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OPPORTUNITIES TO REDUCE LIGHT VEHICLE EMISSIONS IN AUSTRALIA

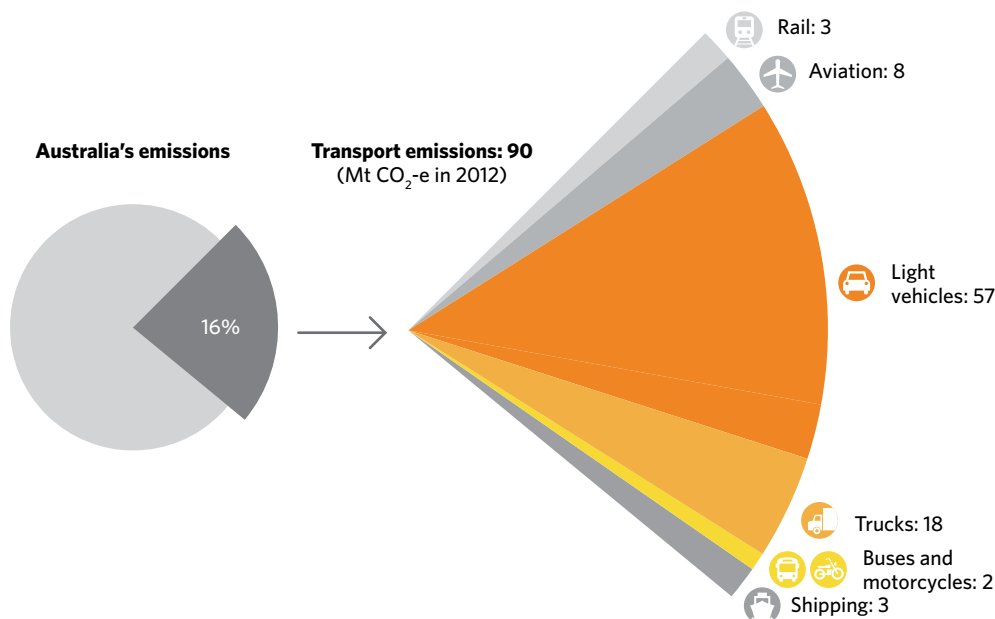
The transport sector accounts for 16 per cent of Australia’s greenhouse gas emissions. Light vehicles account for the largest share—10 per cent of Australia’s total emissions.

The Australian light vehicle fleet has become more efficient and less emissions-intensive over time but large opportunities for further improvements remain. Technologies to improve light vehicle efficiency are readily available and represent one of the lowest cost emissions reductions opportunities in the Australian economy.

2.1 AUSTRALIA’S TRANSPORT EMISSIONS

The transport sector spans four modes—road, rail, aviation and shipping. Greenhouse gas emissions from transport come primarily from fossil fuels combusted in vehicles. The domestic transport sector contributed 90 Mt CO₂-e, or 16 per cent of Australia’s greenhouse gas emissions in 2012 (DoE 2014a, p. 2) (Figure 2.1). Australia’s per capita transport emissions are higher than those of most other countries (IEA 2013a, p. 104). This is partly because we use more road transport and partly because our road passenger transport is relatively inefficient.

FIGURE 2.1: AUSTRALIA’S TRANSPORT EMISSIONS BY MODE, 2012



Source: DoE 2014a; Treasury and DIICSRTE 2013

Note: Figures do not add due to rounding.

Transport emissions increased by 50 per cent between 1990 and 2012, the fastest sectoral growth over the period (DoE 2014a, p. 2). Emissions increased because growth in transport activity outpaced improvements in fuel efficiency. While per person ownership and use of light passenger vehicles has stabilised after decades of growth, freight and aviation activity continues to grow. These trends are reflected in stable automotive petrol consumption and strong increases in diesel and aviation turbine fuel consumption over the past five years (22 and 28 per cent respectively) (DoE 2014b, p. 11).

With no further policy action, overall transport emissions are projected to increase in the period to 2030, as demand growth continues to outpace efficiency improvements. Figure 2.2 shows historical and projected trends of Australia’s transport emissions, by mode of transport. The projected growth is in the absence of a carbon price and without any further policy action.

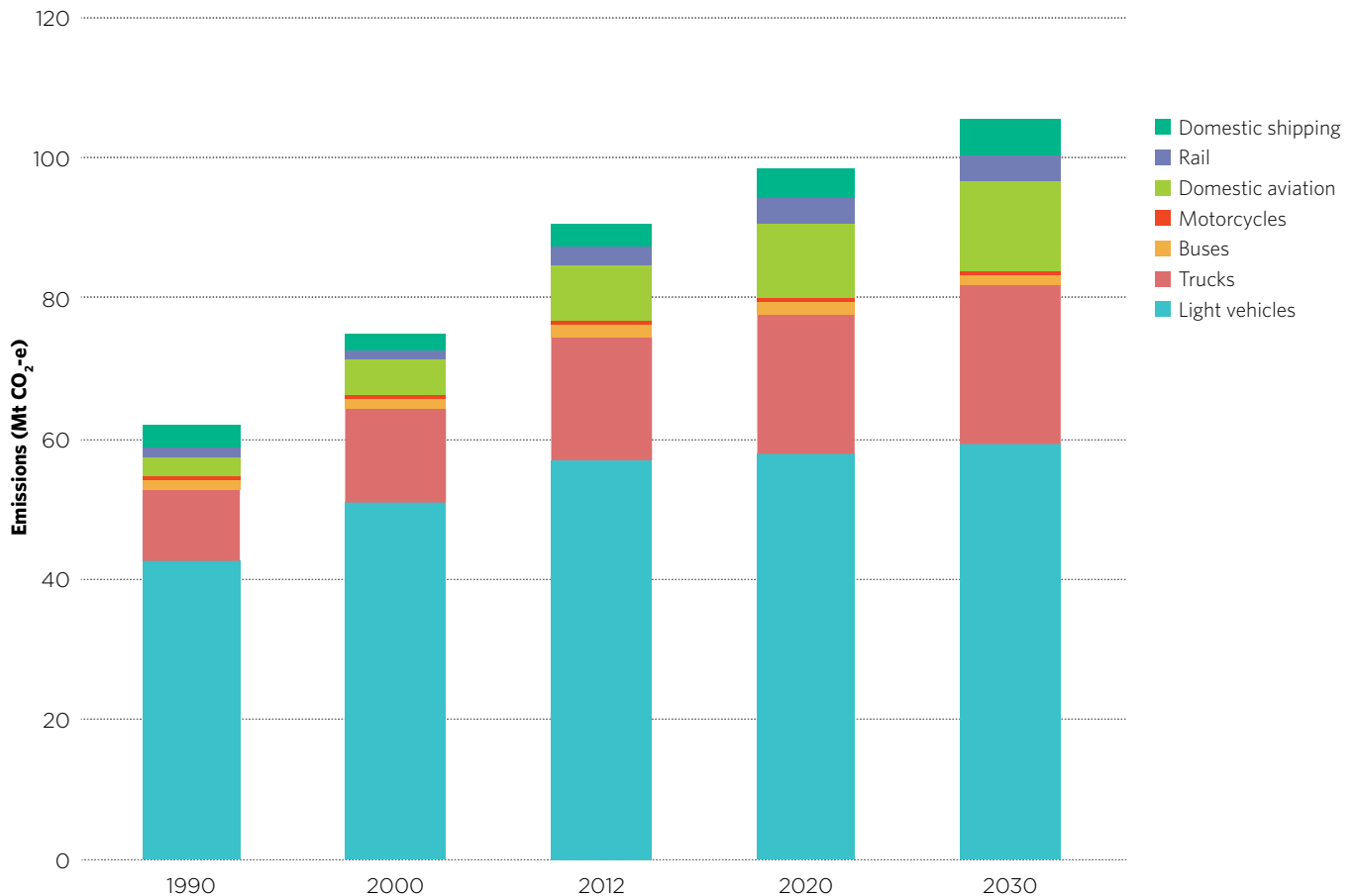
In this graph, and throughout this report, transport emissions refer to the ‘tailpipe’ emissions from vehicles. Emissions from generation of electricity used by electric vehicles are accounted for in the electricity sector. Combustion of biofuels produces zero emissions for transport accounting purposes, but biofuel production emissions can be substantial and are included in the agriculture or industry sectors. Both of

these issues are discussed further below.

Key trends include:

- Road transport is the dominant source of transport emissions, contributing 85 per cent of all transport emissions in 2012 (77 Mt CO₂-e). This includes motorcycles, cars and light commercial vehicles, rigid and articulated trucks and buses (CCA 2014a, p. 274).
 - Light vehicles are the largest contributor, emitting 57 Mt CO₂-e in 2012—almost two-thirds of transport emissions and 10 per cent of Australia’s total emissions (CCA 2014a, p. 274). Growth in road passenger activity has slowed and stabilised over the past decade (Figure 2.3). Historically, passenger travel has increased with rising incomes. Recent trends suggest that the average daily time spent commuting has peaked and future growth in light passenger vehicle activity will likely come predominantly from population increases (BITRE and CSIRO 2008, pp. 7-8). Light commercial vehicle activity is projected to grow more than twice as fast as passenger vehicles to 2030, but will still contribute less than a quarter of the total kilometres travelled by light vehicles (Treasury and DIICCS RTE 2013).

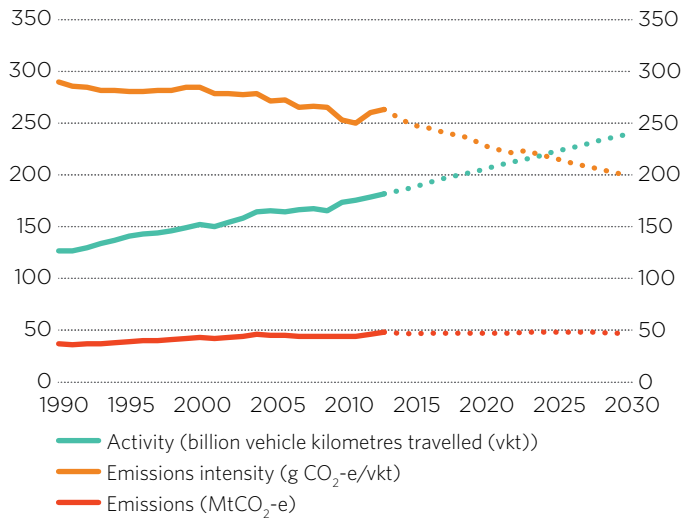
FIGURE 2.2: TRANSPORT EMISSIONS BY MODE OF TRAVEL, SELECTED YEARS, 1990–2030



Note: Future projections are based on a no carbon price scenario.

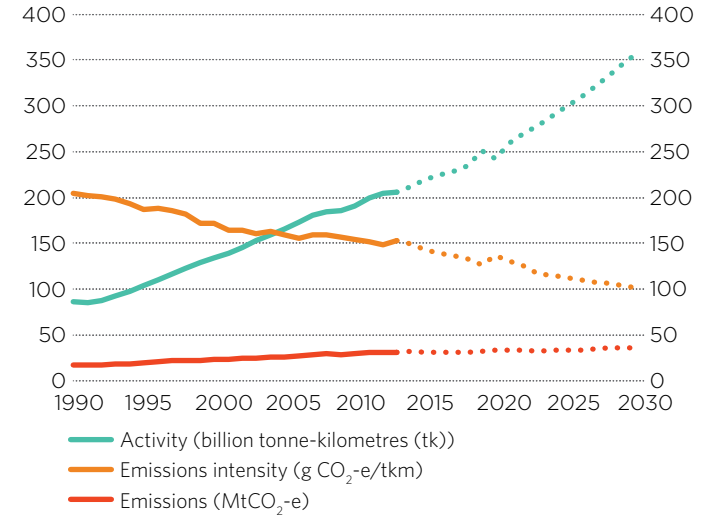
Source: Climate Change Authority calculations using results from Treasury and DIICCS RTE 2013, and Reedman and Graham 2013a

FIGURE 2.3: PASSENGER ROAD EMISSIONS, ACTIVITY AND EMISSIONS INTENSITY, 1990-2030



Note: Future projections under a no carbon price scenario. Activity includes motorcycles and passenger vehicles only and does not include light commercial vehicles.
Source: Climate Change Authority calculations using results from Treasury and DIICCSRTE 2013

FIGURE 2.4: ROAD FREIGHT EMISSIONS, ACTIVITY AND EMISSIONS INTENSITY, 1990-2030



Note: Future projections under a no carbon price scenario. Activity includes light commercial vehicles and rigid and articulated trucks.
Source: Climate Change Authority calculations using results from Treasury and DIICCSRTE 2013, and BITRE 2012

- Road freight is the second-largest contributor to road transport, with trucks accounting for 20 per cent of transport emissions in 2012 (BITRE 2013b, p. 135). The road freight task is growing quickly—up 42 per cent between 2002 and 2012 to 208 billion tonne-kilometres (BITRE 2013b, p. 47)—and is projected to increase further, to 357 billion tonne-kilometres in 2030 (see Figure 2.4). This means emissions from trucks are projected to rise much faster than those from other types of road vehicles, despite improvements in emissions intensity (Treasury and DIICCSRTE 2013).
- Domestic aviation activity, dominated by passenger transport, accounts for 9 per cent of transport emissions. Aviation activity increased by 80 per cent between 2001 and 2011, and is projected to approximately double from 2011 levels by 2030 (CCA 2014a, p. 275). This strong growth is largely driven by economic growth and increasing passenger preference for air travel over road or rail (BITRE 2013a and PC 2011, p. 60).
- Emissions from rail and domestic shipping each accounted for about 3 Mt CO₂-e, or 3 per cent of total transport emissions in 2012 (Treasury and DIICCSRTE 2013).

2.2 OPPORTUNITIES FOR REDUCING TRANSPORT EMISSIONS

Australia’s growing transport demand is not unusual. The IEA projects global travel to double between 2010 and 2050. Without further policy action, global transport emissions could grow by 70 per cent by 2050, despite continuous efficiency improvements (2013b, p. 12).

The Authority’s 2014 Targets and Progress Review found that there are three broad ways to reduce transport emissions without diminishing living standards:

- increased efficiency of motorised vehicles
- reduced emissions intensity of fuels
- more efficient demand management.

2.2.1 INCREASED EFFICIENCY OF MOTORISED VEHICLES

Reducing the amount of carbon-containing fuel required to transport people and freight also reduces greenhouse gases emitted—that is, it improves the emissions intensity of the vehicle.

It would be costly and impractical to retrofit an existing light vehicle fleet with new technologies (IEA 2012b, p. 6). Fleet improvements can be achieved effectively over time by improving the design of new vehicles. As the fleet composition changes to include more new and efficient cars, and old vehicles are retired, the average efficiency of the fleet improves.

CONCLUSION:

C.1 Transport accounts for 16 per cent of Australia’s greenhouse gas emissions. Light vehicles alone contribute 10 per cent.

2.2.2. REDUCED EMISSIONS INTENSITY OF FUELS

The second way that transport emissions can be reduced is by switching from conventional fuels with higher emissions to alternative fuels with potentially lower emissions, such as electricity, natural gas and sustainable biofuels (for example, ethanol and biodiesel produced from crops like wheat, maize or sugar cane, or canola).

The level of CO₂ emitted from the combustion of fuels depends on both their energy content and carbon content. For example, diesel has a higher energy and carbon content, and therefore higher emissions per litre, than petrol. A diesel engine, however, is more efficient than a conventional petrol engine, so its fuel consumption and CO₂ emissions are lower for each kilometre travelled.

The net effect of different fuels on national emissions also depends on the upstream emissions from their production. Emissions from running a vehicle on electricity, for example, depend on how the electricity is generated. When powered by the current average Australian grid, the fully electric vehicles currently available in Australia are less emissions-intensive than the average light car, which is the most efficient class of light vehicle (Climate Change Authority calculation based on CCA 2014a; NTC 2013 and Commonwealth of Australia 2014c).

Similarly, the overall, or 'lifecycle', emissions of biofuels can vary dramatically depending on the source of the feedstock (PC 2011, p. 7). Given the feedstocks currently used in Australia, however, biofuels generally do have lower emissions intensity than fossil-derived fuels on a lifecycle basis.

Biofuel production also involves water and land use, in some cases displacing food crops. Advanced, second- and third-generation biofuels such as lignocellulose use non-food resources including forestry and urban waste, but these are not yet sufficiently developed for deployment on a commercial scale (Reedman and Graham 2013a, p. 33).

2.2.3 MORE EFFICIENT DEMAND MANAGEMENT

The third way transport emissions can be reduced is by changing the way people and freight are moved, and reducing the need for movement while maintaining living standards. These changes improve the emissions intensity of travel or reduce transport demand. The potential for passenger mode shift is difficult to quantify—users' mode selection depends on the price and desirability of the alternative transport options available and, potentially, policies and programs that influence travel behaviour.

Australia's cities are more sparsely populated than most cities of the world (DIT 2013, p. 112), which can present a challenge to broader use of public and active transport. Nevertheless, both global and national assessments (IEA 2013b, pp. 44–5; DCCEE 2010, pp. 130–2) highlight many opportunities, including:

- Mode shift—moves passengers and freight from higher to lower emissions modes; for example, from road to public transport, walking, cycling and rail. Improvements to public transport can reduce congestion while improving travel time and reducing household transport expenses.
- Intelligent transport systems (ITS)—use emerging communications and data systems to better manage logistics and transport use, including by reducing congestion and optimising fuel use. The IEA estimates that ITS could reduce truck fuel use by 2–10 per cent through technologies such as intelligent control of acceleration and speed, and predictive cruise control (IEA 2012a, p. 27).
- Urban and transport planning—can help reduce travel requirements and encourage mode shift to active and public transport; for example, by locating employment and community services like schools close to communities that need them, or creating streetscapes that encourage walking rather than driving.

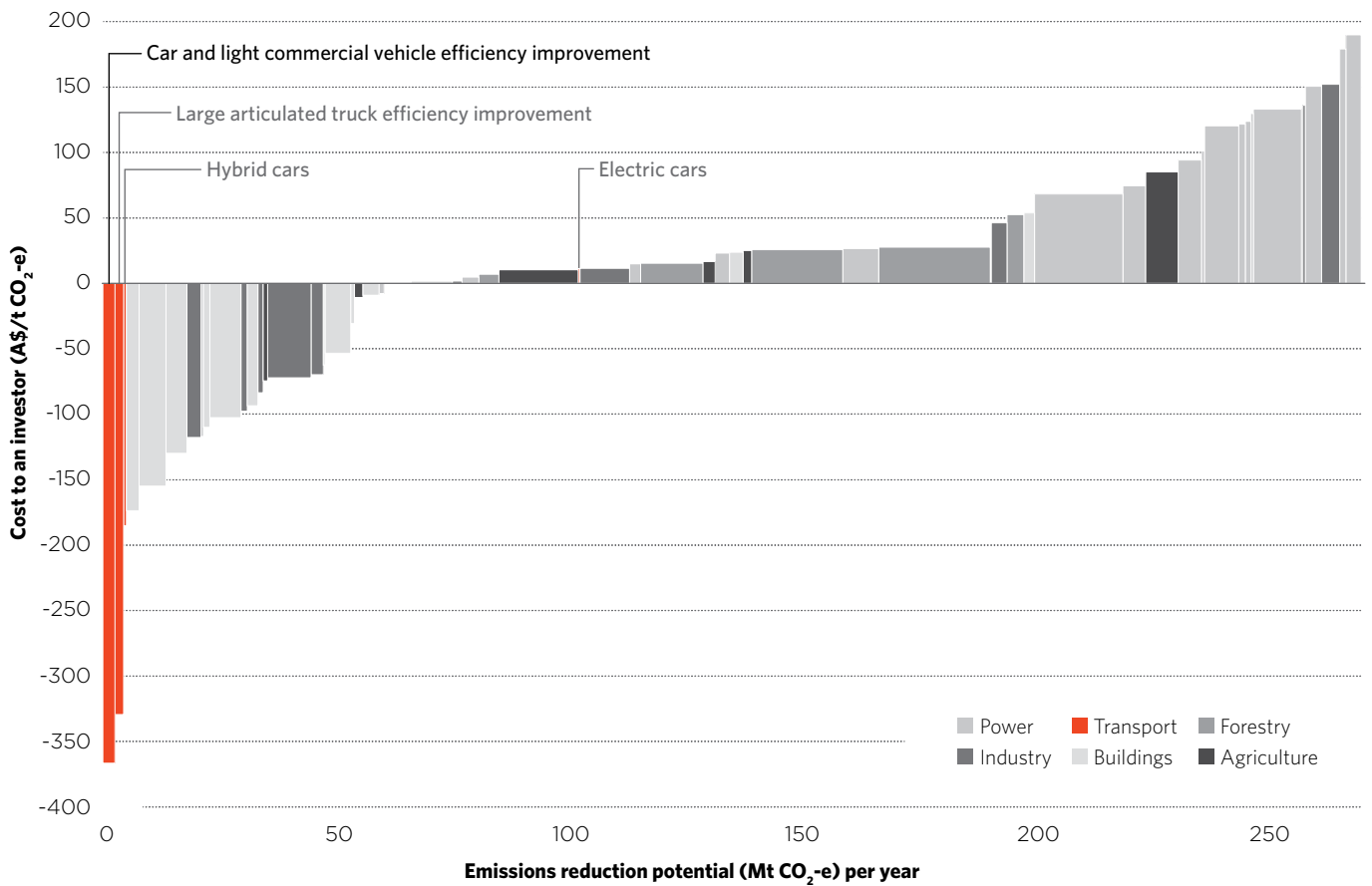
2.2.4 OPPORTUNITIES IN THE MEDIUM AND LONGER TERM

Over the period to around 2030, technologies to improve the fuel efficiency of new conventional light vehicles offer the largest and best-value emissions reduction opportunities in the Australian transport sector.

Significant improvements in light vehicle efficiency are required in a cost-effective pathway to meet the global goal to limit warming to less than 2 degrees. Conventional internal combustion engines are projected to remain the dominant propulsion system used in road vehicles to 2030, even in a 2 degree scenario (IEA 2012b, p. 10).

Relative to other sectors, vehicle efficiency improvements are some of the lowest cost opportunities to reduce emissions, delivering net savings to motorists because higher vehicle purchase costs can be more than offset through lower running costs. ClimateWorks Australia (2014, pp. 4–5) identified that the most financially attractive emissions reduction opportunity across the entire economy could be fuel efficiency improvements to light vehicles with internal combustion engines, providing savings to vehicle users of \$350 for each tonne of CO₂ that is not emitted (Figure 2.5).

FIGURE 2.5: OPPORTUNITIES TO REDUCE EMISSIONS IN AUSTRALIA IN 2020






Source: ClimateWorks Australia 2014
Note: Costs are in 2010 Australian dollars

ClimateWorks estimates that conventional light vehicle efficiency improvements could provide fuel savings of \$500 per year in 2020, rising to \$852 per year in 2024 (2014, p. 11). It also found that even if vehicle purchasers paid up to \$2,500 per vehicle more to cover the costs of improved efficiency technologies, they would recover these costs within three years through fuel savings (2014, p. 2). This is consistent with international assessments (for example, IEA 2009) that if strong enough measures were implemented globally, the fuel consumption of new light vehicles could be halved by 2030 at low or possibly negative cost to consumers.

In the longer term, light vehicle electrification and biofuels for light vehicles could deliver significant reductions (Graham et al. 2012a). Biofuels for heavy vehicles and greater use of natural gas could reduce the emissions intensity of Australia’s heavy vehicle fleet (Graham et al. 2012b, p. 45). Assessing the emissions reduction potential of a large range of transport options, the Australian Low Carbon Transport Forum found that the top four options for delivering emissions improvements were all changes to light vehicles—electrification, use of biofuels, fuel efficiency technologies and downsizing (Table 2.1).

TABLE 2.1: ESTIMATED OPPORTUNITIES FOR ANNUAL EMISSIONS REDUCTIONS IN 2050 FROM TRANSPORT SECTOR

OPPORTUNITIES	ESTIMATED ANNUAL EMISSIONS REDUCTION (FULL FUEL CYCLE) IN 2050 (Mt CO ₂ -e)*	
Increased vehicle efficiency technologies		
	Light vehicles	19.4
	Trucks and buses	7.2
	Aircraft	5.2
	Shipping	0.7
	Rail	0.9
Reduced emissions intensity of fuels		
	Electric light vehicles	22.8**
	Electric trucks and buses	1.9
	Light vehicle biofuels	11.8
	Truck and bus biofuels	14.3
	Aviation biofuels	6.2
	Shipping biofuels	2.0
Rail biofuels	2.4	
More efficient transport demand management		
	Urban road pricing and other pricing incentives	3.9
	Urban design	1.0
	Mode shift, urban car to less emissions-intensive mode	1.22
	Freight mode shift and improved logistics	3.1

Note: *Emissions reduction estimates are the calculated contribution to aggregate abatement from the full fuel cycle (including 'upstream' emissions from fuel production) if the full range of opportunities is introduced in sequence. Estimated abatement from each of the opportunities if introduced in isolation is significantly higher in many cases. **Assumes significant decarbonisation of the electricity supply, from 0.724 t CO₂/MWh in 2020 to 0.209 t CO₂/MWh in 2050.

Source: Graham et al. 2012b

The fact that emissions reduction opportunities from deploying more efficient technologies in conventional vehicles are both relatively low cost and important for achieving global temperature goals suggests light vehicles are a sensible place to focus Australia's current efforts to reduce emissions from the transport sector. A technology-neutral policy such as mandatory vehicle standards (see Chapter 3) will encourage both the low-cost improvements in conventional vehicle technology currently available, and the deployment of alternative vehicles over time.

In some cases, regulation of a particular industry sub-sector may drive activity into other sub-sectors, thereby undermining the intended emissions reductions and other benefits. This is very unlikely in the case of light vehicle emission standards. Standards reduce vehicle operating costs (see Chapter 4), so they create little incentive for regulatory avoidance. Further, other vehicle types are generally poor substitutes for light vehicles—for example, households and businesses are unlikely to switch from cars and vans to heavy duty trucks. Finally, if standards were to encourage mode shifts—for example, from private to public transport—this would tend to strengthen rather than undermine the emissions savings.

CONCLUSION

C2. In the medium term, improving the efficiency of road passenger transport using existing technologies is one of the lowest cost emissions reduction opportunities in the Australian economy.

The next section provides an overview of Australia's light vehicles and how the fleet has evolved since 2005.

2.3 CHARACTERISTICS OF AUSTRALIA'S LIGHT VEHICLE FLEET AND ITS USE

Australia's light vehicle market consists of all road vehicles less than 3.5 tonnes (other than motorcycles) and is classified into light passenger vehicles (cars and SUVs) and light commercial vehicles (sometimes called light trucks).

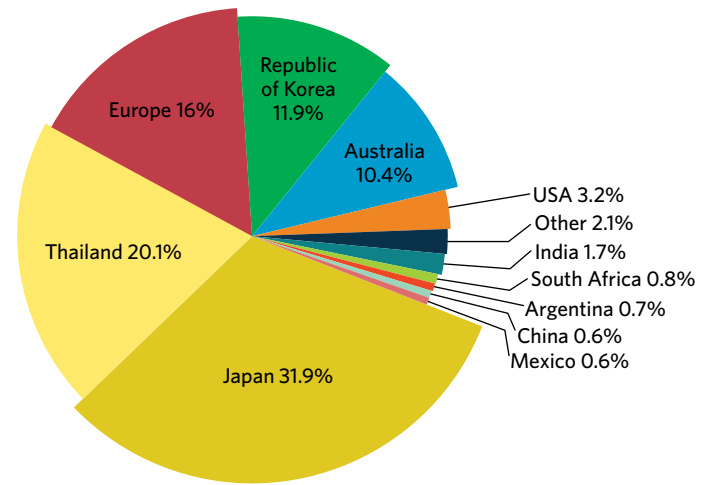
Australian road vehicles travelled over 211 billion kilometres in 2012, or 14,000 km on average per vehicle. Light vehicles accounted for 91 per cent of all road kilometres travelled and consumed 75 per cent of road transport fuel. Passenger vehicles were predominantly fuelled by petrol (85 per cent of fuel consumption), while half of all fuel consumed by light commercial vehicles was diesel (ABS 2013b, p. 7). Australian light vehicles emitted an average of 3.75 tonnes of greenhouse gases in 2012 (Climate Change Authority calculations based on ABS 2013a; BITRE 2013b).

About one million new light vehicles are purchased in Australia each year, adding to a fleet of about 16 million vehicles. Over the five years to 2013, the fleet grew at an average annual rate of 2.4 per cent (ABS 2013a, p. 8). In 2013, the average car was 9.8 years old and the average light commercial vehicle was 11.3 years old (ABS 2013a, p. 11). The average Australian light vehicle has a lifespan of about 20 years (DCCEE 2010, p. 137) and about 4 per cent of the fleet is retired each year (ABS 2013a, p. 21).

The Australian new vehicle sales market is classified into three buyer types—private (that is, households), government and business. In 2013, private sales accounted for over half of new light vehicle sales, followed by 43 per cent from business and 4 per cent from governments (NTC 2014). Privately purchased vehicles have the lowest average vehicle emissions intensity, followed by business and then government. The higher emissions intensity of government vehicles may be attributable in part to purchasing policies in some jurisdictions that favour domestically produced vehicles, which have higher emissions intensities than the average new light vehicle (NTC 2014). With the end of domestic manufacturing, any remaining such policies will need to be reviewed, and fuel economy or emissions intensity could be expected to play a larger role in purchasing decisions. Between 2005 and 2013, the average emissions intensity of vehicles for each class of purchaser fell, with the largest falls in emissions coming from business purchases (22 per cent over the period), followed by government (20 per cent) and private buyers (17 per cent) (NTC 2009, 2011, 2012, 2013, 2014).

Most new vehicles sold in Australia are produced overseas, with the domestic industry supplying about 10 per cent of the new vehicle fleet in 2013. The largest source of imported vehicles was Japan, which supplied about one-third of Australia's new vehicles, followed by Thailand, Europe and Republic of Korea (Figure 2.6).

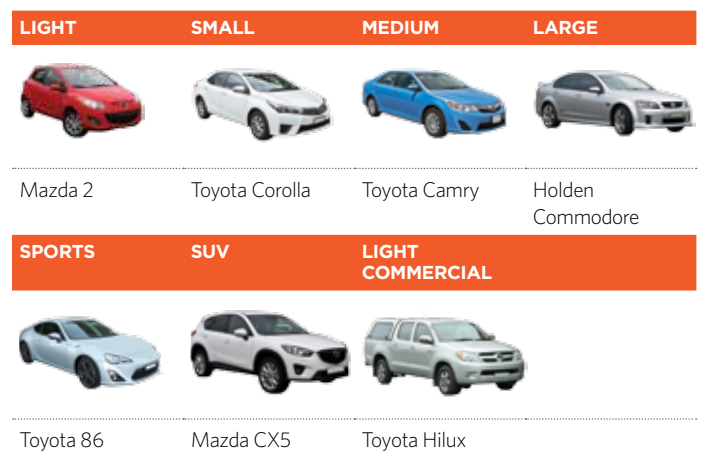
FIGURE 2.6: NEW ROAD VEHICLES BY COUNTRY OF ORIGIN, 2012



Source: FCAI 2014

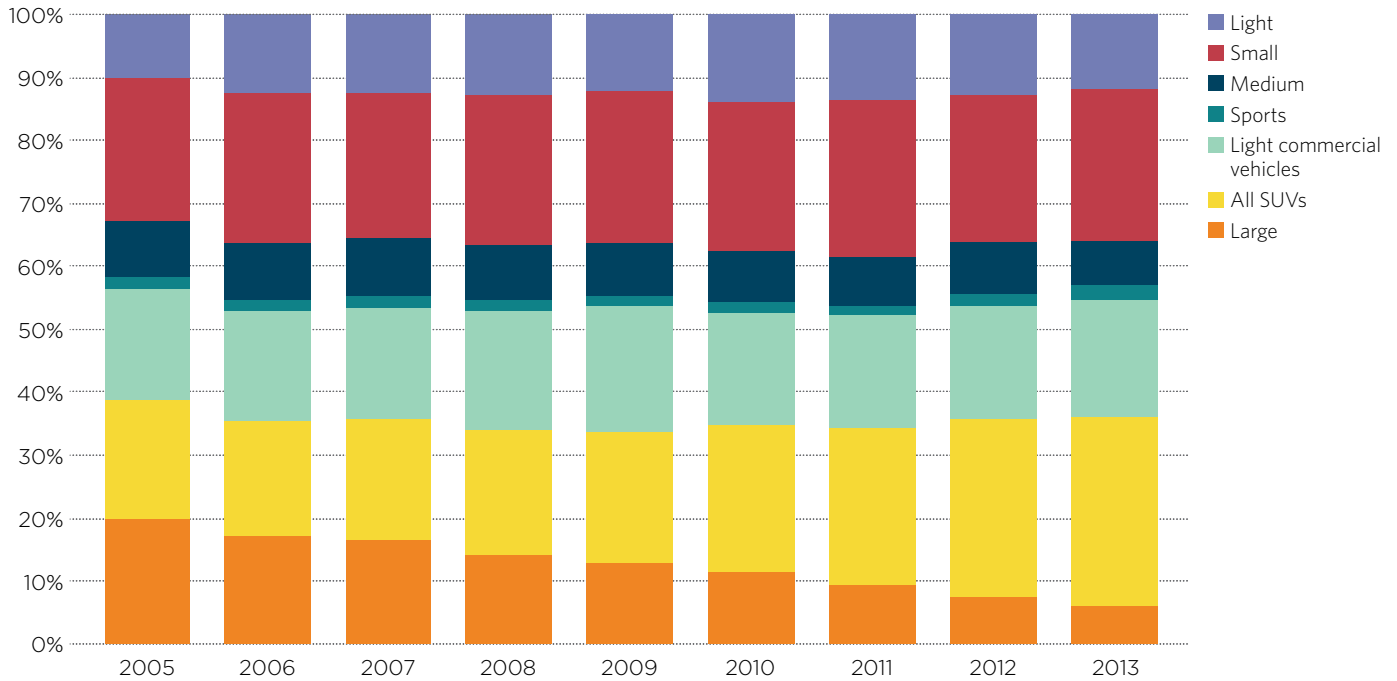
Australia's light vehicle fleet mix has changed over the past decade, with a shift in new vehicle sales towards SUVs at the expense of larger cars and, to a lesser extent, towards smaller cars (Figure 2.8). Since 2005, the market share of larger vehicles has fallen by 14 percentage points. Over the same period, the market share of SUVs increased by 12 percentage points, and light passenger vehicles increased by 2 percentage points. Figure 2.7 shows the highest selling model for each vehicle class.

FIGURE 2.7: HIGHEST SELLING MODELS IN 2013, BY VEHICLE CLASS



Source: National Transport Commission 2014

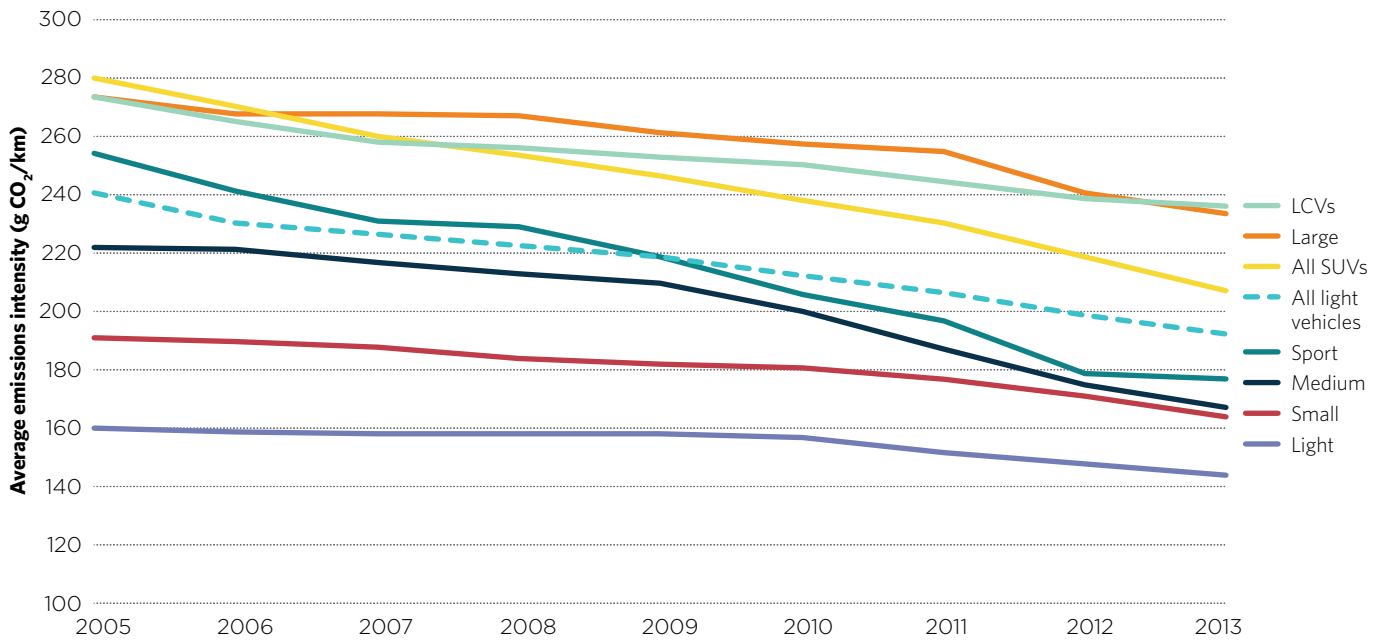
FIGURE 2.8: NEW VEHICLE SHARES BY CLASS OF LIGHT VEHICLE, 2005-13



Note: Large includes large, upper large and people mover vehicles.

Source: Climate Change Authority calculations using results from the National Transport Commission's carbon dioxide emissions reports for new Australian vehicles 2009-14

FIGURE 2.9: NEW VEHICLE AVERAGE EMISSIONS INTENSITY BY VEHICLE CLASS, 2005-13



Note: Large includes large, upper large and people mover vehicles.

Source: Climate Change Authority calculations using results from the National Transport Commission's carbon dioxide emissions reports for new Australian vehicles 2009-14

All classes of light vehicles in Australia are becoming more efficient—tested average emissions intensity from new light vehicles sold in Australia fell by 3.3 per cent per year over the period 2005–13, from 252 g CO₂ per km to 192 g CO₂ per km (NTC 2014, p. 16). Figure 2.9 shows that all light vehicle classes have improved their average emissions intensity since 2005, with larger vehicles making the largest improvements. The shift from large cars into SUVs over the period has lowered the emissions intensity of new light vehicles—in 2013, the average SUV was 11 per cent less emissions-intensive than the average large vehicle. Despite these improvements, the Australian fleet remains more emissions-intensive than that of most other OECD countries (ICCT 2014).

Overall emissions from light vehicles have been increasing but are projected to stabilise. Between 2002 and 2012, emissions increased by 11 per cent because growing light vehicle activity more than offset improvements in emissions intensity (BITRE 2013b, p. 135). Over the period to 2030, total light vehicle emissions are projected to be roughly stable (Figure 2.2).

2.4 OPPORTUNITIES TO IMPROVE EMISSIONS INTENSITY OF THE LIGHT VEHICLE FLEET

Light vehicle emissions intensity can be reduced in two main ways:

- Changes in consumer preferences towards smaller vehicles, which have lower emissions on average. These shifts could be to a smaller vehicle within a class (for example, shifting from a large SUV to a small SUV), or between classes (for example, shifting from a large SUV to a medium-sized car).

- Changes in vehicles, including both vehicle and fuel efficiency technologies.

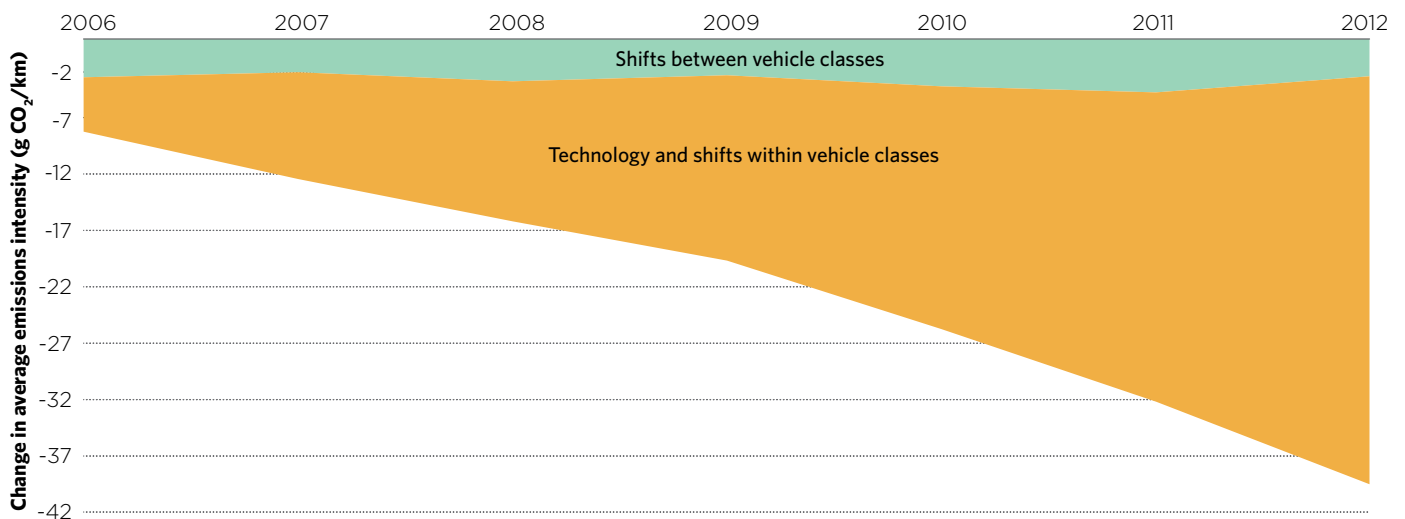
2.4.1 IMPROVING EFFICIENCY THROUGH CHANGES IN THE FLEET MIX

The overall level of emissions from the Australian light vehicle fleet is affected by the composition of that fleet. Smaller vehicles are generally more fuel-efficient than larger vehicles, although there is significant variation within vehicle classes. Figure 2.9 shows recent improvements and the significant gap between the efficiency of smaller and larger new light vehicles. Increasing the proportion of smaller cars in the Australian fleet is likely to decrease emissions, even if there were no further improvements to the efficiency of individual vehicles.

2.4.2 IMPROVEMENTS IN LIGHT VEHICLE TECHNOLOGY

While a shift to smaller vehicles would reduce emissions intensity, Australia’s recent history shows that large improvements can be achieved even without big shifts to smaller vehicles. The Authority has calculated that technology improvements and within-class shifts have been the main driver of improvement in Australia’s average new light vehicle emissions intensity between 2005 and 2012. These two factors contributed over 90 per cent (over 36 g CO₂/km) of the fleet’s average emissions intensity reductions over the period (Figure 2.10). On average, technology improvements and within-class shifts reduced average light vehicle emissions by about 5 g CO₂/km per year from 2005 to 2012.

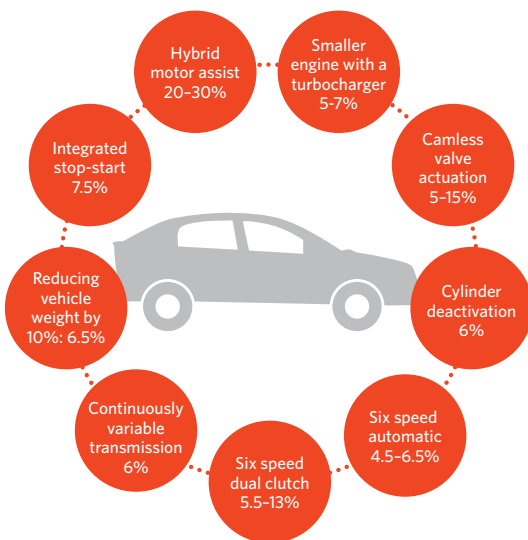
FIGURE 2.10: DECOMPOSITION OF CHANGES IN AVERAGE NEW LIGHT VEHICLE EMISSIONS INTENSITY, 2005–12



Source: Climate Change Authority calculations using national light vehicle sales, vehicle classifications and carbon dioxide emissions from the National Transport Commission’s carbon dioxide emissions reports for new Australian vehicles 2009–13

There are many proven, cost-effective and currently available technologies to improve light vehicle efficiency and thereby reduce emissions intensity; for example, these include reducing vehicle weight, and implementing more efficient engines and more efficient drive trains. International research suggests that currently available technologies could achieve a 30 per cent reduction in new light vehicle emissions intensity in most countries within a decade (DIT 2011a, p. 10) and retain scope for further improvements. Figure 2.11 shows some promising vehicle technologies for improving fuel efficiency, along with an estimate of the emissions they may save.

FIGURE 2.11: ESTIMATED CO₂ EMISSIONS INTENSITY REDUCTIONS FROM AVAILABLE FUEL-SAVING TECHNOLOGIES



Source: DIT 2011, p. 11

The next section considers the Australian policy context in which vehicle efficiency improvements would be made.

2.5 CURRENT POLICIES AFFECTING LIGHT VEHICLES

A range of policies in operation in Australia affect aggregate light vehicle emissions and costs, and therefore the costs and benefits of standards.

2.5.1 STANDARDS TO REDUCE VEHICLE AIR POLLUTION

Australia, like many other countries, already has vehicle standards to reduce air pollutants. These have been in place since the early 1970s (DIRD 2014a). Australia's existing vehicle emissions standards regulate air pollutants to improve human health and air quality (DIT 2010, p. 26). Vehicles significantly contribute to levels of hydrocarbons, oxides of nitrogen, carbon monoxide and particulate matter in the air, which can adversely affect acute and chronic health conditions (DIT 2010, pp. 17, 22).

Australia's existing vehicle emissions standards are set by Australian Design Rules (ADRs), which are legislative instruments under the *Motor Vehicle Standards Act 1989* (Cth) (DIT 2010, p. 11). The ADRs specify the maximum level of emissions permitted by a vehicle under a specified test (DIRD 2014a).

In 2011, the Commonwealth Government announced the adoption of stronger emissions standards, the first stage of which ('Euro 5' standards) will be fully implemented in 2016 (Commonwealth of Australia 2011). These standards mirror those adopted by the European Union, but on a staggered time frame.

2.5.2 POLICIES AND MEASURES ADDRESSING LIGHT VEHICLE GREENHOUSE GAS EMISSIONS

The Commonwealth Government's proposed Direct Action Plan revises Australia's approach to reducing greenhouse gas emissions, including those from the transport sector. Its centrepiece is the Emissions Reduction Fund (ERF), which will purchase emissions reductions from projects and activities according to approved methodologies. The ERF could help to encourage emissions reductions from light vehicles; Chapter 3 discusses the interactions between the ERF and light vehicle emissions standards, concluding that the two can be complementary.

Other measures include:

- Information measures—Australia has compulsory fuel consumption labelling for new vehicles, with relevant information about specific vehicles available online.
 - A fuel consumption label has been mandatory for new light vehicles since 2001. The label is model-specific and since 2003 has provided information on both fuel consumption and CO₂ emissions (DIRD 2013).

- The Green Vehicle Guide is an online consumer information resource that rates new vehicles based on their greenhouse and air pollution emissions. The rating is calculated using data provided by manufacturers when their vehicles are tested against the relevant ADRs (Commonwealth of Australia 2014).
- Fiscal measures
 - State and territory vehicle purchase and registration charges can be designed to create incentives to buy low-emissions vehicles. For example, the ACT differentiates charges based on vehicle emissions: its Green Vehicles Duty Scheme reduces stamp duty costs as the vehicle's Green Vehicle Guide rating improves (TAMS 2011). All other states and territories calculate stamp duty and registration costs based on vehicle value, or attributes such as vehicle mass or cylinder count, although some (such as Victoria) offer modest technology-specific discounts for hybrid vehicles (VicRoads 2014).

The vehicle industry has introduced its own measures in the past. In 2003, the Federal Chamber of Automotive Industries (FCAI) agreed to a Code of Practice with a voluntary 2010 fuel consumption target of 6.8 litres per 100 km (equivalent to about 160 g CO₂/km for a petrol vehicle and 187 g CO₂/km for a diesel). This target was not met. A subsequent voluntary emissions intensity target of 222 g CO₂/km by 2010 was met in 2008 and not renewed (PWC 2010, p. 22).

2.5.3 POLICIES AFFECTING LIGHT VEHICLE COSTS AND AVAILABILITY

Other transport policies affect fuel and vehicle costs:

- Fuel excise applies to both petrol and diesel, with a nominal rate of 38.143 c/L applied since 2001. The Commonwealth Government has proposed that, from 1 August 2014, excise will increase with the consumer price index. This would increase retail fuel prices and, in turn, increase the potential benefit of more fuel efficient vehicles.
- Import tariffs are duties imposed on imported vehicles. A tariff based on vehicle import prices is currently levied on vehicles imported from some countries, including the EU and Japan (5 per cent) and the Republic of Korea (4 per cent). Under recent agreements, cars from Japan and Korea will in future be exempt from tariffs (Australian Government 2014a and 2014b). The Authority estimates that the average impact of tariffs on the purchase price of vehicles in 2012 was about \$1,200 per vehicle subject to tariffs (Authority calculations based on PC 2012 and ABS 2014), with the actual amount varying by vehicle type.

- Second-hand vehicles are subject to a \$12,000 import duty and require a Vehicle Import Approval. The Productivity Commission noted that these requirements create barriers to the importation of second-hand vehicles into Australia (PC 2014, p. 99). They found that the policy rationale for these barriers is weak but, should the barriers be relaxed, appropriate regulatory measures would be required to ensure environmental performance, safety and other requirements are met. This is discussed further in Chapter 5 and Appendix C.
- The Luxury Car Tax (LCT) is a 33 per cent tax on the value of cars over \$60,316 (ATO 2013). The LCT is tiered based on fuel consumption—for vehicles with fuel consumption below seven litres per 100 km (equivalent to 160 g CO₂ per km for petrol and 187 g CO₂ per km for diesel), the LCT has a higher threshold of \$75,375 (ATO 2013). Exemptions include non-passenger commercial vehicles and emergency vehicles (PC 2014, p. 103). The Productivity Commission suggested the *Taxation White Paper* consider removing the LCT (2014, p. 104).
- Fringe benefits tax (FBT) is paid on certain benefits employers provide to their employees in place of salary or wages. A common benefit offered to employees is a car, with the rate of FBT payable varying with the number of kilometres the vehicle travels. The Commonwealth Government has indicated that this policy is not subject to review.

The next chapter discusses why policy action is needed to reduce greenhouse gas emissions from light vehicles in Australia and why fleet average emissions standards are a cost-effective policy tool.