e. Sydney, Melbourne, Brisbane, Adelaide and Perth) (2.3 to 3.4 percentage points). The shift towards diesel driven PVs was also greater in the minor capital cities.

The rest of South Australia and the rest of the Northern Territory experienced the largest decrease in the proportions of petrol-driven PVs and a similarly large increase in the proportion of diesel-driven PVs between 2013 and 2018. In terms of LPG/Dual fuel, regional Victoria experienced the largest decrease (2.2 percentage points).

Table 13.8 also shows that the shift towards diesel-fuelled PVs was evident in all capital cities and state balances between 2013 and 2018, varying in magnitude between 3.5 and 5.9 percentage points.

Table 13.8: Changes in proportions of passenger vehicles by fuel type, individual capital cities and rest of states/territories, 2013 to 2018

Geographic areas	Passenger vehicles - Fuel types								
	2013			2018			Change (2013-2018)		
	Petrol	Diesel	LPG/ Dual fuel	Petrol	Diesel	LPG/ Dual fuel	Petrol	Diesel	LPG/ Dual fuel
	Share (per cent)			Share (per cent)			Percentage points		
Capital Cities									
Sydney	92.5	5.6	1.8	89.4	9.7	0.8	-3.1	4.1	-1.0
Melbourne	89.3	6.3	4.4	87.0	10.4	2.6	-2.3	4.1	-1.8
Brisbane	89.8	8.9	1.3	86.4	12.9	0.7	-3.4	4.0	-0.6
Adelaide	93.8	5.4	0.8	90.6	8.9	0.5	-3.2	3.5	-0.3
Perth	88.9	8.4	2.7	86.3	12.2	1.5	-2.5	3.8	-1.3
Hobart	93.3	6.1	0.6	89.3	10.4	0.2	-4.0	4.3	-0.3
Darwin	86.6	12.5	0.9	82.7	16.9	0.4	-4.0	4.4	-0.5
Canberra	91.5	6.9	1.6	87.6	11.7	0.7	-3.9	4.7	-0.8
Regional Areas									
Rest of NSW	88.8	9.2	2.0	84.4	14.6	1.1	-4.5	5.4	-0.9
Rest of Vic.	85.0	9.2	5.8	81.8	14.5	3.7	-3.1	5.3	-2.2
Rest of Qld	87.8	11.0	1.2	83.5	15.8	0.7	-4.3	4.8	-0.5
Rest of SA	89.4	9.7	0.9	83.7	15.6	0.7	-5.7	5.9	-0.2
Rest of WA	80.0	17.4	2.6	75.5	22.9	1.6	-4.5	5.5	-1.0
Rest of Tas.	92.2	7.1	0.7	88.2	11.5	0.3	-4.0	4.4	-0.4
Rest of NT	78.5	20.7	0.8	73.2	26.2	0.7	-5.3	5.5	-0.2
States/Territories									
NSW	91.1	7.0	1.9	87.5	11.6	0.9	-3.6	4.6	-1.0
Vic.	88.2	7.0	4.8	85.7	11.4	2.9	-2.5	4.4	-1.9
Qld	88.8	9.9	1.3	84.9	14.3	0.7	-3.9	4.4	-0.5
SA	92.8	6.3	0.8	89.1	10.3	0.6	-3.7	4.0	-0.3
WA	87.2	10.1	2.7	84.3	14.2	1.5	-2.9	4.1	-1.2
Tas.	92.7	6.6	0.6	88.7	11.0	0.3	-4.0	4.3	-0.3
NT	84.3	14.9	0.9	80.1	19.4	0.5	-4.2	4.5	-0.4

a. Excludes electric and other/unknown fuelled vehicles.
b. Australian Capital Territory is same as Canberra and was included in the Capital cities.
c. Due to rounding, total may not add to 100.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2013 and 2018 (TableBuilder Pro).

Changes in passenger vehicles by number of cylinders

In Australia, the proportion of PVs having 4 or less cylinders (combination of 1 to 3 cylinders and 4 cylinders) increased by 7.4 percentage points, from 64.4 per cent in 2013 to 71.8 per cent in 2018 (Table 13.9). The proportion of PVs having six cylinders decreased by 7.7 percentage points, from 31.6 per cent in 2013 to 23.9 per cent in 2018.

The change in the proportion of PVs having four or less cylinders is the same in both capital cities and regional areas, whilst the decrease in the share of 6 cylinder vehicles was less pronounced in capital cities than in regional areas. Regional areas also showed higher proportions of PVs having eight or more cylinders and a greater increase in that share.

Between 2013 and 2018, the proportion of PVs having 4 or less cylinders in capital cities and in regional Australia increased by 7.4 percentage points. On the other hand, the proportions of PVs having six cylinders decreased during the same period. For PVs having 6 cylinders, the decrease was less pronounced in capital cities than that of regional Australia (-7.4 percentage points versus -8.2 percentage points). Larger (8 cylinders or more) PVs show only a 0.1 percentage points increase for capital cities, but the increase was slightly larger in regional Australia (0.8 percentage points) during the same period.

Table 13.9: Changes in proportions of passenger vehicles by number of cylinders, total capital cities and regional Australia, 2013 to 2018

Geographic areas/Year	Unit	Passenger vehicles - Number of cylinders			
		4 or less	6	8 or more	All cylinders
All capital cities					
2013	Per cent	66.5	29.8	3.7	100.0
2018	Per cent	73.9	22.4	3.8	100.0
Change (2013 to 2018)	Percentage points	7.4	-7.4	0.1	
Regional Australia					
2013	Per cent	60.3	35.2	4.6	100.0
2018	Per cent	67.6	27.0	5.4	100.0
Change (2013 to 2018)	Percentage points	7.4	-8.2	0.8	
Australia					
2013	Per cent	64.4	31.6	4.0	100.0
2018	Per cent	71.8	23.9	4.3	100.0
Change (2013 to 2018)	Percentage points	7.4	-7.7	0.3	

a. Excludes 'Other territories and not identified' in total Australia.
b. Excludes 'Other - Not elsewhere specified' (which includes rotary powered and other or not stated) from cylinder category.
c. 1 to 3 Cylinders (due to very small numbers) and 4 Cylinders combined.
d. Due to rounding, total may not add to 100.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2013 and 2018 (TableBuilder Pro).

In terms of individual capital cities, the increase in the proportion of PVs having 4 or less cylinders was greater in larger cities and smaller in minor cities (Table 13.10). For example, Melbourne experienced the largest increase (8.3 percentage points), whilst the lowest increase was in Hobart (2.5 percentage points). Melbourne also had the largest decrease in the 6 cylinder vehicle share, and Hobart the smallest. Darwin experienced the largest increase in PVs with eight or more cylinders compared to other capital cities.

When considering state balances, the rest of Victoria experienced the largest increase in 4 or less cylinder PVs (8.0 percentage points), followed by the rest of New South Wales (7.7 percentage points) and the rest of Queensland (7.3 percentage points), whilst the rest of Tasmania experienced a small increase (3.1 percentage points). The proportions of PVs having six cylinders declined in each regional area. The highest decline was in the rest of Northern Territory (-9.6 percentage points) and lowest decline in the rest of Tasmania (-3.3 percentage points). The changes in the proportions of eight or more cylinder PVs were most pronounced in the rest of Northern Territory (+3.8 percentage points).

Changes in LCVs by fuel type

Between 2013 and 2018, the proportion of petrol-driven LCVs in Australia decreased by 14.0 percentage points, from 47.9 per cent to 33.9 per cent (Table 13.11). The proportions of LPG/Dual fuel-driven LCVs also decreased by 1.9 percentage points. On the other hand, the proportions of diesel-driven LCVs increased by 15.9 percentage points, from 47.2 per cent in 2013 to 63.1 per cent in 2018.

Table 13.11 also shows that the change in the proportions of petrol- and diesel-driven LCVs are more pronounced in capital cities than in regional areas. The petrol-driven LCVs in capital cities declined by 15.9 percentage points between 2013 and 2018 (from 52.5 per cent to 36.6 per cent), whilst diesel-driven PVs in capital cities increased by 18.3 percentage points (41.6 per cent to 59.9 per cent) during the same period. The proportions of petrol and diesel-driven PVs in regional Australia also showed the same pattern, but to a lesser extent. The proportions of LPG/Dual fuel-driven PVs declined by 2.4 percentage point in capital cities, greater than that of regional Australia (-1.5 percentage points).

Table 13.10: Changes in proportions of passenger vehicles by number of cylinders, individual capital cities and rest of states/territories, 2013 to 2018

Geographic areas	Passenger vehicles - Number of cylinders								
	2013			2018			Change (2013-2018)		
	4 or less	6	8 or more	4 or less	6	8 or more	4 or less	6	8 or more
	Share (per cent)			Share (per cent)			Percentage points		
Capital Cities									
Sydney	69.3	27.5	3.2	76.4	20.4	3.2	7.1	-7.1	0.0
Melbourne	63.5	32.7	3.9	71.7	24.6	3.7	8.3	-8.1	-0.1
Brisbane	69.2	27.6	3.2	77.0	19.6	3.4	7.8	-8.0	0.2
Adelaide	63.3	32.9	3.8	70.6	25.2	4.2	7.3	-7.7	0.4
Perth	65.1	29.9	5.0	71.3	23.4	5.2	6.3	-6.5	0.2
Hobart	73.8	23.4	2.8	76.3	20.7	3.0	2.5	-2.7	0.2
Darwin	69.1	26.8	4.0	75.2	19.1	5.7	6.1	-7.8	1.7
Canberra	69.5	27.3	3.2	76.3	20.3	3.4	6.9	-7.0	0.1
Regional Areas									
Rest of NSW	63.0	33.2	3.8	70.7	24.8	4.5	7.7	-8.4	0.7
Rest of Vic.	54.4	40.8	4.8	62.4	32.2	5.4	8.0	-8.6	0.6
Rest of Qld	63.8	31.7	4.4	71.2	23.6	5.2	7.3	-8.2	0.8
Rest of SA	50.0	44.6	5.4	56.9	36.3	6.7	6.9	-8.2	1.3
Rest of WA	51.0	40.8	8.2	57.8	32.6	9.6	6.8	-8.2	1.4
Rest of Tas.	68.9	27.5	3.5	72.1	24.2	3.7	3.1	-3.3	0.2
Rest of NT	56.1	37.7	6.2	61.9	28.1	10.0	5.8	-9.6	3.8
States/Territories									
NSW	67.0	29.6	3.4	74.3	22.0	3.7	7.3	-7.6	0.3
Vic.	61.2	34.7	4.1	69.4	26.4	4.1	8.3	-8.3	0.0
Qld	66.5	29.7	3.8	74.1	21.6	4.3	7.6	-8.1	0.5
SA	60.4	35.5	4.2	67.7	27.6	4.7	7.3	-7.9	0.6
WA	62.4	32.0	5.6	68.8	25.1	6.1	6.4	-6.9	0.4
Tas	71.2	25.6	3.2	74.1	22.5	3.4	2.9	-3.0	0.2
NT	65.3	30.0	4.7	71.6	21.5	6.9	6.3	-8.5	2.2

a. Excludes 'Other - Not elsewhere specified' (which includes rotary powered and other or not stated) from cylinder category.
b. 1 to 3 Cylinders (due to very small numbers) and 4 Cylinders combined.
c. Australian Capital Territory is same as Canberra and was included in the Capital cities.
d. Due to rounding, total may not add to 100.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2013 and 2018 (TableBuilder Pro).

Table 13.11: Changes in proportions of light commercial vehicles by fuel type, total capital cities and total regional Australia, 2013 to 2018

Geographic areas/Year	Unit	Light commercial vehicles - Fuel types			
		Petrol	Diesel	LPG/ Dual fuel	Total fuel
All capital cities					
2013	Per cent	52.5	41.6	6.0	100.0
2018	Per cent	36.6	59.9	3.6	100.0
Change (2013 to 2018)	Percentage points	-15.9	18.3	-2.4	
Regional Australia					
2013	Per cent	43.6	52.3	4.1	100.0
2018	Per cent	31.3	66.1	2.6	100.0
Change (2013 to 2018)	Percentage points	-12.3	13.8	-1.5	
Australia					
2013	Per cent	47.9	47.2	5.0	47.9
2018	Per cent	33.9	63.1	3.1	33.9
Change (2013 to 2018)	Percentage points	-14.0	15.9	-1.9	-14.0

a. Excludes electric and other/unknown fuelled vehicles.
b. Excludes 'Other territories and not identified' in total Australia.
c. Due to rounding, total may not add to 100.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2013 and 2018 (TableBuilder Pro).

Table 13.12 shows that the decrease in the proportions of petrol-driven LCVs between 2013 and 2018 was greatest in Canberra and Sydney (more than 19 percentage points each) and lowest in Perth and Darwin (less than 13 percentage points). Sydney, Melbourne and Canberra experienced greater increases in the proportion of diesel-driven LCVs (more than 20 percentage points in each city). The proportion of LPG/Dual fuel-driven LCVs decreased in all cities, but fell most in Melbourne (-4.5 percentage points).

Table 13.12 also shows that regional New South Wales and regional South Australia experienced large decreases in the proportion of petrol-driven LCVs (more than 13 per cent in each area) and smaller decreases in regional Western Australia and regional Northern Territory (9 percentage points). The diesel-driven LCVs showed greater increases for regional New South Wales and regional Victoria (more than 15 percentage points) between 2013 and 2018. Regional Victoria showed a significant decrease in LPG/Dual fuel-driven LCVs.

Table 13.12: Changes in the proportion of light commercial vehicles by fuel type, individual capital cities and rest of states/territories, 2013 to 2018

Geographic areas	Light commercial vehicles - Fuel types								
	2013			2018			Change (2013-2018)		
	Petrol	Diesel	LPG/ Dual fuel	Petrol	Diesel	LPG/ Dual fuel	Petrol	Diesel	LPG/ Dual fuel
	Share (per cent)			Share (per cent)			Percentage points		
Capital Cities									
Sydney	59.3	34.9	5.8	40.2	56.6	3.2	-19.1	21.7	-2.6
Melbourne	50.2	38.3	11.5	34.4	58.5	7.0	-15.8	20.3	-4.5
Brisbane	50.1	47.4	2.5	34.4	64.1	1.6	-15.8	16.7	-0.9
Adelaide	58.3	39.6	2.0	41.5	57.2	1.3	-16.8	17.5	-0.7
Perth	45.9	48.8	5.3	33.9	62.8	3.4	-12.0	13.9	-1.9
Hobart	57.0	41.2	1.7	42.8	56.2	1.0	-14.2	14.9	-0.7
Darwin	43.1	55.9	1.0	30.6	68.9	0.5	-12.5	13.0	-0.5
Canberra	57.7	36.6	5.8	38.5	58.4	3.1	-19.2	21.8	-2.6
Regional Areas									
Rest of NSW	45.4	50.6	4.0	31.8	65.9	2.3	-13.6	15.3	-1.7
Rest of Vic.	43.6	46.4	10.0	31.7	61.6	6.6	-11.8	15.2	-3.4
Rest of Qld	43.8	54.5	1.8	31.3	67.6	1.1	-12.5	13.1	-0.6
Rest of SA	48.1	50.7	1.2	34.6	64.4	1.0	-13.4	13.7	-0.2
Rest of WA	32.4	65.0	2.6	23.9	74.4	1.8	-8.5	9.4	-0.9
Rest of Tas.	48.5	49.5	2.0	36.1	62.8	1.0	-12.3	13.3	-0.9
Rest of NT	34.7	64.4	0.9	25.7	73.8	0.5	-9.0	9.4	-0.3
States/Territories									
NSW	51.4	43.9	4.7	35.5	61.9	2.7	-15.9	18.0	-2.1
Vic.	47.2	41.9	10.8	33.2	59.9	6.8	-14.0	18.0	-4.0
Qld	46.2	51.7	2.0	32.5	66.2	1.3	-13.7	14.4	-0.7
SA	54.0	44.3	1.7	38.6	60.2	1.2	-15.4	15.9	-0.5
WA	41.2	54.5	4.4	30.4	66.8	2.8	-10.8	12.4	-1.6
Tas.	51.9	46.2	1.9	38.9	60.1	1.0	-13.0	13.9	-0.9
NT	40.2	58.8	1.0	29.0	70.5	0.5	-11.2	11.7	-0.5

a. Excludes electric and other/unknown fuelled vehicles.
b. Australian Capital Territory is same as Canberra and was included in the Capital cities.
c. Due to rounding, total may not add to 100.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2013 and 2018 (TableBuilder Pro).

Changes in Light Commercial Vehicles by number of cylinders

Between 2013 and 2018, the proportions of LCVs having 4 or less cylinders (combination of 1 to 3 cylinders and 4 cylinders) in Australia increased by 8.0 percentage points, from 67.5 per cent to 75.4 per cent (Table 13.13). The proportions of 6 cylinder LCVs decreased by 6.8 percentage points, from 26.7 per cent in 2013 to 19.8 per cent in 2018. The proportions of LCVs having eight or more cylinders also showed a small decrease (1.1 percentage points).

Table 13.13 also shows that the changes in the proportions of LCVs, irrespective of the number of cylinders, were more pronounced in capital cities than in regional areas. The proportions of LCVs with four or less cylinders increased in capital cities (7.9 percentage points), but decreased in regional areas (-6.8 percentage points) between 2013 and 2018, whilst the proportions of LCVs having six cylinders decreased in both capital cities and regional areas during the same period.

Table 13.13: Changes in the proportion of light commercial vehicles by number of cylinders, capital cities and regional Australia, 2013 to 2018

Geographic areas/Year	Unit	Light commercial vehicles - Number of cylinders			
		4 or less	6	8 or more	All cylinders
All capital cities					
2013	Per cent	68.0	26.0	6.0	100.0
2018	Per cent	76.9	18.6	4.5	100.0
Change (2013 to 2018)	Percentage points	8.9	-7.4	-1.5	
Regional Australia					
2013	Per cent	67.0	27.4	5.6	100.0
2018	Per cent	73.9	21.1	5.0	100.0
Change (2013 to 2018)	Percentage points	6.9	-6.3	-0.6	
Australia					
2013	Per cent	67.5	26.7	5.8	100.0
2018	Per cent	75.4	19.8	4.7	100.0
Change (2013 to 2018)	Percentage points	7.9	-6.8	-1.1	

a. Excludes 'Other territories and not identified' in total Australia.
b. Excludes 'Other - Not elsewhere specified' (which includes rotary powered and other or not stated) from cylinder category.
c. 1 to 3 Cylinders (due to very small numbers) and 4 Cylinders combined.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2013 and 2018 (TableBuilder Pro).

In terms of individual capital cities, the increase in the proportion of LCVs having four or less cylinders was greatest in Canberra (11.1 percentage points), followed by Melbourne (10.4 percentage points) and lowest Hobart (2.0 percentage points) (Table 13.14). The decrease in the proportions of LCVs having six cylinders was greatest in Sydney, Melbourne, Darwin and Canberra, at more than eight percentage points for each city. Canberra and Melbourne experienced a larger decline in LCVs having eight or more cylinders compared to the other cities.

Table 13.14 also shows that all of the regional areas experienced an increase in four or less cylinder LCVs between 2013 and 2018. The increase was highest in regional Northern Territory (11.6 percentage points), thus resulting in decreases in six cylinder and eight or more cylinder LCVs.

Changes in sport utility vehicles by fuel type

Between 2013 and 2018, the proportions of petrol-driven SUVs in Australia decreased marginally (by only 0.6 percentage points, from 67.7 per cent to 67.1 per cent).The decrease was larger for LPG/Dual fuel-driven SUVs (from 2.3 per cent in 2013 to 1.2 per cent in 2018) (Table 13.15). As a result, the proportions of diesel-driven SUVs showed an increase of 1.8 percentage points.

Table 13.15 also shows that the change in the proportions of petrol- and diesel-driven SUVs are more pronounced in capital cities than in regional areas. It is interesting to note that while the proportion of petrol-driven SUVs in capital cities declined by more than two percentage points, in regional areas, petrol-driven SUVs showed a small increase (0.9 percentage points).

Table 13.14: Changes in the proportion of light commercial vehicles by number of cylinders, individual capital cities and rest of states/territories, 2013 to 2018

Geographic areas	Light commercial vehicles - Number of cylinders								
	2013			2018			Change (2013-2018)		
	4 or less	6	8 or more	4 or less	6	8 or more	4 or less	6	8 or more
	Share (per cent)			Share (per cent)			Percentage points		
Capital Cities									
Sydney	69.3	25.8	4.8	78.9	17.3	3.8	9.6	-8.5	-1.1
Melbourne	63.6	29.7	6.7	74.0	21.3	4.7	10.4	-8.4	-2.0
Brisbane	72.2	23.7	4.1	80.1	16.8	3.2	7.9	-6.9	-1.0
Adelaide	69.4	24.7	5.8	77.7	17.8	4.5	8.2	-6.9	-1.4
Perth	65.9	25.3	8.8	73.5	19.4	7.1	7.6	-5.9	-1.7
Hobart	73.5	21.9	4.7	75.5	20.2	4.3	2.0	-1.7	-0.3
Darwin	72.3	21.8	5.9	82.2	13.4	4.4	9.9	-8.4	-1.5
Canberra	64.8	27.9	7.3	75.9	19.7	4.4	11.1	-8.2	-2.9
Regional Areas									
Rest of NSW	68.1	26.7	5.1	75.7	19.9	4.5	7.5	-6.9	-0.7
Rest of Vic.	63.1	30.5	6.3	70.3	24.4	5.3	7.1	-6.1	-1.0
Rest of Qld	68.0	26.8	5.2	75.2	20.3	4.5	7.3	-6.6	-0.7
Rest of SA	68.8	25.8	5.3	74.6	20.4	4.9	5.8	-5.4	-0.4
Rest of WA	63.6	28.5	7.9	69.2	22.7	8.1	5.6	-5.8	0.2
Rest of Tas.	74.8	21.1	4.1	77.0	19.0	3.9	2.3	-2.1	-0.2
Rest of NT	65.1	26.5	8.4	76.6	16.9	6.5	11.6	-9.7	-1.9
States/Territories									
NSW	68.7	26.3	5.0	77.1	18.8	4.1	8.4	-7.6	-0.9
Vic.	63.4	30.1	6.5	72.3	22.7	5.0	9.0	-7.4	-1.6
Qld	69.6	25.6	4.8	77.1	18.9	4.0	7.5	-6.7	-0.8
SA	69.2	25.2	5.6	76.4	18.9	4.7	7.2	-6.3	-1.0
WA	65.1	26.4	8.5	72.0	20.6	7.5	6.9	-5.9	-1.0
Tas.	74.3	21.4	4.3	76.4	19.5	4.1	2.2	-1.9	-0.2
NT	69.8	23.4	6.7	80.4	14.5	5.0	10.6	-8.9	-1.7

a. Excludes 'Other - Not elsewhere specified' (which includes rotary powered and other or not stated) from cylinder category.
b. 1 to 3 Cylinders (due to very small numbers) and 4 Cylinders combined.
c. Australian Capital Territory is same as Canberra and was included in the Capital cities.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2013 and 2018 (TableBuilder Pro).

Table 13.15: Changes in the proportion of sport utility vehicles by fuel type, capital cities and regional Australia, 2013 to 2018

Geographic areas/Year	Unit	Sport Utility Vehicles - Fuel types			
		Petrol	Diesel	LPG/ Dual fuel	Total fuel
All capital cities					
2013	Per cent	74.0	23.6	2.3	100.0
2018	Per cent	71.9	27.0	1.1	100.0
Change (2013 to 2018)	Percentage points	-2.2	3.4	-1.2	
Regional Australia					
2013	Per cent	58.5	39.1	2.4	100.0
2018	Per cent	59.4	39.3	1.3	100.0
Change (2013 to 2018)	Percentage points	0.9	0.2	-1.1	
Australia					
2013	Per cent	67.7	29.9	2.3	100.0
2018	Per cent	67.1	31.7	1.2	100.0
Change (2013 to 2018)	Percentage points	-0.6	1.8	-1.2	

a. SUVs manufactured before 2005 are not captured in data.
b. Method for selecting SUVs is discussed in Section 13.2.
c. Excludes electric and other/unknown fuelled vehicles. Also excludes 'Other territories and not identified' in total Australia.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2013 and 2018 (TableBuilder Pro).

Table 13.16 shows that proportions of petrol-driven SUVs decreased in six cities between 2013 and 2018, but increased in Darwin and Perth. The decreases in the proportions were greatest in Sydney and Canberra. The proportion of diesel-driven SUVs increased in all capital cities, except Darwin.

Table 13.16 also shows that there were four state balances (Victoria, Queensland, Western Australia and Northern Territory) that experienced increases in petrol-driven SUVs, while regional New South Wales, regional Victoria, regional South Australia and regional Tasmania experienced increases in diesel-driven SUVs.

Table 13.16: Changes in the proportion of sport utility vehicles by fuel type, individual capital cities and rest of states/territories, 2013 to 2018

Geographic areas	Sport Utility Vehicles - Fuel types								
	2013			2018			Change (2013-2018)		
	Petrol	Diesel	LPG/ Dual fuel	Petrol	Diesel	LPG/ Dual fuel	Petrol	Diesel	LPG/ Dual fuel
	Share (per cent)			Share (per cent)			Percentage points		
Capital Cities									
Sydney	80.4	17.8	1.8	75.8	23.5	0.7	-4.7	5.7	-1.1
Melbourne	76.2	20.0	3.8	73.9	24.3	1.8	-2.3	4.3	-2.0
Brisbane	68.4	30.2	1.4	66.6	32.6	0.7	-1.8	2.5	-0.7
Adelaide	77.2	22.5	0.3	74.1	25.7	0.2	-3.1	3.2	-0.2
Perth	64.8	32.4	2.8	65.9	32.6	1.5	1.1	0.2	-1.3
Hobart	75.1	23.9	0.9	72.3	27.4	0.3	-2.9	3.5	-0.6
Darwin	52.6	46.3	1.1	55.9	43.5	0.5	3.4	-2.8	-0.6
Canberra	75.4	22.6	2.0	70.9	28.4	0.7	-4.5	5.8	-1.3
Regional Areas									
Rest of NSW	63.3	34.2	2.5	62.0	36.8	1.2	-1.3	2.7	-1.4
Rest of Vic.	59.4	35.5	5.1	60.7	36.6	2.6	1.4	1.1	-2.5
Rest of Qld	57.8	40.8	1.4	59.8	39.4	0.8	2.0	-1.4	-0.6
Rest of SA	59.9	39.5	0.5	57.7	42.0	0.3	-2.2	2.5	-0.3
Rest of WA	41.4	56.5	2.1	43.3	55.4	1.3	1.9	-1.1	-0.8
Rest of Tas.	69.6	29.2	1.2	68.8	30.8	0.5	-0.8	1.6	-0.8
Rest of NT	39.0	60.2	0.8	41.8	57.5	0.6	2.9	-2.7	-0.2
States/Territories									
NSW	72.8	25.1	2.1	69.9	29.2	0.9	-2.9	4.1	-1.2
Vic.	71.3	24.5	4.2	70.1	27.8	2.1	-1.1	3.3	-2.2
Qld	62.3	36.3	1.4	62.9	36.4	0.7	0.6	0.1	-0.6
SA	72.1	27.5	0.4	69.7	30.2	0.2	-2.5	2.7	-0.2
WA	57.9	39.5	2.6	59.9	38.7	1.4	1.9	-0.8	-1.2
Tas	72.0	26.9	1.1	70.3	29.3	0.4	-1.7	2.4	-0.7
NT	47.4	51.6	1.0	51.2	48.3	0.5	3.8	-3.3	-0.5

a. SUVs manufactured before 2005 are not captured in the data.
b. Method for selecting SUVs is discussed in Section 13.2.
c. Excludes electric and other/unknown fuelled vehicles.
d. Australian Capital Territory is same as Canberra and was included in the Capital cities.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2013 and 2018 (TableBuilder Pro).

Changes in sport utility vehicles by number of cylinders

In Australia, the proportions of SUVs having four or less cylinders increased (from 53.0 per cent in 2013 to 65.3 per cent in 2018, whilst the proportions of SUVs with six cylinders decreased from 41.9 per cent to 29.6 per cent during the same period (Table 13.17). There was no change in the representation of SUVs with eight or more cylinders. Regional Australia had a greater decline in six cylinder vehicles than the capital cities.

Table 13.17: Changes in proportions of sport utility vehicles by number of cylinders, capital cities and regional Australia, 2013 to 2018

Geographic areas/Year	Unit	Sport Utility Vehicles - Number of cylinders			
		4 or less	6	8 or more	All cylinders
All capital cities					
2013	Per cent	55.4	40.0	4.6	100.0
2018	Per cent	67.4	28.7	4.0	100.0
Change (2013 to 2018)	Percentage points	12.0	-11.3	-0.6	
Regional Australia					
2013	Per cent	49.3	44.7	6.0	100.0
2018	Per cent	61.9	30.9	7.2	100.0
Change (2013 to 2018)	Percentage points	12.6	-13.7	1.2	
Australia					
2013	Per cent	53.0	41.9	5.2	100.0
2018	Per cent	65.3	29.6	5.2	100.0
Change (2013 to 2018)	Percentage points	12.3	-12.3	0.0	

a. SUVs manufactured before 2005 are not captured in data.
b. Method for selecting SUVs is discussed in Section 13.2.
c. Excludes 'Other territories and not identified' in total Australia.
d. Excludes 'Other - Not elsewhere specified' (which includes rotary powered and other or not stated) from cylinder category.
e. 1 to 3 Cylinders (due to very small numbers) and 4 Cylinders combined.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2013 and 2018 (TableBuilder Pro).

For the capital cities, between 2013 and 2018, the increases in the proportion of SUVs with four or less cylinders were greatest in Brisbane (15.1 percentage points) and Perth (12.4 percentage points) and lowest in Hobart (5.9 percentage points) (Table 13.18). The decrease in the proportion of SUVs with six cylinders was also greatest in Brisbane (-14.6 percentage points), followed by Darwin (-13.8 percentage points). Darwin also showed the largest increase in SUVs with eight or more cylinders, whilst other cities showed either virtually no change or very small negative changes.

Table 13.18 also shows that all of the regional areas experienced an increase in four or less cylinder SUVs between 2013 and 2018, and the increase was particularly pronounced for regional Queensland (15.7 percentage points), but small in regional Tasmania (7.4 percentage points). For SUVs with six cylinders, regional Queensland and regional Northern Territory show the greatest decreases (-17.0 percentage points and -15.3 percentage points, respectively). For SUVs with eight or more cylinders, all regional areas showed a positive increase, being greatest in regional Northern Territory (4.9 percentage points).

Table 13.18: Changes in the proportion of sport utility vehicles by number of cylinders, individual capital cities and rest of states/territories, 2013 to 2018

Geographic areas	Sport Utility Vehicles - Number of cylinders								
	2013			2018			Change (2013-2018)		
	4 or less	6	8 or more	4 or less	6	8 or more	4 or less	6	8 or more
	Share (per cent)			Share (per cent)			Percentage points		
Capital Cities									
Sydney	57.2	39.4	3.4	68.4	28.8	2.8	11.2	-10.6	-0.6
Melbourne	55.8	40.4	3.7	67.0	29.9	3.2	11.2	-10.6	-0.6
Brisbane	55.1	39.7	5.2	70.2	25.1	4.7	15.1	-14.6	-0.5
Adelaide	58.5	37.9	3.6	68.9	27.7	3.4	10.4	-10.2	-0.2
Perth	49.1	42.7	8.2	61.5	31.4	7.1	12.4	-11.3	-1.1
Hobart	60.1	36.6	3.4	65.9	30.8	3.3	5.9	-5.8	0.0
Darwin	51.5	41.2	7.2	62.3	27.4	10.3	10.7	-13.8	3.1
Canberra	63.1	34.1	2.8	71.4	25.8	2.8	8.3	-8.4	0.1
Regional Areas									
Rest of NSW	54.3	41.0	4.8	65.2	29.1	5.7	11.0	-11.9	0.9
Rest of Vic.	51.7	43.9	4.4	61.9	32.8	5.3	10.2	-11.1	0.9
Rest of Qld	47.8	45.3	6.9	63.6	28.3	8.1	15.7	-17.0	1.3
Rest of SA	44.8	49.8	5.4	56.6	35.8	7.5	11.8	-14.0	2.2
Rest of WA	36.3	53.6	10.0	46.6	40.0	13.4	10.2	-13.6	3.4
Rest of Tas.	54.6	41.8	3.6	62.0	33.9	4.0	7.4	-7.9	0.4
Rest of NT	36.2	49.8	14.0	46.5	34.6	18.9	10.3	-15.3	4.9
States/Territories									
NSW	55.9	40.1	4.0	67.0	29.0	4.0	11.1	-11.2	0.0
Vic.	54.6	41.4	3.9	65.5	30.7	3.8	10.9	-10.7	-0.2
Qld	50.9	42.9	6.2	66.6	26.9	6.6	15.7	-16.1	0.4
SA	54.5	41.4	4.1	65.6	29.9	4.5	11.1	-11.5	0.4
WA	45.4	45.9	8.7	57.5	33.7	8.8	12.1	-12.2	0.1
Tas.	57.0	39.5	3.5	63.7	32.5	3.7	6.8	-7.0	0.2
NT	45.6	44.5	9.8	56.9	29.8	13.2	11.3	-14.7	3.4

a. SUVs manufactured before 2005 are not captured in data.
b. Method for selecting SUVs is discussed in Section 13.2.
c. Excludes 'Other territories and not identified' in total Australia.
d. Excludes 'Other - Not elsewhere specified' (which includes rotary powered and other or not stated) from cylinder category.
e. 1 to 3 Cylinders (due to very small numbers) and 4 Cylinders combined.
f. Australian Capital Territory is same as Canberra and was included in the Capital cities.
Source: BITRE analysis of ABS *Motor Vehicle Census* 2013 and 2018 (TableBuilder Pro).

14 Concluding remarks

As at 31 January 2018, there were 19.2 million registered motor vehicles in Australia, of which 18.4 million were light vehicles (i.e. PVs, LCVs and motorcycles), accounting for about 96 per cent of the total vehicle fleet, based on ABS *Motor Vehicle Census 2018*. Of these 18.4 million light vehicles, PVs accounted for 78.0 per cent, 17.3 per cent were LCVs and the rest were motorcycles (4.7 per cent).

This Information Sheet has investigated how the characteristics of Australia's light vehicle fleet vary across different types of regions (i.e. States/Territories, major cities, city sectors and regional areas, and small areas). Vehicle characteristics considered include fuel type, average age, cylinders and tare weight. Specific types of vehicles, such as electric vehicles, sports utility vehicles and utilities were also examined. This research builds on BITRE's previous study on how realised rates of fuel consumption varied over time and how the rates depended on key vehicle characteristics and region.

The results and analysis presented in this information sheet show that:

- Capital cities have comparatively newer vehicles than regional areas (9.4 years versus 10.7 years for PVs, and 9.5 years versus 11.5 years for LCVs). Tasmania had the oldest PVs, whilst Northern Territory and the Australian Capital Territory had relatively new PVs.
- Among major cities, Greater Hobart and Launceston in Tasmania and Bendigo in Victoria had the oldest vehicles (both PVs and LCVs).
- The most common vehicle within Australia's light vehicle fleet in 2018 was the 2003 Holden Commodore. In fact, 10 of the top 20 makes and models were Holden Commodores (2001-2010). Other makes/models in the top 20 included the Toyota Corolla (2005-2008, 2014), Toyota Hilux (2012, 2017), Ford Falcon (2003) and Mazda 3 (2012, 2013).
- Although limited number of EVs are on Australian roads, the most common makes/models are Tesla (i.e. Tesla Model 3, Tesla Model S, Tesla Model X and Tesla Unknown Model) and the Nissan Leaf. Canberra and Greater Sydney had the highest proportion of EVs. Higher proportions of EVs were evident in the inner suburbs than the middle and outer suburbs of the five largest capital cities and there was very low representation of EVs in regional Australia.
- Between 2013 and 2018, there was a shift towards more PVs and LCVs having four cylinder engines (up 7.4 percentage points), and a shift towards more diesel-fuelled light vehicles (up 6.8 percentage points). Average vehicle age showed minimal change.
- Between 2013 and 2018, the number of SUVs registered in Australia grew much faster than the total number of PVs and LCVs. Victoria and Tasmania recorded a relatively fast increases in the share of total PVs and LCVs that were SUVs, whilst the Northern Territory recorded a much slower increase (off a higher base).

The Information Sheet provides a useful basis for understanding the most popular light vehicles (in terms of makes/models) in Australia, especially from a spatial perspective. It also provides some insight into the recent changes in the light vehicle fleet, and how these changes have played out in cities and regions. The results should help provide a more comprehensive evidence base for understanding the spatial impacts of vehicle-related policies.

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Appendix A BITRE Migration Geography 2016

The BITRE migration geography draws on and closely matches the ABS classification utilised in the ABS (2009) publication *A Picture of the Nation: the Statistician's Report on the 2006 Census, 2006* (refer section On the move).This type of geography better captures the natural endowments, features and amenities of different regions, which takes into account in a person's decision to move. For example, this geography captures the importance of coastal areas in terms of both population growth and migration flows.

Six broad geographical areas, based on the 2016 Australian Statistical Geographical Standard (ASGS), are defined as follows:

- *Capital cities*—Greater Capital City Statistical Areas (GCCSAs)[18] as defined by the ABS.
- *Coastal cities*—ABS Significant Urban Areas (SUAs)[19] that border the coastline or have their population-weighted centre within 50 kilometres of the coast.
- *Inland cities*—ABS SUAs that do not border a coastline or have their population-weighted centre within 50 kilometres of the coast.
- *Coastal country areas*—Statistical Areas Level 2[20] (SA2s) that border the coastline or have their population-weighted centre within 50 kilometres of the coast and are not classified as either remote or very remote (based on the ABS Remoteness Area (RA) structure) or as a coastal city.
- *Inland country areas*—SA2s whose population-weighted centre is not within 50 kilometres of the coast and are not otherwise classified as an inland city or classified as remote or very remote (based on the ABS RA structure).
- *Remote areas*—Any SA2 region that is predominantly classified as remote or very remote under the 2016 ABS RA structure[21].

[18] GCCSAs are built from whole SA4s and represent a broad socioeconomic definition of each of the eight state and territory capital cities. They contain not only the urban area of the city, but also the surrounding and non-urban areas where much of the population has strong links to the capital city, through for example, commuting to work (ABS 2016).

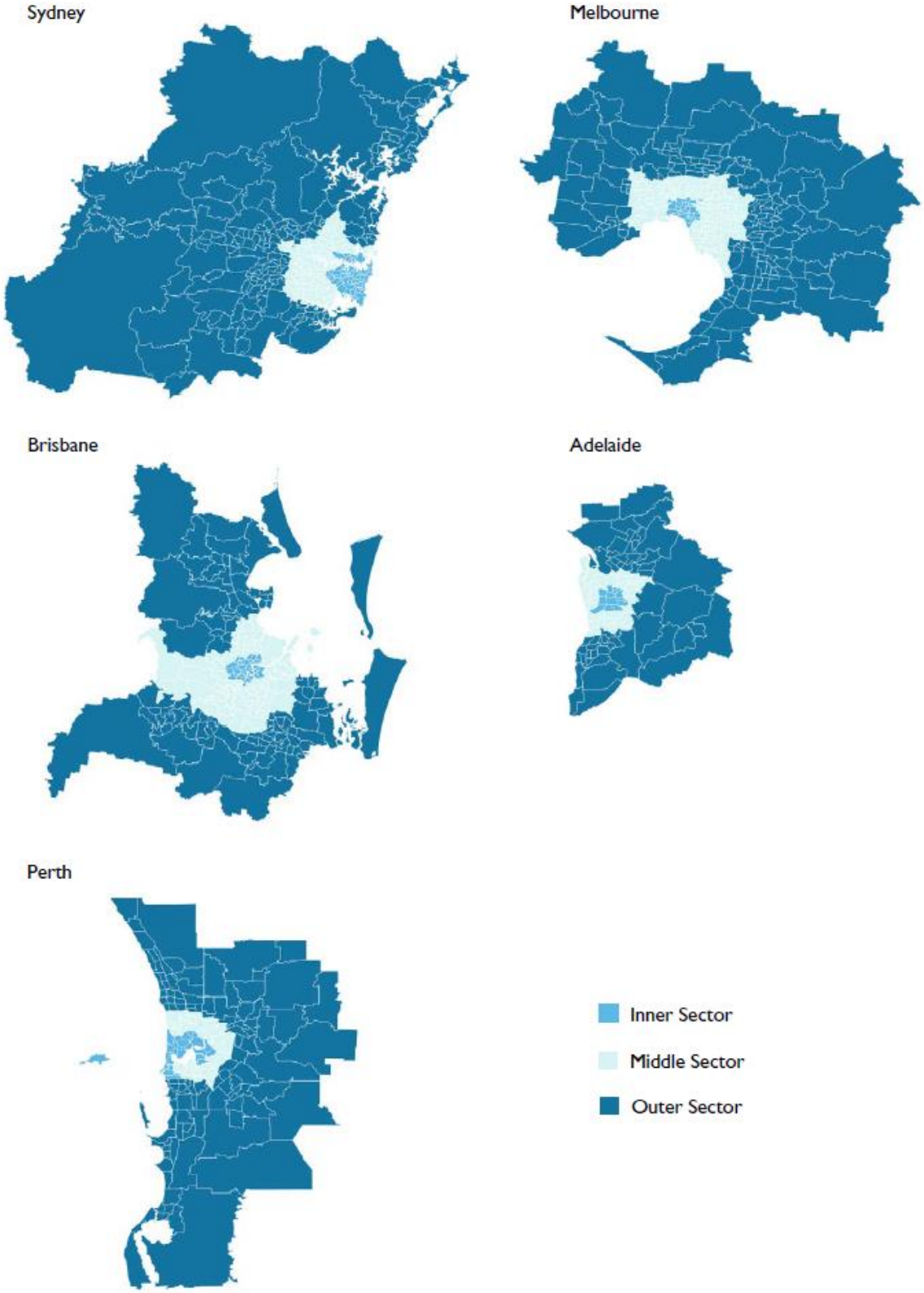
[19] SUAs are aggregations of whole SA2s, which represent concentrations of urban development with populations of 10,000 people or more. They do not necessarily represent a single Urban Centre, as they can represent a cluster of related Urban Centres. They can also include related peri-urban and satellite development and the area into which the urban development is likely to expand. SUAs may cross a state or territory border ABS (2016).

[20] The SA2 (as defined in the ASGS) is the base spatial unit used to collect and disseminate statistics other than those collected from the Census. In aggregate, SA2s cover the whole of Australia without gaps or overlaps. SA2s are medium-sized general-purpose areas, which aim to represent communities that interact together socially and economically. SA2s are based on officially gazetted suburbs and localities. In urban areas SA2s largely conform to one or more whole suburbs, while in rural areas they generally define the functional zone of a regional centre (ABS 2016).

[21] Remoteness Areas (RAs) represent an aggregation of non-contiguous geographical areas, which share common characteristics of remoteness. The delimitation criteria for RAs are based on the Accessibility and Remoteness Index of Australia (ARIA+), which measures the remoteness of a point based on the road distance to the nearest urban centre. The RA categories range from Major Cities to Very Remote. Each RA is created from a grouping of SA1s, which have a particular degree of remoteness. Data for RAs are approximated by aggregating the data for SA1s that best fit the area. The SA1 is the smallest geographic unit for the release of Census data. There are approximately 57 500 SA1s and they cover the whole of Australia without gaps or overlaps (ABS 2016).

Appendix B Sectors of five major cities

Map B.1: Inner, Middle and Outer sectors of Sydney, Melbourne, Brisbane, Adelaide and Perth



Note: All five city maps are presented at a common scale. Each city has been disaggregated into Inner, Middle and Outer sectors, based on ABS 2016 Statistical Area 2 (SA2) boundaries. Sydney, Melbourne, Adelaide and Perth reflect GCCSA boundaries, while Brisbane reflects a narrower definition (capturing 3 per cent less population than the GCCSA), based on BITRE's sectoral classification. The inner, middle and outer sectors for Sydney, Melbourne, Brisbane, Adelaide and Perth have been developed by BITRE.
Source: BITRE analysis of ABS 2016 SA2 boundaries.

Appendix C Type of Electric Vehicles Available in Australia

There are a number of different electric vehicles (EVs) available in Australia. Classifications differ depending on the extent to which the vehicles use electricity, not petrol or diesel, as their energy source.

According to Australian Renewable Energy (ARENA) (2020), there are currently four main types of EVs in the literature which are listed below:

1. Battery electric vehicles (BEVs): these vehicles are fully-electric, meaning they are solely powered by electricity and do not have a petrol, diesel or LPG engine, fuel tank or exhaust pipe. BEVs are also known as 'plug-in' EVs as they use an external electrical charging outlet to charge the battery.
2. Plug-in hybrid electric vehicles (PHEVs): these vehicles are powered by a combination of fuel and electricity. They can be charged with electricity using a plug but also contain an internal combustion engine that uses liquid fuel.
3. Fuel cell electric vehicles (FCEVs): these are propelled by one or more electric motors powered by electricity generated on-board by a hydrogen fuel cell, and that require refuelling with hydrogen gas.
4. Non-plug-in hybrid EVs (HEVs): instead of using an external plug to charge the vehicle, the electricity generated by the HEV's braking system is used to recharge the battery (i.e. regenerative braking).

Appendix D Method used to identify electric vehicles in current study

This study follows standard BITRE practice in defining EVs as comprising Battery Electric Vehicle (BEV) and Plug-in Hybrid Electric Vehicle (PHEV). Many of the vehicles identified as having an 'electric' fuel type in the ABS 2020 *Motor Vehicle Census* are conventional hybrids[22]/HEVs (e.g. Toyota Camry, Toyota Corolla, Toyota RAV4, Toyota Prius, Ford Mondeo), rather than BEVs or PHEVs. Just these five conventional hybrid makes and models contribute around 1500 (or 12 per cent) of the passenger vehicles with an electric fuel type in the ABS 2020 *Motor Vehicle Census.* Consequently, simply using the ABS MVC data on vehicles with an 'electric' fuel type did not meet our needs.

BITRE used lists of BEV and PHEV makes and models from the Federal Chamber of Automotive Industries (FCAI) and Glasses Guide as a starting point. This list is referred to as the 'reference' list. Our analysis is restricted to passenger vehicles that are EVs. It specifically excludes electric motorcycles, LCVs and heavy vehicles.

EVs which were manufactured prior to 2010, such as the Hyundai Getz[23], a BEV, were excluded. BITRE analysis, based on the ABS 2020 *Motor Vehicle Census*, shows that around 96 per cent of all electric vehicles were manufactured in 2010 or later.

This reference list of EV makes and models was then assessed against the ABS 2020 *Motor Vehicle Census* list of makes/models of passenger vehicles with a nominated 'electric' fuel type. Some EV makes/models, such as the Jaguar i-pace and Renault Zoe, were not separately listed in the ABS 2020 *Motor Vehicle Census*, and so could not be captured empirically. Others, such as the Mercedes-Benz E350 and Volvo C30, had an estimate of zero registered vehicles in the ABS 2020 *Motor Vehicle Census*. After considering all these inputs, a list of 17 electric passenger vehicle makes and models with a non-zero count in the 2020 *Motor Vehicle Census* was finalised and used as the basis for the analysis (refer Table 12.1).

For many of the vehicles identified as having an 'electric' fuel type in the ABS 2020 *Motor Vehicle Census*, the vehicle make was identified but the specific model was unknown—these vehicles were generally excluded from BITRE's analysis of EVs as we could not verify they were actually electric. As noted previously, the 'electric' fuel type category captures a significant number of vehicles that are demonstrably conventional hybrids rather than BEVs or PHEVs, so it would be naïve to accept uncritically that all vehicles nominated as 'electric' with an unknown make or model are necessarily BEVs or PHEVs, particularly where that vehicle manufacturer does not produce a BEV or PHEV for the Australian market. This methodological decision excluded around 1100 vehicles. However, an exception was made for unknown Tesla models, which were classified as EVs due to Tesla only manufacturing EVs.

There are a further 2400 passenger vehicles with an 'electric' fuel type in the ABS 2020 *Motor Vehicle Census* that were manufactured between 2010 and 2020 but for which the vehicle make and model is unknown. These vehicles were all excluded from BITRE's analysis of EVs as we could not verify they were BEVs or PHEVs.

These methodological choices mean that BITRE's overall estimate of PV EVs is quite conservative. For example, the ABS *Motor Vehicle Census* estimate of passenger vehicles with an 'electric' fuel type is about 80 per cent higher than BITRE's EV estimate for 2020 of 7007. While some of these vehicles are out of scope of the present study (which focuses on vehicles manufactured since 2010), the two main reasons for the discrepancy are the large number of vehicles designated as having an 'electric' fuel type in the ABS *Motor Vehicle Census*:

(a) while actually being conventional hybrids/HEVs (e.g. Toyota Prius), or

(b) having an unknown model (and sometimes an unknown vehicle make)—while BITRE has not classified these unknown models as EVs, it recognises that some proportion of them will in fact be EVs (e.g. Nissan unknown model, Renault unknown model).

[22] Conventional hybrid term is used to refer to vehicles that are petrol/electric hybrids or diesel/electric hybrids.

[23] Five Hyundai Getz vehicles that were manufactured prior to 2010 were still in the vehicle fleet in 2020 (ABS *Motor Vehicle Census 2018* (TableBuilder Pro).

Glossary

According to ABS *Motor Vehicle Census* (Cat No. 9309.0), the different types of light vehicle used in this study are defined as:

Passenger vehicles

Motor vehicles constructed primarily for the carriage of persons and containing up to nine seats (including the driver's seat). This category includes cars, station wagons, four-wheel drive passenger vehicles and forward-control passenger vehicles. Campervans are excluded.

Light commercial vehicles

Vehicles primarily constructed for the carriage of goods, and which are less than or equal to 3.5 tonnes Gross Vehicle Mass (GVM). This includes utilities, panel vans, cab-chassis and forward-control load carrying vehicles (whether four-wheel drive or not).

Motorcycles

Two and three wheeled motor vehicles constructed primarily for the carriage of one or two persons. This category includes two and three wheeled mopeds, scooters, motor tricycles and motorcycles with sidecars.

Abbreviations and Acronyms

This information sheet uses the following abbreviations and acronyms.

ABS	Australian Bureau of Statistics
ACT	Australian Capital Territory
ARIA	Accessibility and Remoteness Index of Australia
ASGS	Australian Statistical Geographical Standard
BEV	Battery Electric Vehicle
BITRE	Bureau of Infrastructure, Transport and Regional Economics
Cat No.	Catalogue Number
ERP	Estimated Resident Population
EV	Electric vehicle
FCAI	Federal Chamber of Automotive Industries
FCEV	Fuel Cell Electric Vehicle
GCCSA	Greater Capital City Statistical Area
GCM	Gross Combination Mass
GVM	Gross Vehicle Mass
HEV	Non-plug-in Hybrid EVs
Kg	Kilogram
LCV	Light Commercial Vehicle
MVC	Motor Vehicle Census
NCPF	National Cities Performance Framework
NSW	New South Wales
NT	Northern Territory
PHEV	Plug-in Hybrid Electric Vehicle
PO	Post Office
PV	Passenger Vehicle
Qld	Queensland
RA	Remoteness Area
SA	South Australia
SA	Statistical Area Level 2
SA3	Statistical Area Level 3
SA4	Statistical Area Level 4
SMVU	Survey of Motor Vehicle Use
SUA	Significant Urban Area
SUV	Sport Utility Vehicle
Tas.	Tasmania
UN	United Nations
Vic.	Victoria
WA	Western Australia

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