Carbon Dioxide Emissions Intensity for New Australian Light Vehicles 2019

National Transport Commission

ntc

Leading change

Executive summary

Every year the National Transport Commission reports on the carbon dioxide emissions intensity performance of new passenger and light commercial vehicles sold in Australia, based on annual sales data provided by the Federal Chamber of Automotive Industries (FCAI).

This helps inform governments, fleet managers and consumers about Australia's purchasing trends and the collective impacts of our buying choices on carbon dioxide emissions intensity.

In the last five years, there has been a growing trend towards electric and 'green' vehicles, but not at a scale that has materially decreased overall emissions intensity.

Electric vehicle sales rose 149 per cent in 2019 taking the number on Australian roads to 14,500 – out of the nation's almost 18 million cars and light trucks.

Another consumer trend that has changed the fleet mix in Australia since 2011 is the growth in SUVs and pick-up trucks. This trend away from smaller vehicles has seen a flatlining of emissions intensity levels. In 2019, the overall emissions intensity decreased by 0.2 per cent, the smallest improvement since reporting began in 2002.

Key findings

- Electric vehicles are becoming more popular, with 5,875 electric vehicles sold by FCAI members and Tesla in 2019 compared with 2,357 vehicles sold in 2018—a 149 per cent increase.

- The national average carbon dioxide emissions intensity from new passenger vehicles decreased by 0.3 per cent and increased for light commercial vehicles by 0.7 per cent in 2019. The combined average emissions intensity of 180.5 g/km is a 0.2 per cent decrease from 2018.

- If people who purchased new vehicles in 2019 had chosen the best-in-class for emissions performance, Australia's average carbon emissions intensity would have dropped 63 per cent to 67 g/km.

- 'Green' vehicles were 5.7 per cent of total vehicle sales in 2019, up from 4.1 per cent in 2018. There were 85 'green' vehicle model variants on the market available in Australia in 2019 (compared with 93 in 2018). A 'green' vehicle is defined as a vehicle with emissions intensity that does not exceed 120 g/km.

- About 90 per cent of all new vehicle sales in 2019 were from 15 makes. Of these, Suzuki had the lowest average emissions intensity (128 g/km), and Ford had the highest (210 g/km).

- The average emissions intensity from government car fleets decreased by 2.0 per cent in 2019, and the emissions intensity for private buyers also decreased, while the average emissions intensity for business buyers increased. However, emissions intensity from private buyers remains the lowest on average (174 g/km), followed by business buyers (186 g/km) and government buyers (191 g/km).

- The average emissions intensity for new passenger vehicles in European countries was 120.4 g/km in 2018 (using provisional European data). The corresponding figures in Japan and the United States were 114.6 g/km and 145.8 g/km, respectively, in 2017 (the latest available year). Australia's average emissions intensity for passenger vehicles in 2018 was 169.8 g/km, 41 per cent higher than for Europe.

- There are many reasons why Australian light vehicle emissions intensity are higher than in Europe, including:

  - Australian consumer preferences for heavier vehicles with larger and more powerful engines

  - Consumer choice in Europe favouring small diesel-powered vehicles with manual transmission, where Australian consumers are trending towards SUVs, pick up trucks and automatic transmission

  - Australia has fewer government incentives for lower emissions vehicles

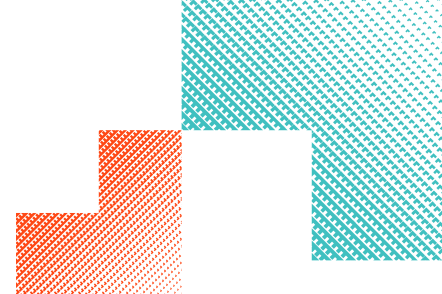 - relatively lower fuel prices in Australia compared with Europe.

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Abbreviations

BEV	battery electric vehicle	**g/km**	grams per kilometre	**NTC**	National Transport Commission
EEA	European Environment Agency	**GVM**	gross vehicle mass	**PHEV**	plug-in hybrid electric vehicle
FCAI	Federal Chamber of Automotive Industries	**ICCT**	nternational Council on Clean Transportation	**SUV**	sports utility vehicle

1. Introduction

Each year since 2009, the National Transport Commission (NTC) has published a carbon dioxide emissions intensity report on new Australian light vehicles. This is the latest in this series and provides data for 2019.

Vehicle emissions intensity is a measure of vehicle efficiency, not actual vehicle emissions, which depends on many real-world factors such as distance travelled, the nature of the driving, and road and traffic conditions.

The Federal Chamber of Automotive Industries (FCAI) collates carbon dioxide emissions intensity data from vehicle manufacturers. We use the FCAI data to prepare this report and we would like to thank the FCAI for making this data available for use in this report.

This report is divided into three main sections:
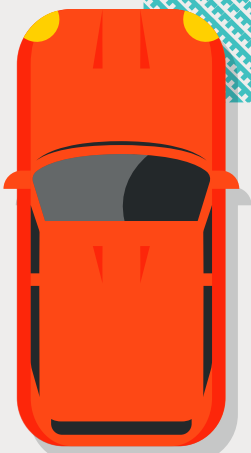
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Describes the methodology used.

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Section 3
Presents the results of the analysis.

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Section 4
Compares Australian data with international data.

2. Methodology

This section describes the methodology used to calculate the carbon dioxide emissions intensity data for Australia.

The FCAI and its members collate data on the sales of new vehicles. It provided this data to the NTC. We entered the FCAI data into a database and analysed it.[1] These records consisted of:

vehicle attributes: including make, model, vehicle generation, body style, engine capacity, number of cylinders, engine power, transmission type, gears, number of seats, gross vehicle mass (GVM), driven wheels, country of origin, fuel type, carbon dioxide emissions intensity and fuel economy

vehicle category: consistent with the classifications and definitions as described in Table 1

sales data: sales by state and region and by type of buyer (that is, government, business or private).

Carbon dioxide emissions intensity for vehicles is calculated using the method described in *Vehicle Standard (Australian Design Rule 81/02 – fuel consumption labelling for light vehicles)* and expressed in grams of carbon dioxide per kilometre (g/km).

The data in this report reflects tailpipe emissions. It does not reflect all aspects of lifecycle emissions for a vehicle, which also include those involved in manufacturing the vehicle, transporting it to the point of sale, and disposing of it.

The NTC calculated the sales weighted average for vehicle emissions for different vehicle attributes, categories and buyer types. A weighted average calculation is similar to an arithmetic average (the most common type of average), but instead of each data point contributing equally to the final average, some data points contribute more than others. In this case, the average was weighted to vehicle sales.

Battery electric vehicles with no secondary engine and emissions of 0 g/km have been excluded when calculating sales weighted averages in most tables and figures in this report. Although vehicles operating on their electric engine may have no tailpipe emissions, the electricity may produce carbon dioxide emissions depending on its source.

Tesla sales data and other vehicle information is not included in the FCAI database, and as a result most tables and figures in this report do not include Tesla. However, certain tables and figures in the electric vehicles section do include estimated Tesla sales (these tables and figures specifically mention Tesla).

The light vehicles are classified into three main classes by the FCAI: passenger motor vehicles, sports utility vehicles (SUVs) and light trucks. These classes are then broken down into segments. For example, the segments of SUVs are small, medium, large and upper large.[2] Table 1 presents the classifications and definitions.

This report uses the following definitions:

- **passenger vehicles:** passenger motor vehicles and SUVs
- **light commercial vehicles:** light trucks.

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1 Prior to entering the data into the database, we amended the emissions numbers for a very small sample of the data we received from the FCAI. The Land Rover RR EVOQUE listed zero carbon dioxide emissions in some of the reported sales data, despite having a petrol-only engine. We corrected this apparent error by replacing the zero carbon dioxide number for these sales with the emissions number for the same (or closest) vehicle model—with the same engine capacity and engine power—in other sales in the FCAI's data. The data affected by these changes is a very small fraction of the total: 51 records, comprising 109 vehicle sales, out of total vehicle sales of over one million.

2 From 2020, the FCAI's data will start recording an SUV Light segment. This will contain a number of vehicle models that were previously in the SUV Small segment. Some of the 2019 data provided by the FCAI to the NTC recorded these sales as SUV Light. For the purposes of this report, we have treated these vehicle models as being within the SUV Small segment, given that the report is for 2019 and the segmentation change occurred in 2020.

Table 1: FCAI motor vehicle classifications and definitions

Passenger motor vehicles	Sports utility vehicles	Light trucks
Passenger vehicles are classified dependent on size, specification and average retail pricing. Selected vehicle types will be assessed on footprint* defined as length (mm) x width (mm), rounded, as follows:	Vehicles classified as SUVs meet the FCAI criteria for classifying SUVs based on a 2/4 door wagon body style and elevated ride height. Vehicles typically will feature some form of 4WD or all-wheel drive; however, where a 2WD variant of a model is available it will be included in the appropriate segment to that model. Selected vehicle types will be assessed on footprint* defined as length (mm) × width (mm), rounded, as follows:	Vehicles designed principally for commercial use but may include designs intended for non-commercial applications.
Micro Hatch, sedan or wagon with a footprint < 6.3 m^2	**Small** < 8.1 m^2	**Light Bus < 20 seats** 8+ seats, but less than 20 seats
Light Hatch, sedan or wagon with a footprint range 6.301–7.5 m^2	**Medium** 8.101–8.8 m^2	**Light Bus ≥ 20 seats** 20+ seats
Small Hatch, sedan or wagon with a footprint range 7.501–8.3 m^2	**Large** 8.801–9.8 m^2	**Van/Cab Chassis ≤ 2.5t** Blind/window vans and cab chassis ≤ 2.5 t GVM
Medium Hatch, sedan or wagon with a footprint range 8.301–9.0 m^2	**Upper Large** > 9.801 m^2	**Van/Cab Chassis > 2.5–3.5t** Blind/window vans and cab chassis 2.5–3.5 t GVM
Large Hatch, sedan or wagon with a footprint range 9.001–9.5 m^2		**Pick-up/Chassis 4×2** Two driven wheels, normal control (bonnet), utility, cab chassis, one and a half cab and crew cab
Upper Large Hatch, sedan or wagon with a footprint range > 9.501 m^2		**Pick-up/Chassis 4×4** Four driven wheels, normal control (bonnet), utility, cab chassis, one and a half cab and crew cab
People Movers Wagon for passenger usage, seating capacity > 5 people		
Sports Car, coupe, convertible or roadster		

Note: These parameters are indicative only; exceptions do occur based on market focus and other subjective criteria. They are largely based on the specifications listed and are reflective of the volume-selling variant where crossover occurs.

* Note the NTC has converted the footprint units to m^2. The units on the FCAI website are mm^2/1000.

Source: FCAI 2020

Carbon dioxide emissions intensity per kilometre is directly related to vehicle fuel consumption values. Table 2 provides fuel consumption figures and the corresponding carbon dioxide emissions intensity for petrol and diesel.

Another way to relate carbon dioxide emissions intensity to fuel is per litre of fuel consumed. For example, 1 litre of petrol will produce about 2.3 kg of carbon dioxide and 1 litre of diesel will produce about 2.7 kg of carbon dioxide.

Table 2: Fuel consumption and corresponding average emissions intensity

Fuel consumption (litres per 100 kilometres)	Average emissions intensity (g/km)	
	Petrol	Diesel
3	68	80
4	91	107
5	114	134
6	137	160
7	160	187
8	182	214
9	205	240
10	228	267
11	251	294
12	274	321
13	297	347
14	319	374
15	342	401
16	365	427
17	388	454
18	411	481
19	433	508
20	456	534

Source: Department of Climate Change 2009

To help get a frame of reference for carbon dioxide emissions intensity from vehicles, Figure 1 shows carbon dioxide emissions from the top 10 selling vehicle models in Australia during 2019. Figure 1 also contains four low emitting vehicle models[3] (excluding zero emission vehicles) and the highest emitting model. Also shown is the average emissions intensity for all Australian vehicles sold in 2019.

Figure 1: Average emissions intensity for top 10 selling vehicles in Australia plus other selected models, 2019
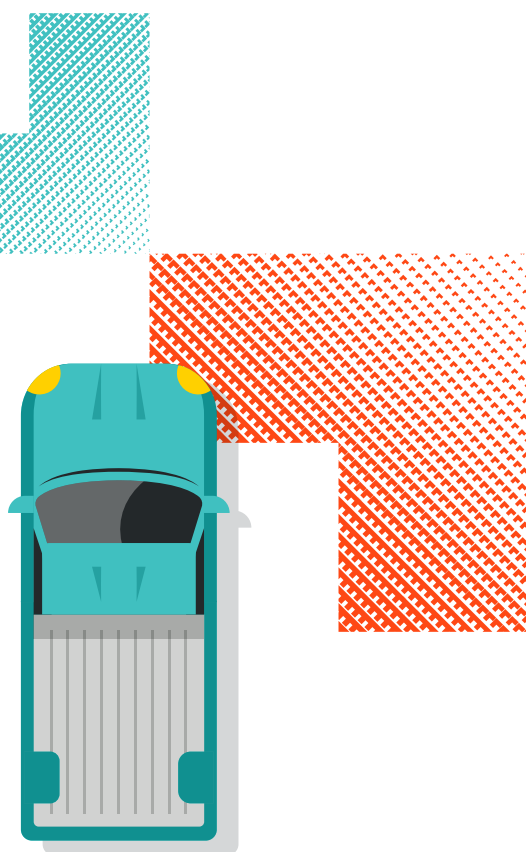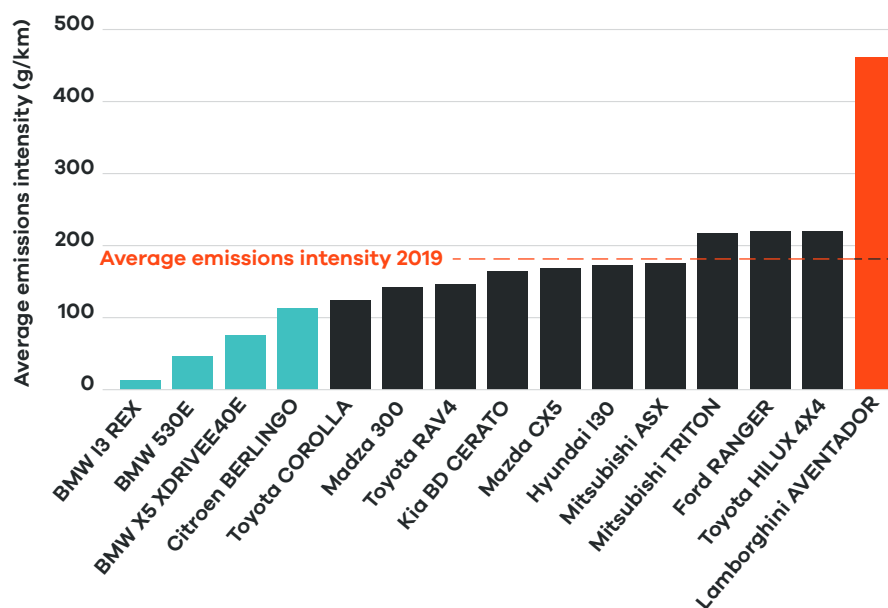
3   In this case, the models selected are the lowest emitting model from the micro, light or small segments; the lowest emitting model from the medium, large, or upper large segments; the lowest emitting SUV; and the lowest emitting van or pick-up.

3. Australian emissions intensity

This section contains Australian data about the carbon dioxide emissions intensity for new passenger vehicles and light commercial vehicles in 2019.

Across all new passenger and light commercial vehicles sold in 2019, the national average carbon dioxide emissions intensity was 180.5 g/km (Figure 2). This is a 0.2 per cent decrease from the previous year. This is the smallest decrease in average emissions intensity since records started in 2002.

Since 2002 there has been an overall reduction of 28 per cent in carbon dioxide emissions intensity. Additional data on the annual average emissions intensity is provided in Table 10 in the appendix.

Figure 2: National average emissions intensity for new passenger and light commercial vehicles, 2002–2019
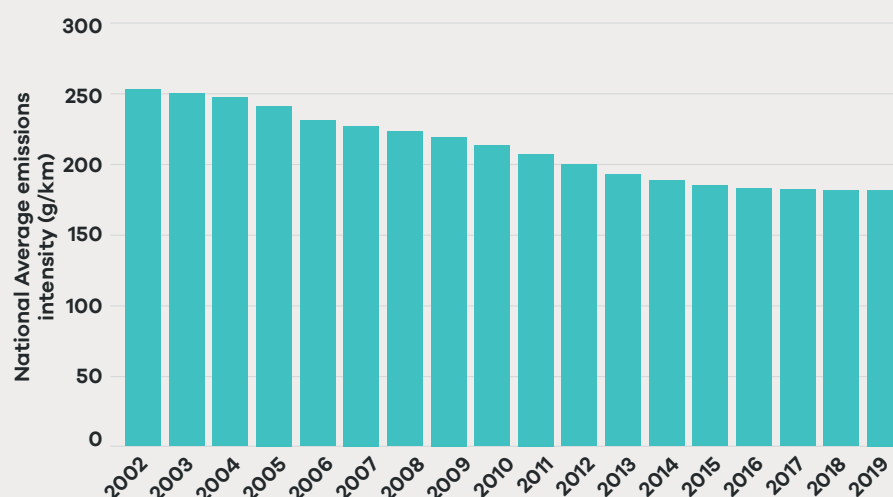
0.2% Annual decrease in carbon intensity for new cars sold in Australia in 2019.

Vehicle manufacturers

In 2019 there were 50 makes of new vehicles sold to Australian consumers. Ninety per cent of all new vehicle sales were from the 15 highest-selling makes. The average carbon dioxide emissions intensity of these market-leading makes largely determines the national average emissions intensity.

Figure 3 shows the average carbon dioxide emissions intensity for the top 15 makes in 2019 (data for all vehicle makes is provided in Table 11 in the appendix). Suzuki had the lowest average carbon dioxide emissions intensity (128 g/km), and Ford had the highest (210 g/km).

Figure 3: Average emissions intensity for the top 15 makes by volume, 2019
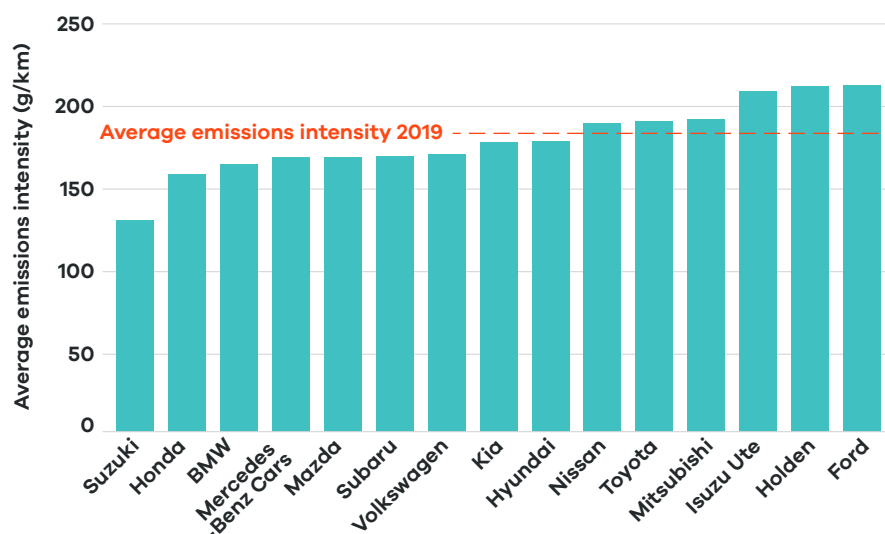
Figure 4 shows the change in average carbon dioxide emissions intensity between 2018 and 2019 for the highest-selling 15 makes. Subaru had a 4.4 per cent reduction in average emissions intensity. BMW's average carbon dioxide emissions intensity increased by 7.3 per cent.

Figure 4: Change in average emissions intensity between 2018 and 2019 for the top 15 makes by volume
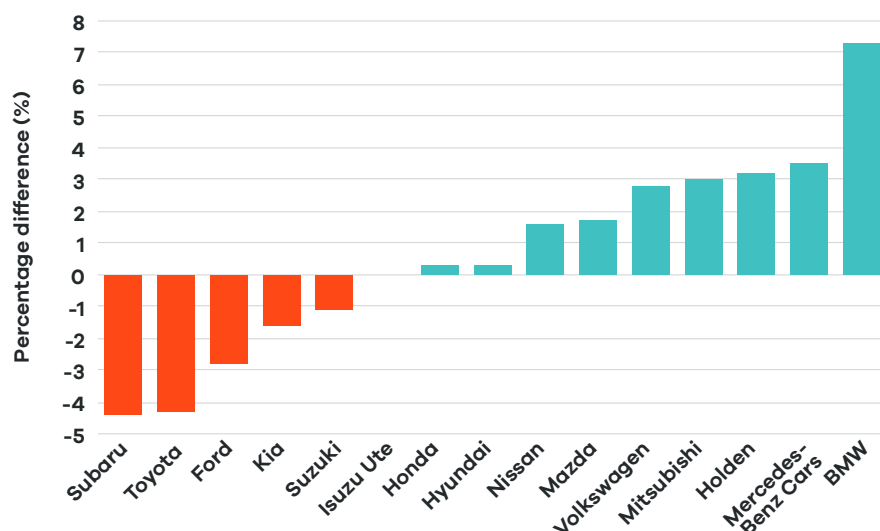
ABOUT

90%

of all new vehicle sales in 2019 were from 15 makes.

Segment type

A segment analysis was conducted using the categories shown in Table 1.

Figure 5 shows the average carbon dioxide emissions intensity by segment during 2019. The lowest emitting segment was 'micro' (129 g/km); 'Light Buses' (258 g/km) was the highest. Additional segment data, including the top 10 selling models for each segment, is provided in Tables 12 and 13 in the appendix.

SUVs as a segment grouping had a reduction of 1.1 per cent in average emissions intensity during 2019 (179 g/km) when compared with 2018 (181 g/km).

Figure 6 shows the change in average carbon dioxide emissions intensity by segment between 2018 and 2019. In 2019 the 'large' segment had the largest reduction of 6.5 per cent, while the 'upper large' segment had the largest increase of average emissions intensity at 6.1 per cent.

Figure 7 shows the average and the range in carbon dioxide emissions intensity for the segments during 2019. The average emissions are represented by the horizontal lines, and the ranges are represented by the vertical bars.

The 'small' segment had the lowest minimum emissions intensity—excluding battery electric vehicles with zero emissions—with the BMW i3 REx emitting 12 g/km.

Figure 5: Average emissions intensity by segment, 2019
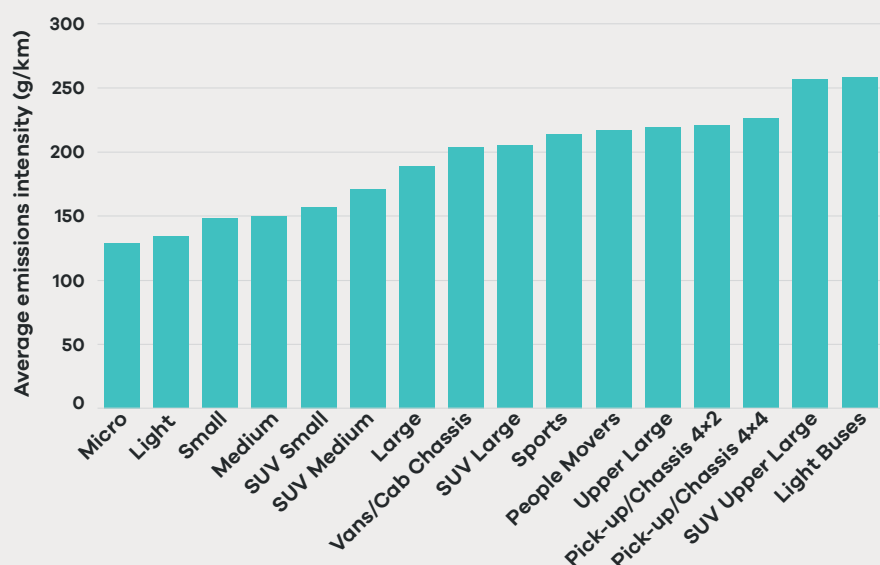
Figure 6: Change in average emissions intensity by segment between 2018 and 2019
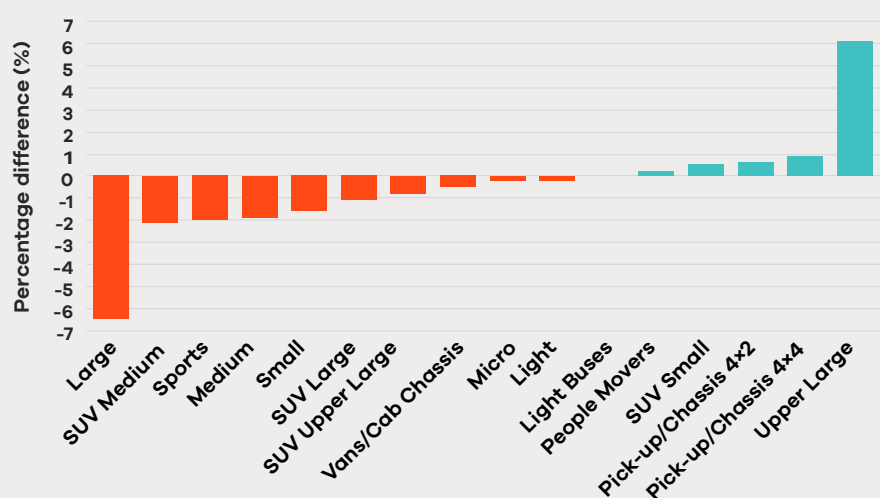
Figure 7: Range and average emissions intensity by segment, 2019
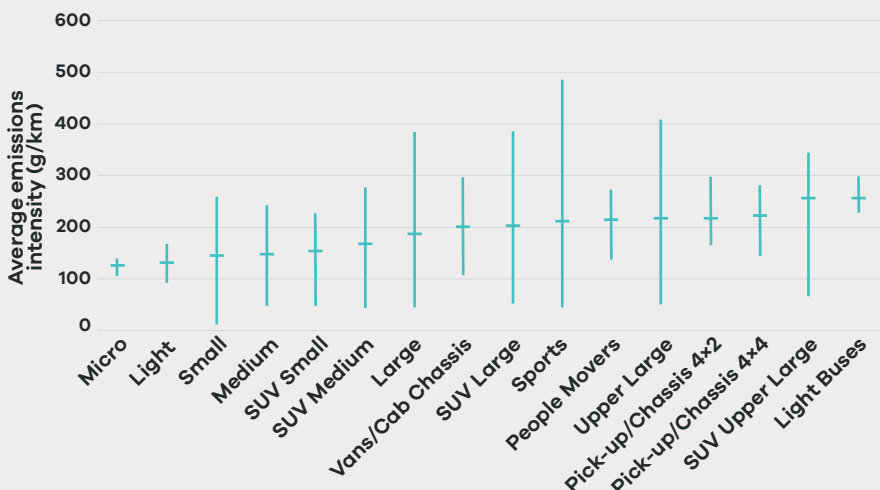
If Australian consumers had purchased vehicles with best-in-class carbon dioxide emissions in 2019, the national average carbon dioxide emissions would have been reduced to 67 g/km, a 63 per cent reduction. This shows the potential emissions reduction with currently available vehicles and technologies. It is important to note that fully electric vehicles with zero tailpipe emissions were excluded from this analysis.[4]

Table 3 shows the best-in-class vehicles for carbon dioxide emissions intensity available for each segment. Where the best-in-class vehicle model's primary engine is listed as electric for a segment, we have also shown the best-in-class with the primary engine listed as petrol or diesel.

If everyone bought a vehicle with best-in-class emissions in 2019, there would be a

63%

reduction in carbon intensity.

Table 3: Best-in-class vehicles for carbon dioxide emissions intensity for each segment, 2019

| Segment	Make and model (fuel source/s)*	Best-in-class vehicle emissions intensity (g/km)
Micro	Mitsubishi MIRAGE (petrol)	109
Light	Toyota PRIUS C (petrol-electric)	90
Small	BMW I3 REX (electric-petrol)	12
	Hyundai IONIQ (petrol-electric)	79
Medium	Volvo Car S60 (electric-petrol)^	46
	BMW 330E (petrol-electric)	50
Large	BMW 530E (electric-petrol)	46
	Mercedes-Benz Cars E350E (petrol-electric)	55
Upper Large	BMW 740E (electric-petrol)	50
	Porsche 97A (petrol-electric)	56
Sports	BMW I8 ROADSTER (electric-petrol)	48
	Audi A3 (petrol)	120
People Movers	Volkswagen CADDY (petrol)	138
SUV Small	MINI COOPER (electric-petrol)	49
	Toyota C-HR HYBRID (petrol-electric)	97
SUV Medium	Mitsubishi OUTLANDER (electric-petrol)	41
	Toyota RAV4 (petrol-electric)	107
SUV Large	Volvo Car XC90 (electric-petrol)^	49
	Land Rover RR SPORT (petrol-electric)	64
SUV Upper Large	Land Rover RANGE ROVER (electric-petrol)	64
	Land Rover DISCOVERY (diesel)	166
Pick-up/ Chassis 4×2	Nissan NAVARA (diesel)	166
Pick-up/ Chassis 4×4	Nissan NAVARA (diesel)	147
Vans/Cab Chassis	Citroen BERLINGO (diesel)	108
Light Buses	Toyota HIACE (diesel)	228

* If two fuel sources are shown, the first is the primary engine.
^ At least two vehicle models in this segment have the equal-lowest emissions. The make and model reported in this table is the one with the highest sales.

Additional data comparing the top 10 highest selling models[5] in each segment against best-in-class vehicles is provided in Table 13 in the appendix. Additional average emissions intensity data for all models that sold more than 1,000 vehicles is provided in Table 14 in the appendix.

4 However, the corresponding figures if battery electric vehicles were included in the best-in-class analysis would be an 80 per cent reduction to 37 g/km; six of the 16 segments had at least one battery electric vehicle model sold in 2019.

5 Top 10 models, or as many vehicle models as were sold in that segment.

Buyer type

Figure 8 shows the average carbon dioxide emissions intensity by buyer type in 2019. Vehicles bought by private buyers had the lowest average carbon dioxide emissions intensity (174 g/km), followed by business buyers (186 g/km) and government buyers (191 g/km). Additional data on buyer types is provided in Table 15 in the appendix.

Figure 8: Average emissions intensity by buyer type, 2019
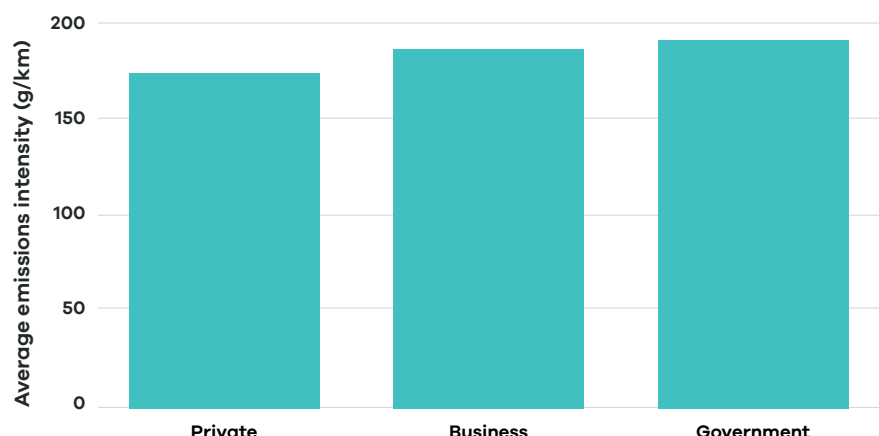
Figure 9 shows the change in average emissions intensity between 2018 and 2019. Government buyers purchased vehicles with a 2.0 per cent reduction in average emissions relative to the previous year, while average emissions for vehicles purchased by business buyers increased by 0.2 per cent.

Figure 9: Change in average emissions intensity by buyer type between 2018 and 2019
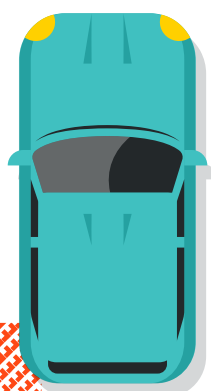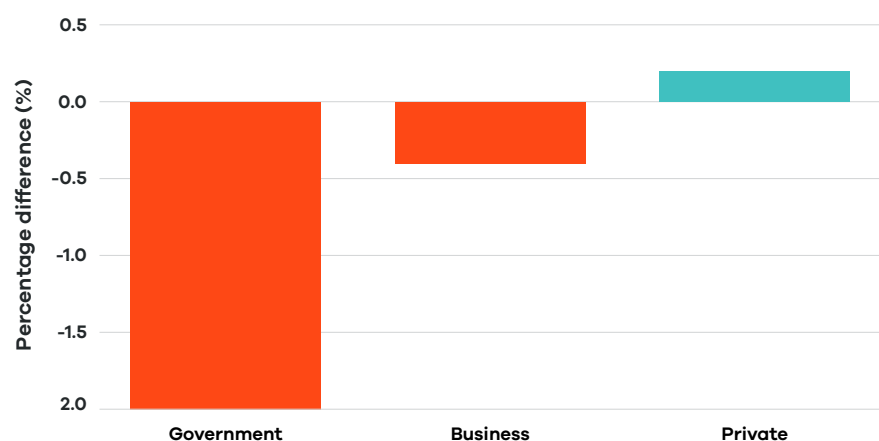
Emissions intensity from private buyers remains the lowest on average, followed by business buyers and government buyers.

The three buyer types can be broken down further:

- **private:** local delivery and overseas delivery

- **government:** federal, state and local

- **business:** company capitalisation, dealer demonstrator, diplomatic, fleet, large fleet, not-for-profit organisation, overseas delivery, rental and taxi.

Figure 10 shows the average carbon dioxide emissions intensity for these buyers. The change in average emissions intensity from 2018 to 2019 is shown in Figure 11. Additional data on the detailed buyer types is provided in Table 16 in the appendix.

Figure 10: Average emissions intensity by detailed buyer type, 2019
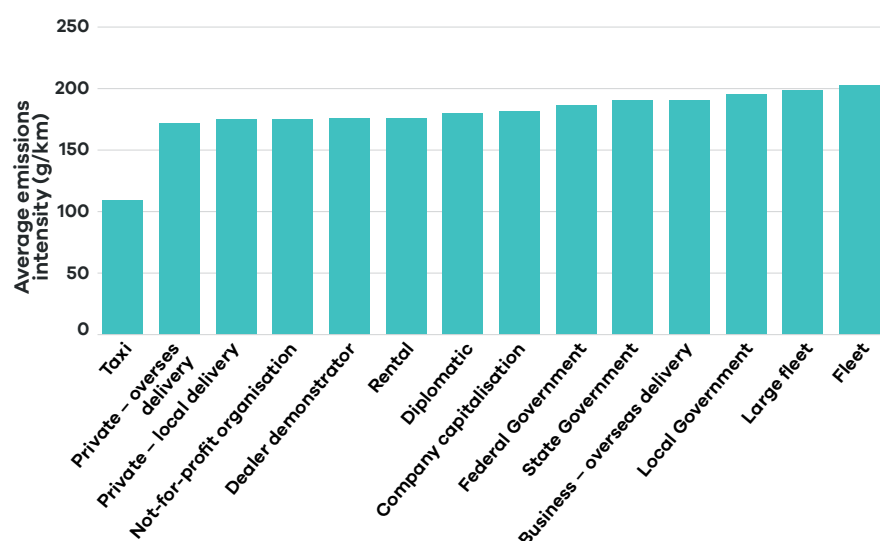
Figure 11: Change in average emissions intensity between 2018 and 2019 by detailed buyer type
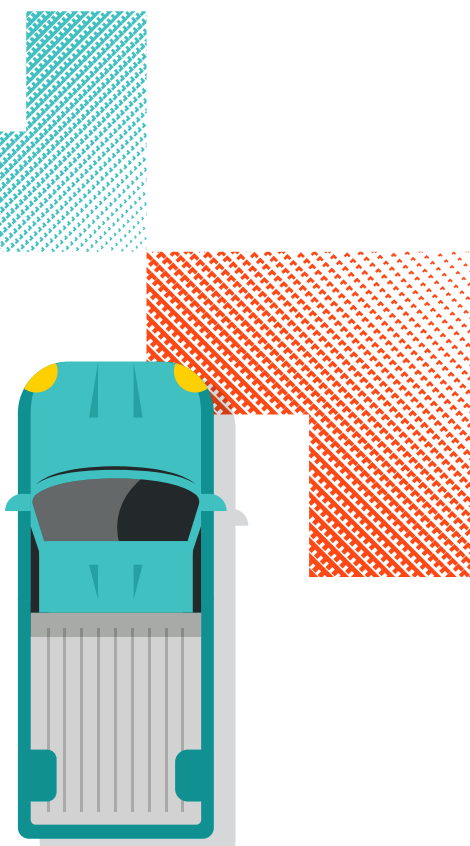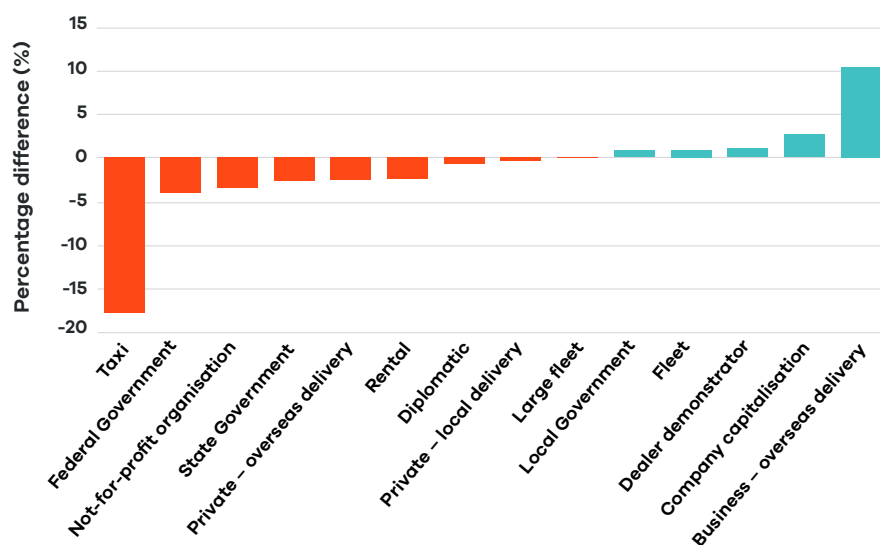
Fuel type

This section contains average carbon dioxide emissions intensity by fuel type.

Figure 12 shows the average carbon dioxide emissions intensity by fuel type for 2019 for petrol and diesel vehicles.[6] Information about electric vehicles is reported separately in the following section. Petrol vehicles had an average emissions intensity of 165 g/km, while diesel vehicles' average emissions intensity was 213 g/km.

Figure 12: Average emissions intensity by fuel type, 2019

Figure 13 shows that petrol vehicles had a reduction in emissions intensity of 1.3 per cent between 2018 and 2019, while the emissions intensity of diesel vehicles increased by 2.2 per cent. Additional data on fuel types is provided in Table 17 in the appendix.
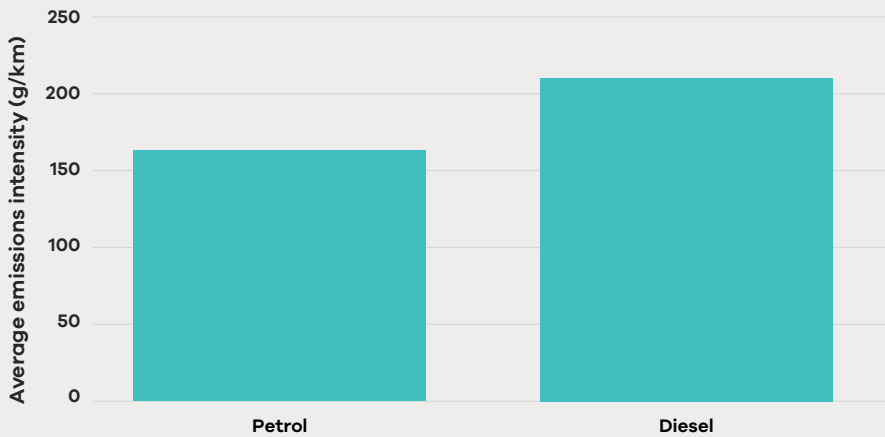
Figure 13: Change in average emissions intensity for new passenger and light commercial vehicles between 2018 and 2019 by fuel type
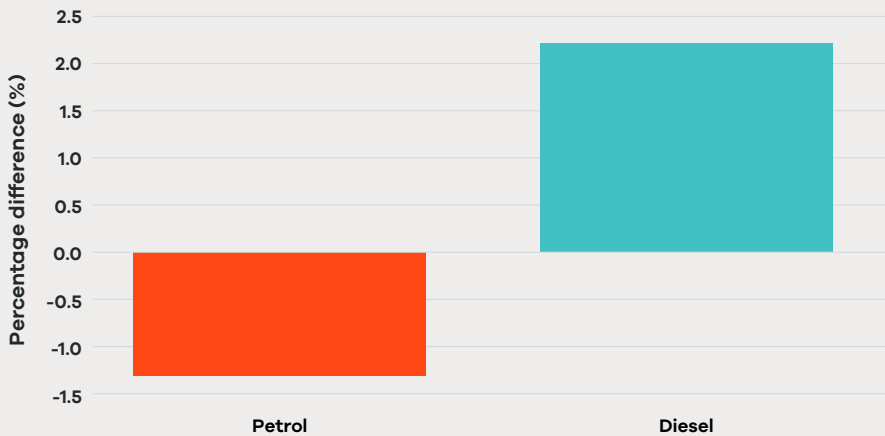
6   Petrol and diesel are the primary fuel type for the data used in the graph. However, the data includes hybrid vehicles, where there is a secondary electric engine.

Electric vehicles

Data on electric vehicle sales and emissions can be broken down into the categories shown in Table 4. Plug-in hybrid electric vehicles are vehicles whose primary fuel type is electric, but which have a secondary engine/fuel type (that is, petrol or diesel) and have a non-zero emissions figure in the FCAI data. Battery electric vehicles have no secondary engine/fuel type, and therefore no (tailpipe) emissions listed in the FCAI data.

Table 4: Emissions intensity and annual sales by electric vehicle type, 2018 and 2019

Electric vehicle type	Average emissions intensity (g/km)		Change from 2018 to 2019 (%)	Sales	
	2018	2019		2018	2019
Plug-in Hybrid Electric Vehicles	49	49	-0.4	1,163	1,402
Battery Electric Vehicles	0	0	0.0	189	1,523
Total	**42**	**23**	**-44.5**	**1,352**	**2,925**

The FCAI data does not include Tesla vehicles. Table 5 includes the FCAI data on electric vehicle sales and the NTC's estimates of the number of Tesla vehicles sold to determine total electric vehicle sales in Australia. We have used state- and territory-based registration systems for the number of Tesla vehicles for 2018 and 2019. The total number of electric vehicles sold in 2019 was 5,875 compared to 2,357 vehicles sold in 2018. This is a 149 per cent increase.

Table 5: Electric vehicle sales, 2018 and 2019

Make	2018	2019	% change between 2018 and 2019
Tesla	1,005[a]	2,950[b]	194%
All other makes[c]	1,352	2,925	116%
Total	**2,357**	**5,875**	**149%**

a New registrations from state- and territory-based registration systems for December 2017 (estimated using the May 2017 and May 2018 data points) to December 2018

b New registrations from state- and territory-based registration systems for December 2018 to December 2019

c FCAI data

The total number of registered Tesla electric vehicles in the Australian fleet in December 2019 was 6,158.

There were 33 models of electric vehicles sold in 2019 compared with 27 models in 2018 (excluding Tesla models). Figure 14 shows the sales of the more popular electric vehicle models in 2018 and 2019. Additional data on sales by model, state and buyer type for 2018 and 2019 for the FCAI data are provided in Tables 18, 19 and 20 in the appendix.

Figure 14: Sales of selected electric vehicles, 2018 and 2019
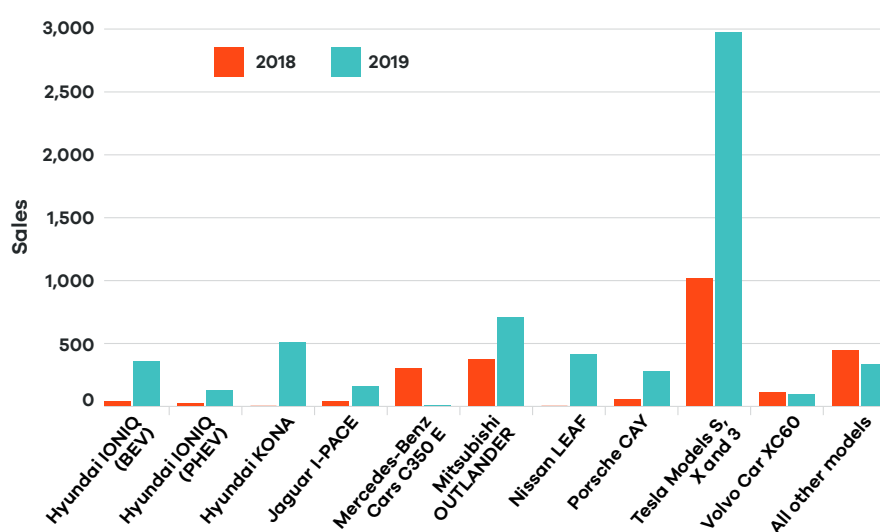
Note: BEV is Battery Electric Vehicle and PHEV is Plug-in Hybrid Electric Vehicle
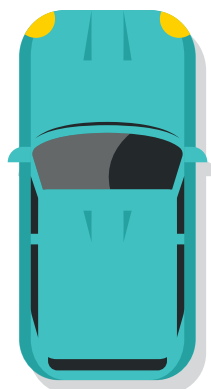
Electric vehicle sales rose 149 per cent in 2019, with 5,875 electric vehicles sold by FCAI members and Tesla

Table 6 summarises various types of electric vehicle data by state and territory. The first row of data summarises electric vehicle sales in 2019 from the FCAI data. The second row of data shows all electric vehicle sales between 2010 and 2019 in each state and territory, and again relies on the FCAI data.

The final row of data shows the number of Tesla vehicles registered in each state and territory as at 18 December 2019. Although the second and third rows of data to some extent show the total (cumulative) vehicle fleet for non-Tesla and Tesla electric vehicles, respectively, they are not directly comparable.[7]

The NTC estimates there were around 14,500 electric vehicles in the Australian vehicle fleet at the end of 2019. The total number of passenger vehicles and light commercial vehicles in Australia as at 31 January 2019 was 17.8 million (ABS 2019).

Table 6: Electric vehicle sales and Tesla registrations by state and territory

	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	Australia
Electric vehicle sales in 2019 (excluding Tesla)	134	832	5	450	412	65	815	212	2,925
Total electric vehicle sales from 2010 to 2019 (excluding Tesla)	321	2,272	20	1,249	1,605	138	2,325	639	8,569
Tesla registrations as at 18 December 2019*	202	2,355	10	1,167	182	57	1,868	317	6,158

* Registrations from state- and territory-based registration systems as at 18 December 2019
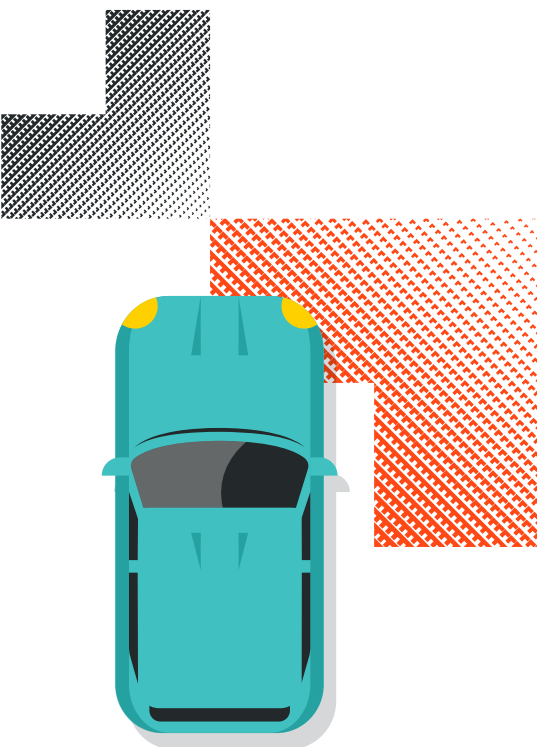
7   For example, it is possible that an electric vehicle could be sold in one state/territory and subsequently transferred to a different one. Additionally, a vehicle may be sold but subsequently written off as a result of a crash.

Green vehicles

As in previous reports, a 'green' vehicle has been defined as a vehicle whose carbon dioxide emissions intensity does not exceed 120 g/km. In Australia, the proportion of green cars sold in 2019 was 5.7 per cent of total sales (compared with 4.1 per cent in 2018). Figure 15 shows 'green' vehicle sales as a proportion of total new light vehicle sales between 2008 and 2019.[8]

There were 85 green car model variants[9] available in Australia in 2019 (compared with 93 in 2018). This includes battery electric vehicles with zero emissions. Figure 16 shows the number of green vehicle model variants sold in Australia for each year from 2008 to 2019.

Table 21 in the appendix provides more detail on green vehicles sold in Australia in 2018.

Figure 15: 'Green' vehicle sales as a percentage of total new light vehicles sold, 2008–2019
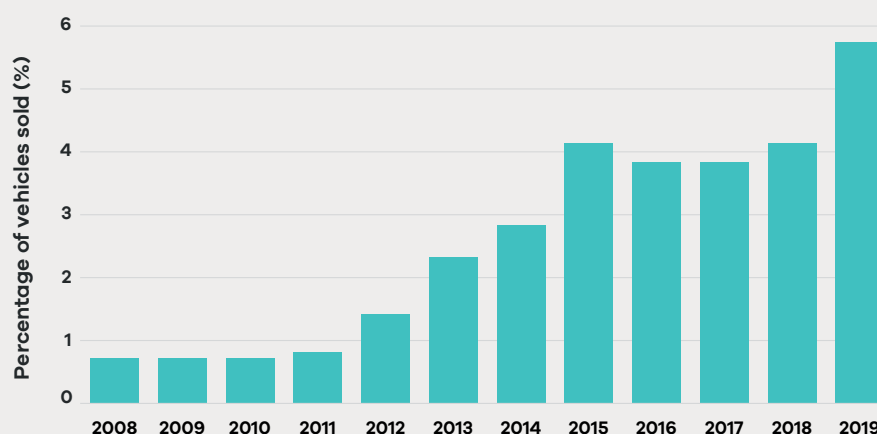
Figure 16: 'Green' vehicle model variants sold, 2008–2019
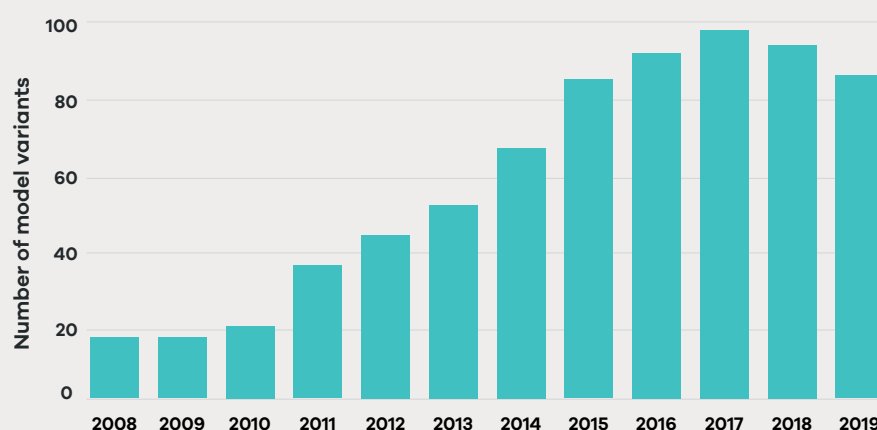
'Green' vehicles made up **5.7%** of total vehicle sales in 2019.

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8 In our report on 2018 Australian vehicle sales and emissions (NTC, 2019), we identified slight inconsistencies in the way that green vehicle sales were calculated in earlier years. The time series shown in Figures 15 and 16 are now determined on a consistent basis throughout the period shown; however, the numbers shown for historical years may be slightly different than what was published in earlier reports.

9 In the context of this table, a 'variant' generally means that each vehicle model name appears once only, even if under that one vehicle model 'variant' there are differences in attributes such as fuel types or emissions. However, there are certain exceptions such as the Audi A3, which appears as two 'variants' in 2019 as a result of having a listing in two market 'segments' (small and sports).

Contribution of each segment to national average emissions intensity

This section shows the contribution of each segment to the national average light vehicle emissions intensity figure. Figure 17 contains the data for 2019, while Figure 18 contains the data for a historical year, 2011.[10] The 'waterfall' charts show the 'contribution' of each segment to the national average light vehicle emissions intensity, which was 180.5 in 2019 and 206.6 in 2011. The 'contribution' for a segment is calculated as: the number of vehicle sales in the segment, multiplied by the weighted average emissions intensity figure for that segment (as reported in Table 12), divided by total vehicle sales. The sum of the 'contributions' from each segment is the national average emissions intensity. A segment will make a larger contribution to the overall average emissions intensity the higher the number of vehicle sales in that segment and/or the higher the average emissions intensity of vehicles in that segment.

Figure 17: Contribution of each segment to national average emissions intensity, 2019
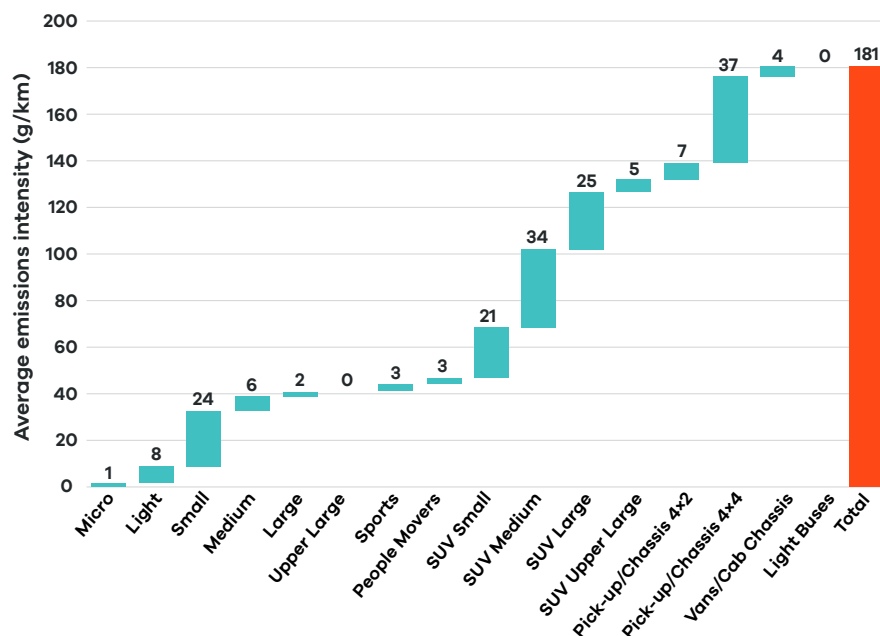
Figure 18: Contribution of each segment to national average emissions intensity, 2011
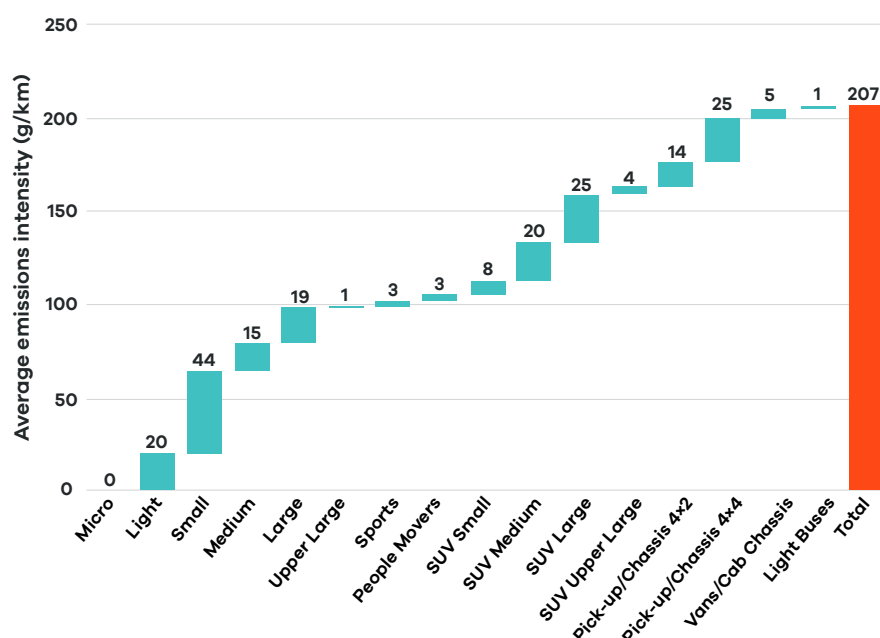
10 The year 2011 was chosen as the earliest year when essentially all of the current segment categories—except for 'Micro'—were first available in the dataset.

In 2019, the five largest 'contributions' to the national average emissions intensity were from:

37	34	25	24	21
21%	**19%**	**14%**	**13%**	**12%**
Pick-up/ chassis 4×4	SUV medium	SUV large	Small	SUV small
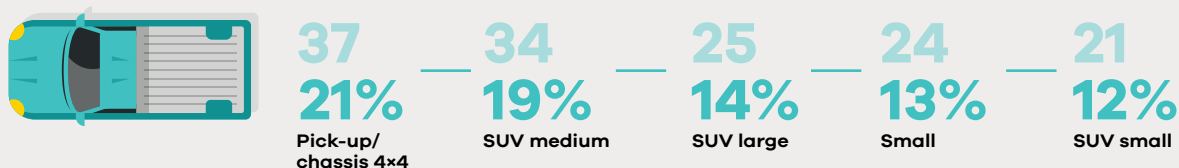
In 2011 the five largest 'contributions' to the national average emissions intensity were from:

44	25	25	20	20
21%	**12%**	**12%**	**10%**	**10%**
Small	SUV large	Pick-up/ chassis 4×4	Light	SUV medium
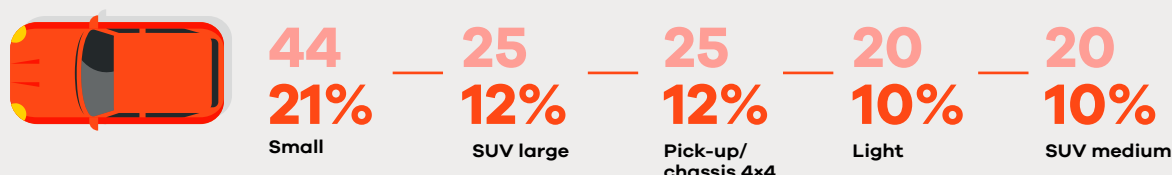
This shows the transition of Australia's vehicle fleet since 2011. There has been a large shift of sales away from segments in the 'Passenger motor vehicles' section of Table 1, and a shift towards SUVs and light trucks. For example, the 'Small' segment contributed 44 towards the national average emissions intensity figure in 2011, but only 24 in 2019. This was partly due to fewer sales (163,243 in 2019 compared with 244,071 in 2011), and partly due to a reduction in average emissions intensity (148.3 in 2019 compared with 177.5 in 2011).

Between 2011 and 2019, the average emissions intensity decreased in all segments except 'Sports', and in most segments there was a decrease by at least 10 per cent. However, the mix of the fleet has changed, as shown in Table 7. In both years shown in the table, these segment groupings represented around 95 per cent of total sales, but there was a large shift from sales of passenger vehicles towards SUVs and pick-ups between 2011 and 2019. This shift in the mix of the fleet may help explain why the national average emissions intensity figure has declined relatively slowly in recent years (as shown in Figure 2), despite the relative emissions intensity improving in most segments.

A consumer trend that has changed the fleet mix in Australia since 2011 is the growth in SUVs and pick-up trucks.

Table 7: Percentage of sales in selected segment groupings, 2011 and 2019

Groupings	2011	2019
Passenger vehicles (excluding sports and people movers)	55%	28%
SUVs	25%	47%
Pick-ups	16%	20%
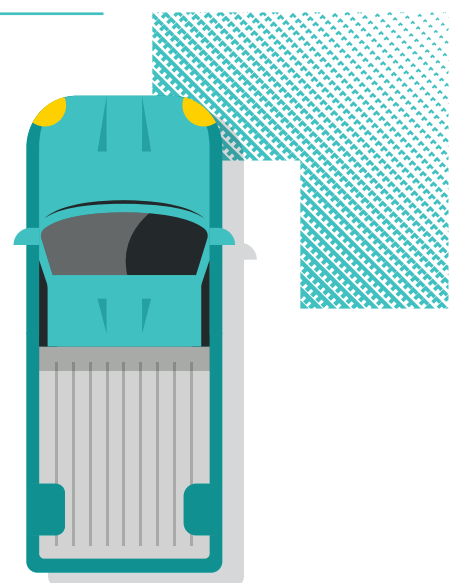
4. Comparison of emissions in Australia and other countries

This section compares data from Australia and other countries.

In the past different methods were used worldwide to calculate vehicle emissions. The three main methods were from Europe, Japan and the United States. Each method can give a different emissions result when applied to the same vehicle.

An international test method, called the Worldwide Harmonised Light Vehicle Test Procedure (WLTP), has been developed to replace these three different regional test methods and to better reflect on-road emissions performance. The WLTP will progressively be used around the world from 2019.

Australia currently uses the previous European method, the New European Driving Cycle (NEDC), until the UN Working Party on Pollution and Energy agrees to adopt the WLTP method. However, Australia is accepting the WLTP test results as an alternative to the NEDC where manufacturers have used the WLTP method already. This makes the Australian data and European data somewhat difficult to compare, given that both sets of emissions figures may be a mix of results from the NEDC and WLTP testing approaches (for 2018).

From 2019 onwards, European vehicle emissions data must be reported using the WLTP method. The published data from Europe separates passenger vehicles from light commercial vehicles. The Australian information presented in section 3 is combined data covering passenger and light commercial vehicles. To enable comparisons between Australian and European data, we separated the Australian data into passenger vehicle and light commercial vehicle groups as defined in section 1. The Australian groupings are consistent with the European Commission Regulation (No 443/2009, Annex II).

In previous years' reports, we compared emissions intensity in Australia with European countries using European data from the European Environment Agency (EEA).[11] The methodology we have used for international comparisons in this year's report has changed, as discussed in more detail below.

Emissions from new vehicles in European countries tend to be lower than Australia. There are a number of reasons for this, including fewer measures in Australia to reduce carbon dioxide emissions and emissions intensity.

The European measures are shown in Table 8. A summary of the European measures was published by the European Conference of Ministers of Transport (2007). Governments in a number of European countries have provided incentives or levied taxes to try to reduce carbon dioxide emissions from road transport: see ETCAPCCM (2018) for a summary.

There are also other consumer preferences that contribute to the difference emissions performance between Australia and Europe. For example, European consumers purchase more small vehicles compared with Australian consumers. In addition, European consumers prefer manual transmission vehicles, whereas Australian consumers prefer automatic transmissions.[12]

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11 See Figures 17 and 18, and Tables 23 and 24, in NTC (2019).

12 Data from the International Council on Clean Transportation Europe shows that around 36 per cent of new passenger car sales/registrations in the 28 European Union countries in 2018 had automatic transmissions (ICCT, 2019a). By contrast, FCAI data shows that around 91 per cent of vehicle sales in Australia in 2018 were either automatic or continuously variable transmission.

Table 8: European measures that have reduced carbon dioxide emissions from motor vehicles

European measure	Intent of measure
High fuel prices through higher fuel taxes	Encourages consumers to purchase fuel-efficient vehicles to lower running costs
Low diesel taxes compared with petrol taxes	Encourages consumers to purchase diesel vehicles to reduce running costs
Regulating carbon dioxide emissions from motor vehicles (passenger vehicle standards were phased in from 2012, with full implementation from 2015)	Provides manufacturers with targets for emissions reductions
Vehicle excise duties	Encourages consumers to purchase low carbon dioxide-emitting vehicles
Direct cash incentives for consumers to purchase low carbon dioxide vehicles	Encourages consumers to purchase low carbon dioxide vehicles as it lowers the purchase price of the vehicle
Consumer information on vehicles	Provides information to consumers about relative carbon dioxide efficiency and the annual running costs of new vehicles
Consumer information in printed advertisements	Provides information to consumers about relative carbon dioxide efficiency and the annual running costs of new vehicles

Table 9 gives separated emissions data for passenger and light commercial vehicles. The average carbon dioxide emissions intensity for passenger vehicles and light commercial vehicles sold in Australia during 2019 was 169.3 g/km and 223.0 g/km respectively.

Table 9: Average emissions intensity for new passenger and light commercial vehicles, 2018 and 2019 for Australia

Groupings	Average emissions intensity (g/km)		Change from 2018 to 2019 (%)
	2018	**2019**	
Passenger vehicles	169.8	169.3	–0.3
Light commercial vehicles	221.5	223.0	0.7

The rest of this section compares Australian and other countries' carbon dioxide emissions intensity data for passenger and light commercial vehicles separately.

The international comparisons and graphs in the following sections differ to previous years' reports. This is primarily because the European data that formed the basis of the international comparisons in previous reports was not yet available at the time of publication of this report. However, based on provisional data from the EEA, emissions intensity data for new passenger cars in Europe increased by around 1.6 per cent

to 120.4 g/km in 2018 (EEA 2019a; EEA 2019b). The average emissions intensity for passenger cars in Australia (169.8 g/km) was 41 per cent higher than for Europe in 2018. For light commercial vehicles, the provisional data for Europe showed an increase in emissions intensity of 1.3 per cent to 158.1 g/km in 2018. Australia's emissions intensity for light commercial vehicles was around 40 per cent higher than Europe's in 2018.

The following sections compare Australia with a range of countries— on different continents and at different stages of economic development— and with the

EU (rather than individual EU countries). The data used for these comparisons is published by the ICCT (2019b). The ICCT's dataset provides emissions intensity data based on the NEDC methodology for emissions testing; however, some caution should be exercised in interpreting the results as the NEDC data for most countries is based on the ICCT's conversion of results from alternative testing methodologies to NEDC using assumptions.[13] Nonetheless, the data allows a useful illustrative comparison of Australia's emissions intensity for new vehicles with other countries.

13 That is, the accuracy of the NEDC results provided by the ICCT will depend on the accuracy of the conversion methodology (and any assumptions used), as well as the quality of the original input data. Details of the ICCT's methodology are available in ICCT (2019b).

Passenger vehicles: average emissions intensity by country for 2017

The breakdown for average carbon dioxide emissions intensity for new passenger vehicles by country for 2017 is shown in Figure 19. We have used 2017 as the comparison year because the ICCT's dataset contains data for only two countries for 2018. In addition, some countries did not have 2017 data, so the latest available year has been used instead; these countries have been marked with asterisks in Figure 19.

In 2017, emissions intensity for the available countries ranged from 115 g/km in Japan to 174 g/km in Peru. Australia's emissions intensity was second highest within this set of countries at 172 g/km. Within the EU, emissions intensity ranged from 105 g/km in Portugal to 133 g/km in Estonia (meaning Australia's average emissions intensity was 64 per cent and 29 per cent higher, respectively).[14]

Figure 19: Average emissions intensity for new passenger vehicles by country, 2017 or latest available
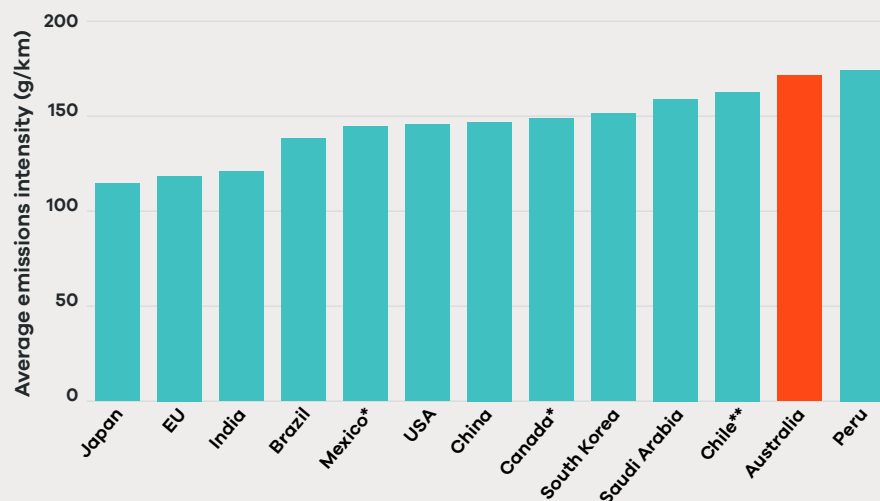
Note: * means 2016; ** means 2015

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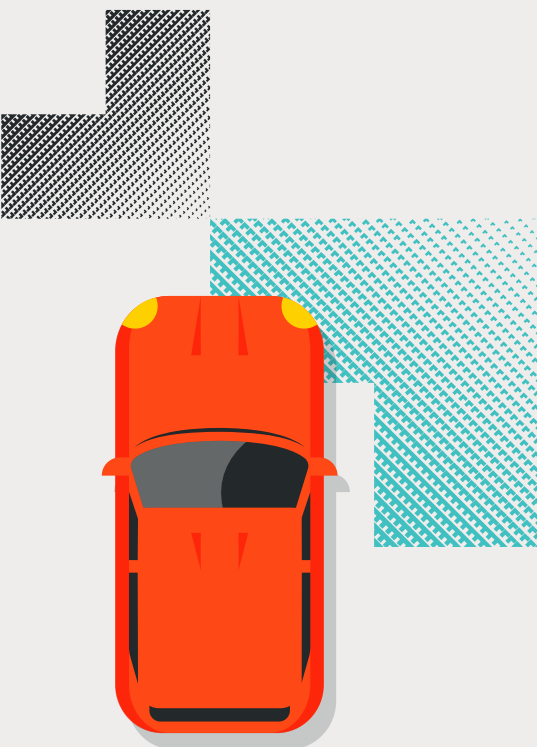
14 Detailed data for each European country is available in Tables 23 and 24 of NTC (2019).

Light commercial vehicles: average emissions intensity by country for 2017

Figure 20 shows the average carbon dioxide emissions intensity for light commercial vehicles in various countries for 2017 (or the latest available year). Europe had the lowest emissions intensity from the available set of countries (156 g/km), while Peru had the highest with 244 g/km (albeit using data for 2015). Australia's emissions intensity of 221 g/km was fourth highest from this set of countries. (The ICCT's dataset contains fewer countries for light commercial vehicles than for passenger cars.)

Figure 20: Average emissions intensity for light commercial vehicles by country, 2017 or latest available
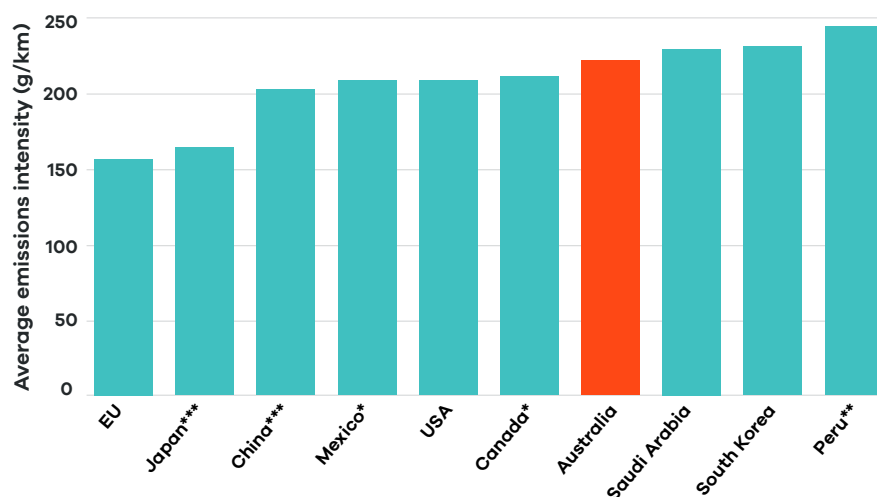
Note: * means 2016; ** means 2015; *** means 2012

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Appendix

This appendix provides tables containing the data used in this report.

Table 10: National average emissions intensity for new passenger and light commercial vehicles, 2002–2019

Year	Average CO_2 emissions (g/km)	Annual change (%)
2002	252.4	n/a
2003	249.5	-1.1
2004	246.5	-1.2
2005	240.5	-2.4
2006	230.3	-4.2
2007	226.4	-1.7
2008	222.4	-1.8
2009	218.6	-1.7
2010	212.6	-2.7
2011	206.6	-2.8
2012	199.0	-3.7
2013	192.2	-3.4
2014	187.8	-2.3
2015	184.2	-1.9
2016	182.1	-1.1
2017	181.7	-0.3
2018	180.9	-0.4
2019	180.5	-0.2

n/a – not applicable

Table 11: Average emissions intensity and annual sales by make, 2018 and 2019

Make	Average emissions intensity (g/km)		Change from 2018 to 2019 (%)*	Sales	
	2018	2019		2018	2019
Toyota	197	188	-4.3	216,779	203,764
Mazda	164	166	1.7	111,280	97,619
Hyundai	175	176	0.3	94,153	85,253
Mitsubishi	184	189	3.0	84,944	83,250
Ford	216	210	-2.8	68,263	62,340
Kia	178	175	-1.6	58,815	61,503
Nissan	184	187	1.6	57,699	50,167
Volkswagen	163	168	2.8	56,115	49,130
Honda	155	156	0.3	51,525	43,868
Holden	202	209	3.2	60,751	43,176
Subaru	175	167	-4.4	50,015	40,007
Mercedes-Benz Cars	161	166	3.5	32,026	31,900
Isuzu Ute	206	206	0.0	27,640	25,311
BMW	151	162	7.3	23,003	23,241
Suzuki	129	128	-1.1	17,601	17,310
Audi	148	150	1.7	19,416	15,708
Lexus	178	168	-5.6	8,819	9,612
Land Rover	169	189	12.0	10,089	8,877
MG	166	161	-2.8	3,007	8,326
Volvo Car	157	165	5.1	6,693	7,779
Renault	160	163	1.7	8,225	7,036
Skoda	139	145	4.1	5,807	7,001
LDV	247	246	-0.6	6,064	6,480
Jeep	227	226	-0.6	7,326	5,519
Porsche	197	207	5.1	3,909	4,161
Mercedes-Benz Vans	183	198	8.1	3,894	3,269
MINI	133	134	0.7	3,590	3,204
RAM	253	259	2.3	491	2,609
Peugeot	138	142	3.0	2,838	2,436
Jaguar	157	169	8.1	2,640	2,119

Make	Average emissions intensity (g/km)		Change from 2018 to 2019 (%)*	Sales	
	2018	2019		2018	2019
Haval	227	222	-1.9	633	1,706
Great Wall	222	221	-0.8	784	1,401
Ssangyong	198	208	5.0	3	1,040
Fiat	130	129	-0.6	1,158	928
Alfa Romeo	149	153	2.7	1,279	891
Infiniti	209	220	5.4	649	571
Maserati	226	241	6.4	642	482
Citroen	123	122	-0.9	494	400
Chrysler	291	295	1.3	250	292
Ferrari	284	287	1.0	241	257
Bentley	283	274	-3.2	208	191
Lamborghini	316	314	-0.6	134	147
Aston Martin	263	254	-3.6	167	129
Genesis	232	235	1.3	19	103
McLaren	250	260	4.0	88	88
Fiat Professional	137	133	-2.7	79	81
Lotus	201	219	9.5	56	57
Rolls-Royce	333	333	0.2	40	55
Alpine	137	137	0.0	32	35
Morgan	204	225	10.1	10	10
Caterham	172	-	n/a	3	-
Chery	214	-	n/a	1	-
Proton	193	-	n/a	1	-
Total	**181**	**181**	**-0.2**	**1,110,388**	**1,020,839**

* Due to rounding, average emissions intensity may appear the same for 2018 and 2019 in some rows of the table. However, the percentage change considers the unrounded figure.

Table 12: Average emissions intensity and annual sales by segment, 2018 and 2019

Segment	Average emissions intensity (g/km)		Change from 2018 to 2019 (%)*	Sales	
	2018	2019		2018	2019
SUV Medium	174	171	-2.1	206,450	201,371
Pick-up/Chassis 4×4	224	226	0.9	173,263	168,584
Small	151	148	-1.6	199,123	163,243
SUV Small	157	157	0.5	139,163	138,883
SUV Large	207	205	-1.1	132,662	122,681
Light	135	134	-0.2	76,664	63,050
Medium	153	150	-1.9	46,231	42,994
Pick-up/Chassis 4×2	219	221	0.6	37,668	32,783
Vans/Cab Chassis	205	204	-0.5	23,328	20,898
SUV Upper Large	259	257	-0.8	16,933	19,738
Sports	219	214	-2.0	18,571	14,344
People Movers	217	217	0.2	13,357	12,543
Large	202	189	-6.5	15,405	11,422
Micro	129	129	-0.2	7,819	6,505
Upper Large	206	219	6.1	1,109	943
Light Buses	258	258	0.0	2,642	857
Total	**181**	**181**	**-0.2**	**1,110,388**	**1,020,839**

* Due to rounding, average emissions intensity may appear the same for 2018 and 2019 in some rows of the table. However, the percentage change considers the unrounded figure.
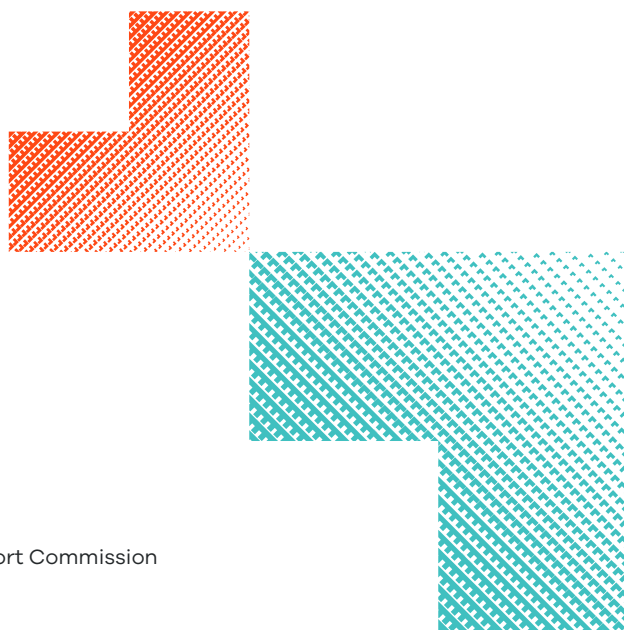
Table 13: Top selling models within segments and comparison with best-in-class model, 2019

Segment	Selling rank within segment	Make	Model	Sales	Average emissions intensity (g/km)	Difference in average emissions intensity compared with best-in-class model (%)	Best-in-class emissions intensity (g/km) *
Micro	1	Kia	JA PICANTO	5,237	131	20	**109** **Mitsubishi MIRAGE (petrol)**
	2	Mitsubishi	MIRAGE	592	113	3	
	3	Fiat	500	375	114	5	
	4	Fiat	ABARTH	298	139	27	
	5	Holden	SPARK	3	137	26	
Light	1	Hyundai	ACCENT	9,963	154	71	**90** **Toyota PRIUS C (petrol-electric)**
	2	Toyota	YARIS	9,853	146	62	
	3	Mazda	200	8,198	119	32	
	4	Suzuki	SWIFT	6,676	113	26	
	5	Kia	YB RIO	6,270	141	56	
	6	Volkswagen	POLO	5,723	118	31	
	7	Honda	JAZZ	5,263	136	51	
	8	MG	MG3	4,017	159	77	
	9	Suzuki	BALENO	2,277	125	39	
	10	MINI	COOPER	1,776	127	41	
Small	1	Toyota	COROLLA	30,468	126	951	**12** **BMW I3 REX (electric-petrol)**
	2	Hyundai	I30	28,378	172	1,330	
	3	Mazda	300	24,939	142	1,085	
	4	Kia	BD CERATO	21,658	166	1,280	
	5	Volkswagen	GOLF	14,355	136	1,033	
	6	Honda	CIVIC 5D	6,633	147	1,122	
	7	Subaru	IMPREZA	4,518	157	1,209	
	8	Holden	ASTRA	4,188	138	1,053	
	9	Ford	FOCUS	3,682	150	1,147	
	10	Honda	CIVIC 4D	3,605	146	1,114	

Segment	Selling rank within segment	Make	Model	Sales	Average emissions intensity (g/km)	Difference in average emissions intensity compared with best-in-class model (%)	Best-in-class emissions intensity (g/km) *
Medium	1	Toyota	CAMRY HYBRID	8,696	96	109	
	2	Toyota	CAMRY	7,081	182	297	
	3	Mercedes-Benz Cars	C300 FL	2,936	159	246	
	4	Mazda	600	2,612	177	284	**46**
	5	Mercedes-Benz Cars	C200 FL	2,540	149	225	**Volvo Car S60 (electric-petrol)**
	6	BMW	330I	1,993	147	219	
	7	Skoda	OCTAVIA	1,814	131	184	
	8	Subaru	LIBERTY	1,344	173	276	
	9	Audi	A4	1,075	137	197	
	10	Volkswagen	PASSAT	1,040	140	203	
Large	1	Holden	COMMODORE	5,915	189	311	
	2	Kia	CK STINGER	1,773	238	418	
	3	Skoda	SUPERB	849	155	237	
	4	Mercedes-Benz Cars	E200	391	154	234	
	5	BMW	530D	295	134	191	**46**
	6	Mercedes-Benz Cars	E450 4M	194	201	337	**BMW 530E (electric-petrol)**
	7	BMW	530I	175	145	215	
	8	BMW	M5	154	241	424	
	9	Mercedes-Benz Cars	E220D	151	113	146	
	10	BMW	520I	147	141	207	
Upper Large	1	Chrysler	300 LX	292	295	489	
	2	Mercedes-Benz Cars	S350 D FL	124	141	182	
	3	Mercedes-Benz Cars	M-AMG GT 63S 4M	62	258	416	
	4	BMW	740I	60	171	241	**50**
	5	Porsche	97A	51	188	276	**BMW 740E (electric-petrol)**
	6	Audi	A8	40	171	242	
	7	BMW	630I GT	38	159	219	
	8	Mercedes-Benz Cars	S450L FL	31	192	284	
	9	Lexus	LS500	26	217	334	
	10	BMW	730D	24	133	166	

Segment	Selling rank within segment	Make	Model	Sales	Average emissions intensity (g/km)	Difference in average emissions intensity compared with best-in-class model (%)	Best-in-class emissions intensity (g/km) *
Sports	1	Ford	MUSTANG	3,948	282	487	**48** **BMW I8 ROADSTER (electric-petrol)**
	2	Mercedes-Benz Cars	C200 CPE FL	806	150	213	
	3	Toyota	86	568	177	270	
	4	Mercedes-Benz Cars	M-AMG C63S CPFL	514	234	388	
	5	Porsche	911	504	256	432	
	6	BMW	M2	452	207	331	
	7	Mazda	MX5	442	162	237	
	8	Mercedes-Benz Cars	C300 CPE FL	435	159	231	
	9	Subaru	BRZ	399	183	281	
	10	Mercedes-Benz Cars	M-AMG C43 CPEFL	378	217	352	
People Movers	1	Kia	YP CARNIVAL	6,493	230	66	**138** **Volkswagen CADDY (petrol)**
	2	Honda	ODYSSEY	1,684	181	31	
	3	Volkswagen	MULTIVAN	929	201	46	
	4	Hyundai	IMAX	854	231	67	
	5	LDV	G10	845	267	93	
	6	Toyota	TARAGO	618	212	54	
	7	Mercedes-Benz Vans	V-CLASS	423	164	19	
	8	Volkswagen	CADDY	309	138	0	
	9	Toyota	GRANVIA	140	211	53	
	10	Mercedes-Benz Vans	VALENTE	125	169	22	

Segment	Selling rank within segment	Make	Model	Sales	Average emissions intensity (g/km)	Difference in average emissions intensity compared with best-in-class model (%)	Best-in-class emissions intensity (g/km) *
SUV Small	1	Mitsubishi	ASX	20,806	176	260	**49** **MINI COOPER (electric-petrol)**
	2	Mazda	CX3	14,813	144	194	
	3	Hyundai	KONA	12,843	167	240	
	4	Honda	HR-V	11,731	157	219	
	5	Nissan	QASHQAI	11,653	159	225	
	6	Subaru	XV	10,062	159	225	
	7	Toyota	C-HR	9,223	145	196	
	8	Mitsubishi	ECLIPSE CROSS	6,998	166	239	
	9	Suzuki	VITARA	5,253	139	183	
	10	Holden	TRAX	4,808	163	233	
SUV Medium	1	Mazda	CX5	25,539	170	315	**41** **Mitsubishi OUTLANDER (electric-petrol)**
	2	Toyota	RAV4	24,260	146	256	
	3	Nissan	XTRAIL	19,726	186	353	
	4	Hyundai	TUCSON	18,251	182	344	
	5	Mitsubishi	OUTLANDER	17,514	161	292	
	6	Subaru	FORESTER	15,096	168	310	
	7	Honda	CR-V	13,810	166	305	
	8	Kia	QL SPORTAGE	13,645	181	342	
	9	Volkswagen	TIGUAN	7,747	179	338	
	10	Holden	EQUINOX	4,562	180	339	
SUV Large	1	Toyota	PRADO	18,335	211	331	**49** **Volvo Car XC90 (electric-petrol)**
	2	Toyota	KLUGER	11,371	216	341	
	3	Isuzu Ute	MU-X	8,419	210	330	
	4	Subaru	OUTBACK	7,210	173	252	
	5	Mazda	CX9	7,168	201	310	
	6	Mitsubishi	PAJERO SPORT	6,477	212	333	
	7	Hyundai	SANTA FE	5,857	199	306	
	8	Ford	EVEREST	5,333	197	302	
	9	Volkswagen	TIGUAN ALLSPACE	4,665	183	273	
	10	Kia	UM SORENTO	3,777	204	316	

Segment	Selling rank within segment	Make	Model	Sales	Average emissions intensity (g/km)	Difference in average emissions intensity compared with best-in-class model (%)	Best-in-class emissions intensity (g/km) *
SUV Upper Large	1	Toyota	LANDCRUISER	13,802	253	295	64 Land Rover RANGE ROVER (electric-petrol)
	2	Nissan	PATROL	1,951	343	436	
	3	Land Rover	DISCOVERY	1,216	203	216	
	4	BMW	X7 XDRIVE30D	499	191	198	
	5	Audi	Q8	494	210	228	
	6	Land Rover	RANGE ROVER	339	241	276	
	7	Mercedes-Benz Cars	M-AMG G63 FL	300	299	367	
	8	Lexus	LX570	268	334	422	
	9	Mercedes-Benz Cars	GLS350D 4M	195	199	211	
	10	Mercedes-Benz Cars	GLS400D 4M	166	202	216	
Pick-up/ Chassis 4×2	1	Toyota	HILUX 4X2	11,324	241	45	166 Nissan NAVARA (diesel)
	2	Isuzu Ute	D-MAX	5,116	198	19	
	3	Ford	RANGER	3,956	202	22	
	4	Mitsubishi	TRITON	3,138	222	34	
	5	Nissan	NAVARA	2,751	174	5	
	6	Mazda	B32	2,548	243	46	
	7	Holden	COLORADO	1,822	240	45	
	8	Mazda	B22	1,122	217	30	
	9	Great Wall	STEED	891	220	32	
	10	Volkswagen	AMAROK	67	226	36	
Pick-up/ Chassis 4×4	1	Ford	RANGER	37,004	219	49	147 Nissan NAVARA (diesel)
	2	Toyota	HILUX 4X4	36,325	221	50	
	3	Mitsubishi	TRITON	22,681	217	47	
	4	Holden	COLORADO	15,650	245	67	
	5	Isuzu Ute	D-MAX	11,776	207	41	
	6	Nissan	NAVARA	10,661	183	25	
	7	Toyota	LANDCRUISER	9,222	281	91	
	8	Volkswagen	AMAROK	8,304	234	59	
	9	Mazda	B32	7,687	263	79	
	10	LDV	T60	3,529	246	67	

Segment	Selling rank within segment	Make	Model	Sales	Average emissions intensity (g/km)	Difference in average emissions intensity compared with best-in-class model (%)	Best-in-class emissions intensity (g/km) *
Vans/ Cab Chassis	1	Toyota	HIACE	6,127	228	111	
	2	Hyundai	ILOAD	3,919	229	112	
	3	Ford	TRANSIT CUSTOM	2,070	187	74	
	4	Renault	TRAFIC	1,935	166	53	**108** Citroen **BERLINGO** (diesel)
	5	Volkswagen	CADDY VAN	1,672	140	30	
	6	Volkswagen	TRANSPORTER	1,672	203	88	
	7	LDV	G10	1,322	233	115	
	8	Renault	KANGOO	731	140	30	
	9	Mercedes-Benz Vans	VITO	578	170	57	
	10	LDV	V80	520	248	130	
Light buses	1	Toyota	HIACE	857	258	13	**228** Toyota **HIACE** (diesel)

* Best-in-class is the lowest emissions model variant and excludes fully electric vehicles with emissions of 0 g/km.

Table 14: Average emissions intensity for models with a sales volume greater than 1,000 vehicles, 2019

Rank	Make	Model	Average emissions intensity (g/km)	Sales
1	Ford	RANGER	219	37,004
2	Toyota	HILUX 4X4	221	36,325
3	Toyota	COROLLA	126	30,468
4	Hyundai	I30	172	28,378
5	Mazda	CX5	170	25,539
6	Mazda	300	142	24,939
7	Toyota	RAV4	146	24,260
8	Mitsubishi	TRITON	217	22,681
9	Kia	BD CERATO	166	21,658

Rank	Make	Model	Average emissions intensity (g/km)	Sales
10	Mitsubishi	ASX	176	20,806
11	Nissan	XTRAIL	186	19,726
12	Toyota	PRADO	211	18,335
13	Hyundai	TUCSON	182	18,251
14	Mitsubishi	OUTLANDER	161	17,514
15	Holden	COLORADO	245	15,650
16	Subaru	FORESTER	168	15,096
17	Mazda	CX3	144	14,813
18	Volkswagen	GOLF	136	14,355
19	Honda	CR-V	166	13,810
20	Toyota	LANDCRUISER	253	13,802
21	Kia	QL SPORTAGE	181	13,645
22	Hyundai	KONA	167	12,843
23	Isuzu Ute	D-MAX	207	11,776
24	Honda	HR-V	157	11,731
25	Nissan	QASHQAI	159	11,653
26	Toyota	KLUGER	216	11,371
27	Toyota	HILUX 4X2	241	11,324
28	Nissan	NAVARA	183	10,661
29	Subaru	XV	159	10,062
30	Hyundai	ACCENT	154	9,963
31	Toyota	YARIS	146	9,853
32	Toyota	C-HR	145	9,223
33	Toyota	LANDCRUISER	281	9,222
34	Toyota	CAMRY HYBRID	96	8,696
35	Isuzu Ute	MU-X	210	8,419
36	Volkswagen	AMAROK	234	8,304
37	Mazda	200	119	8,198
38	Volkswagen	TIGUAN	179	7,747
39	Mazda	B32	263	7,687
40	Subaru	OUTBACK	173	7,210
41	Mazda	CX9	201	7,168
42	Toyota	CAMRY	182	7,081
43	Mitsubishi	ECLIPSE CROSS	166	6,998
44	Suzuki	SWIFT	113	6,676
45	Honda	CIVIC 5D	147	6,633
46	Kia	YP CARNIVAL	230	6,493

Rank	Make	Model	Average emissions intensity (g/km)	Sales
47	Mitsubishi	PAJERO SPORT	212	6,477
48	Kia	YB RIO	141	6,270
49	Toyota	HIACE	228	6,127
50	Holden	COMMODORE	189	5,915
51	Hyundai	SANTA FE	199	5,857
52	Volkswagen	POLO	118	5,723
53	Ford	EVEREST	197	5,333
54	Honda	JAZZ	136	5,263
55	Suzuki	VITARA	139	5,253
56	Kia	JA PICANTO	131	5,237
57	Isuzu Ute	D-MAX	198	5,116
58	Holden	TRAX	163	4,808
59	Volkswagen	TIGUAN ALLSPACE	183	4,665
60	Holden	EQUINOX	180	4,562
61	Subaru	IMPREZA	157	4,518
62	Holden	ASTRA	138	4,188
63	MG	MG3	159	4,017
64	Ford	RANGER	202	3,956
65	Ford	MUSTANG	282	3,948
66	Hyundai	ILOAD	229	3,919
67	Kia	UM SORENTO	204	3,777
68	MG	MG ZS	159	3,729
69	Ford	FOCUS	150	3,682
70	Honda	CIVIC 4D	146	3,605
71	LDV	T60	246	3,529
72	Volvo Car	XC60	160	3,406
73	Ford	ESCAPE	174	3,326
74	Audi	Q5	156	3,279
75	Holden	ACADIA	214	3,215
76	Mitsubishi	TRITON	222	3,138
77	Toyota	FORTUNER	228	3,033
78	Jeep	GRAND CHEROKEE	237	2,986
79	Mercedes-Benz Cars	C300 FL	159	2,936
80	Volvo Car	XC40	171	2,858
81	Mitsubishi	PAJERO	240	2,847
82	Holden	TRAILBLAZER	251	2,813
83	Nissan	NAVARA	174	2,751
84	Nissan	PATHFINDER	235	2,712

Rank	Make	Model	Average emissions intensity (g/km)	Sales
85	Lexus	NX300	179	2,698
86	Hyundai	ELANTRA	166	2,644
87	Mazda	600	177	2,612
88	Mazda	CX8	154	2,551
89	Mazda	B32	243	2,548
90	Mercedes-Benz Cars	C200 FL	149	2,540
91	Renault	KOLEOS	186	2,533
92	Audi	A3	120	2,513
93	BMW	X5 XDRIVE30D	188	2,385
94	Suzuki	BALENO	125	2,277
95	Land Rover	RR SPORT	211	2,202
96	Mitsubishi	LANCER	173	2,197
97	Land Rover	DISCOVERY SPORT	177	2,185
98	Skoda	KODIAQ	176	2,163
99	Audi	Q2	128	2,155
100	Mercedes-Benz Vans	X-CLASS	214	2,081
101	Ford	TRANSIT CUSTOM	187	2,070
102	Kia	SP2 SELTOS	163	2,048
103	Mercedes-Benz Cars	A250 4M	150	2,046
104	Porsche	95B	212	2,009
105	BMW	330I	147	1,993
106	Nissan	PATROL	343	1,951
107	Renault	TRAFIC	166	1,935
108	Ford	ENDURA	175	1,893
109	Holden	COLORADO	240	1,822
110	Skoda	OCTAVIA	131	1,814
111	MINI	COOPER	127	1,776
112	Kia	CK STINGER	238	1,773
113	Land Rover	RR EVOQUE	168	1,755
114	Mercedes-Benz Cars	GLA180 FL	133	1,723
115	Honda	ODYSSEY	181	1,684
116	Volkswagen	CADDY VAN	140	1,672
117	Volkswagen	TRANSPORTER	203	1,672
118	BMW	X3 XDRIVE30I	173	1,636
119	Mercedes-Benz Cars	GLC200	168	1,632

Rank	Make	Model	Average emissions intensity (g/km)	Sales
120	RAM	LARAMIE 1500	278	1,589
121	Lexus	UX200	132	1,450
122	Suzuki	JIMNY	154	1,391
123	Porsche	CAY	190	1,352
124	Subaru	LIBERTY	173	1,344
125	LDV	G10	233	1,322
126	Mercedes-Benz Cars	GLC250	168	1,297
127	Mercedes-Benz Cars	B180	131	1,255
128	Hyundai	VENUE	165	1,245
129	Land Rover	DISCOVERY	203	1,216
130	Volvo Car	XC90	166	1,192
131	Land Rover	RR VELAR	173	1,180
132	Jeep	WRANGLER	232	1,153
133	Mazda	B22	217	1,122
134	BMW	X1 XDRIVE25I	146	1,117
135	Volkswagen	TOUAREG	195	1,116
136	Subaru	WRX	223	1,109
137	Skoda	KAROQ	133	1,105
138	Audi	A4	137	1,075
139	Suzuki	IGNIS	113	1,074
140	Peugeot	3008	150	1,072
141	Mercedes-Benz Cars	GLE300D 4M	182	1,063
142	Mercedes-Benz Cars	A200 SEDAN	130	1,041
143	Volkswagen	PASSAT	140	1,040
144	Audi	Q7	160	1,039
145	Jaguar	E-PACE	172	1,029
146	RAM	EXPRESS 1500	230	1,020
Total*			**181**	**938,017**

* The totals shown in this row differ to the national totals shown in other tables as they only include vehicle models with sales of at least 1,000.

Table 15: Average emissions intensity and annual sales by buyer type, 2018 and 2019

Buyer type	Average emissions intensity (g/km)		Change from 2018 to 2019 (%)*	Sales	
	2018	2019		2018	2019
Business	186	186	0.2	557,188	507,779
Private	174	174	-0.4	515,163	477,557
Government	195	191	-2.0	38,037	35,503
Total	**181**	**181**	**-0.2**	**1,110,388**	**1,020,839**

* Due to rounding, average emissions intensity may appear the same for 2018 and 2019 in some rows of the table. However, the percentage change considers the unrounded figure.
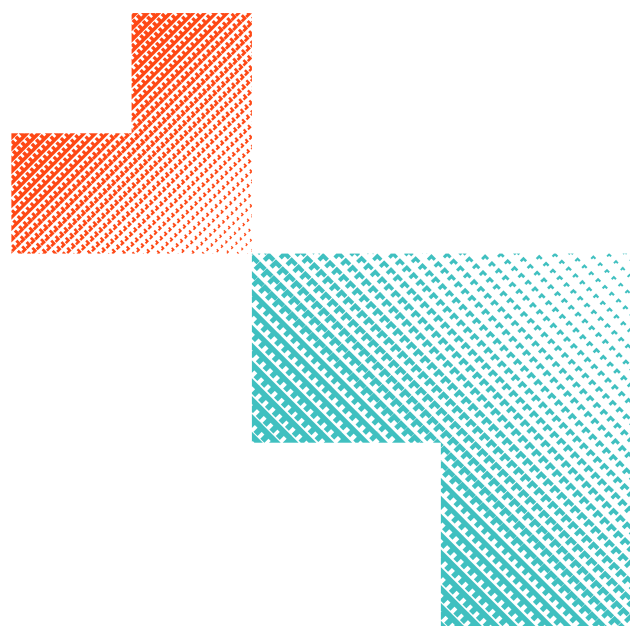
Table 16: Average emissions intensity and annual sales by detailed buyer type, 2018 and 2019

Buyer type	Average emissions intensity (g/km)		Change from 2018 to 2019 (%)*	Sales	
	2018	2019		2018	2019
Private – local delivery	174	174	-0.4	514,991	477,346
Dealer demonstrator	173	175	1.0	183,960	159,835
Fleet	201	202	0.8	165,562	140,803
Large fleet	198	198	-0.1	73,358	75,782
Rental	180	175	-2.4	77,126	73,073
Company capitalisation	177	181	2.6	37,157	38,922
State Government	195	190	-2.7	25,059	24,956
Not-for-profit organisation	180	174	-3.5	18,791	17,712
Local Government	194	195	0.7	9,365	8,323
Federal Government	194	186	-4.0	3,613	2,224
Taxi	132	109	-17.6	1,010	1,410
Private – overseas delivery	176	171	-2.6	172	211
Business – overseas delivery	173	190	10.2	128	150
Diplomatic	181	179	-0.7	96	92
Total	**181**	**181**	**-0.2**	**1,110,388**	**1,020,839**

* Due to rounding, average emissions intensity may appear the same for 2018 and 2019 in some rows of the table. However, the percentage change considers the unrounded figure.

Table 17: Average emissions intensity and annual sales by fuel type, 2018 and 2019

Fuel type	Average emissions intensity (g/km)		Change from 2018 to 2019 (%)	Sales	
	2018	2019		2018	2019
Petrol	167	165	-1.3	740,980	689,752
Diesel	208	213	2.2	368,245	329,685
Total*	**181**	**181**	**-0.2**	**1,109,225**	**1,019,437**

* Totals in this row do not match the national totals shown in other tables because they do not include electric vehicles, which are reported separately
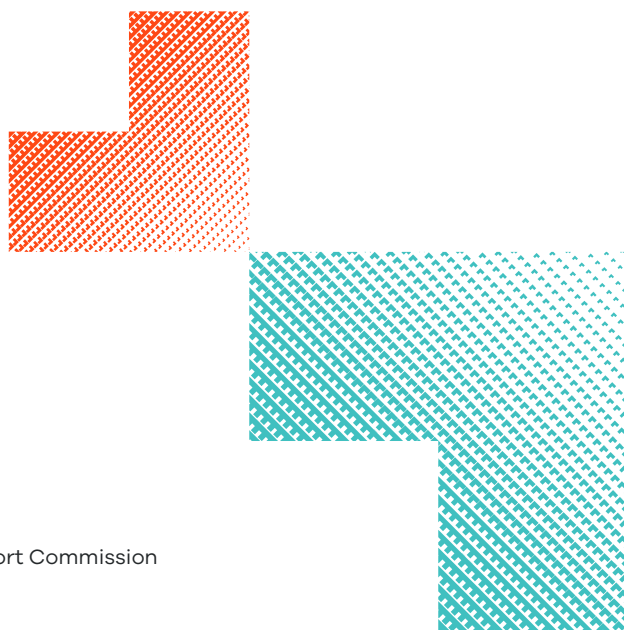
Table 18: Electric vehicle sales by model for FCAI data, 2018 and 2019

Make and Model	2018	2019
Audi A3	1	0
Audi Q7	14	1
BMW 330E	34	1
BMW 530E	27	19
BMW 740E	4	2
BMW I3	16	15
BMW I3 REX	26	14
BMW I3S	36	51
BMW I3S REX	37	16
BMW I8	12	6
BMW I8 ROADSTER	2	11
BMW X5 XDRIVE40E	14	12
Hyundai IONIQ	54	475
Hyundai KONA	0	499
Jaguar I-PACE	39	155
Land Rover RANGE ROVER	3	9
Land Rover RR SPORT	1	26
Mercedes-Benz Cars C300E FL	0	4
Mercedes-Benz Cars C350 E	297	3
Mercedes-Benz Cars C350T E	9	0
Mercedes-Benz Cars E300E	0	2
Mercedes-Benz Cars E350E	10	2
Mercedes-Benz Cars EQC 400 4M	0	11
Mercedes-Benz Cars GLE500E	39	2
MINI COOPER	0	32
Mitsubishi OUTLANDER	370	700
Nissan LEAF	0	408
Porsche 97A	33	5
Porsche CAY	53	269
Renault KANGOO	16	27
Renault ZOE	48	5
Volvo Car S60	0	16
Volvo Car V60	0	6
Volvo Car XC60	103	87
Volvo Car XC90	54	34
Total	**1,352**	**2,925**

Table 19: Electric vehicle sales by state for FCAI data, 2018 and 2019

State	2018	2019
Australian Capital Territory	37	134
New South Wales	461	832
Northern Territory	1	5
Queensland	210	450
South Australia	147	412
Tasmania	14	65
Victoria	401	815
Western Australia	81	212
Total	**1,352**	**2,925**

Table 20: Electric vehicle sales by buyer type for FCAI data, 2018 and 2019

State	2018	2019
Company capitalisation	304	518
Dealer demonstrator	381	456
Diplomatic	1	1
Federal Government	1	16
Fleet	111	146
Large fleet	36	215
Local Government	16	136
Not-for-profit organisation	3	19
Private – local delivery	442	1,293
Rental	23	2
State Government	34	123
Total	**1,352**	**2,925**

Table 21: 'Green' vehicle average emissions intensity and sales by segment, 2019

Segment	Make	Model	Average emissions intensity (g/km)	Sales
Micro	Mitsubishi	MIRAGE	113	592
	Kia	JA PICANTO	113	690
	Fiat	500	114	375
Light	Renault	ZOE	0	5
	Toyota	PRIUS C	90	415
	Peugeot	208	104	55
	Skoda	FABIA	108	645
	Citroen	C3	110	79
	Renault	CLIO	110	6
	Suzuki	SWIFT	110	6,048
	Volkswagen	POLO	114	4,877
	Mazda	200	114	5,081
	Audi	A1	115	200
	Suzuki	BALENO	118	132
Small	BMW	I3	0	15
	BMW	I3S	0	51
	Nissan	LEAF	0	408
	BMW	I3 REX	13	14
	BMW	I3S REX	14	16
	Hyundai	IONIQ	17	546
	Toyota	PRIUS	80	180
	Lexus	CT200H	95	183
	Toyota	COROLLA	96	10,597
	BMW	118D	99	29
	Toyota	PRIUS V	101	392
	BMW	218D AT	111	6
	BMW	118I	112	598
	Mercedes-Benz Cars	B200 CDI	114	1
	Peugeot	308	115	262
	Audi	A3	116	2,017
	Skoda	RAPID	118	425
	Alfa Romeo	GIULIETTA	119	63
	Hyundai	I30	119	30
Medium	Mercedes-Benz Cars	C300E FL	46	4
	Volvo Car	S60	46	16
	Volvo Car	V60	49	6
	BMW	330E	50	8

Segment	Make	Model	Average emissions intensity (g/km)	Sales
	Mercedes-Benz Cars	C350 E	56	3
	Toyota	CAMRY HYBRID	96	8,696
	Honda	ACCORD	98	18
	Lexus	ES300H	104	557
	Alfa Romeo	GIULIA	109	5
	Mercedes-Benz Cars	CLA220D	111	2
	Jaguar	XE	111	43
	Lexus	IS300H	113	102
	Mercedes-Benz Cars	CLA220D SB	115	2
	BMW	320D G TURISMO	118	11
	BMW	320D	119	421
	Audi	A4	119	157
Large	BMW	530E	46	19
	Mercedes-Benz Cars	E300E	50	2
	Mercedes-Benz Cars	E350E	55	11
	Mercedes-Benz Cars	E220D	113	151
	Jaguar	XF	114	16
	BMW	520D TOUR	119	32
Upper Large	BMW	740E	50	2
	Mercedes-Benz Cars	S560E L FL	58	1
	Porsche	97A	63	6
Sports	BMW	I8 ROADSTER	48	11
	BMW	I8	49	6
	Audi	A3	120	148
SUV Small	Hyundai	KONA	0	499
	MINI	COOPER	49	32
	Toyota	C-HR HYBRID	97	155
	Lexus	UX250H	104	481
	Citroen	C4 CACTUS	108	92
	Peugeot	2008	110	194
	Suzuki	IGNIS	113	1,074
	BMW	X1 SDRIVE18D	114	499
	Mercedes-Benz Cars	GLA220 D FL	118	1
	Renault	CAPTUR	120	419
SUV Medium	Mercedes-Benz Cars	EQC 400 4M	0	11
	Mitsubishi	OUTLANDER	41	700
	Volvo Car	XC60	50	87
	Toyota	RAV4	108	7,411

Segment	Make	Model	Average emissions intensity (g/km)	Sales
SUV Large	Jaguar	I-PACE	0	155
	Volvo Car	XC90	49	34
	Audi	Q7	49	1
	Land Rover	RR SPORT	64	31
	BMW	X5 XDRIVE40E	77	12
	Mercedes-Benz Cars	GLE500E	78	2
	Porsche	CAY	78	270
SUV Upper Large	Land Rover	RANGE ROVER	64	9
Vans/Cab Chassis	Renault	KANGOO	0	27
	Citroen	BERLINGO	108	97
Total*				**57,782**

* The total shown in this row differs to the national total shown in other tables as it only includes 'green' vehicles.
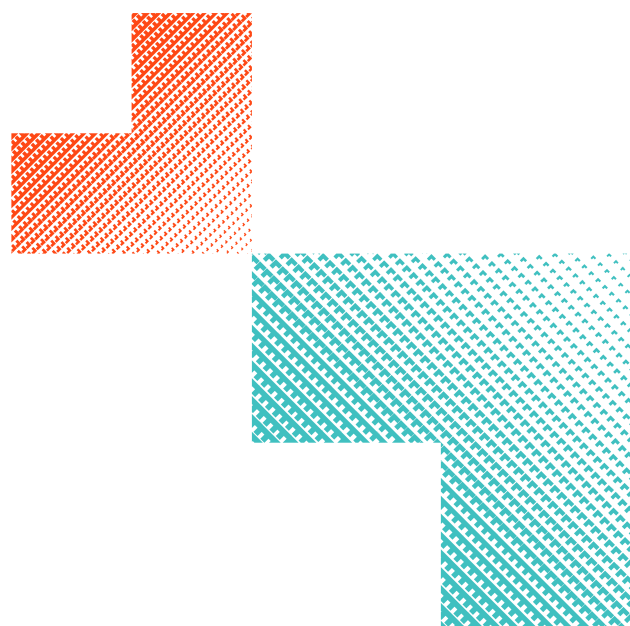
Table 22: Average emissions intensity for new passenger vehicles for Australia, 2018

Make	Average emissions intensity (g/km)	Sales
Alfa Romeo	149	1,279
Alpine	137	32
Aston Martin	263	167
Audi	148	19,416
Bentley	283	208
BMW	151	23,003
Caterham	172	3
Chery	214	1
Chrysler	291	250
Citroen	112	232
Ferrari	284	241
Fiat	130	1,158
Ford	205	24,239
Genesis	232	19
Haval	227	633
Holden	184	42,108
Honda	155	51,525
Hyundai	173	89,791
Infiniti	209	649
Isuzu Ute	210	9,090
Jaguar	157	2,640

Make	Average emissions intensity (g/km)	Sales
Jeep	227	7,326
Kia	178	58,815
Lamborghini	316	134
Land Rover	169	10,089
LDV	266	1,072
Lexus	178	8,819
Lotus	201	56
Maserati	226	642
Mazda	152	98,113
McLaren	250	88
Mercedes-Benz Cars	161	32,026
Mercedes-Benz Vans	167	1,029
MG	166	3,007
MINI	133	3,590
Mitsubishi	177	60,048
Morgan	204	10
Nissan	186	41,230
Peugeot	138	2,838
Porsche	197	3,909
Proton	193	1
Renault	162	5,503
Rolls-Royce	333	40
Skoda	139	5,807
Ssangyong	198	3
Subaru	175	50,015
Suzuki	129	17,600
Toyota	178	145,544
Volkswagen	148	42,756
Volvo Car	157	6,693
Total	**170**	**873,487**

Table 23: Average emissions intensity for new light commercial vehicles for Australia by make, 2018

Make	Average emissions intensity (g/km)	Sales
Citroen	132	262
Fiat Professional	137	79
Ford	222	44,024
Great Wall	222	784
Holden	244	18,643
Hyundai	228	4,362
Isuzu Ute	204	18,550
LDV	243	4,992
Mazda	253	13,167
Mercedes-Benz Vans	189	2,865
Mitsubishi	199	24,896
Nissan	181	16,469
RAM	253	491
Renault	157	2,722
Suzuki	190	1
Toyota	235	71,235
Volkswagen	211	13,359
Total	**222**	**236,901**

National
Transport
Commission

ntc

Leading change