Submission by

Australian Greenhouse Office
and
Environment Australia

to the Productivity Commission
Inquiry into Post-2005 Assistance Arrangements for the Automotive Manufacturing Sector

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13 June 2002

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Executive summary

In this joint submission to the Productivity Commission, the Australian Greenhouse Office and Environment Australia provide information on four main areas. These are:

- The nature of environmental issues associated with the automotive industry and associated costs;
- The increasing competitive pressure for improved vehicle environmental performance in international markets, and the impacts on the Australian industry to date;
- Australia's automotive environmental performance in relation to international trends; and
- The ways in which the automotive assistance package post-2005 could be tailored to stimulate improvements in the environmental performance, and the competitiveness, of the industry.

Environmental issues associated with the automotive industry

The main environmental issues for the automotive industry are greenhouse gas emissions and air pollutant emissions related to fuel consumption by vehicles in service.

The transport sector contributed 16.1 per cent of Australia's net greenhouse gas emissions in 1999. Over half of those emissions were from passenger motor vehicles. The Australian Greenhouse Office project that, without reduction measures, greenhouse gas emissions from the transport sector will rise by 28 per cent between 1999 and 2010.

Increased greenhouse gas emissions are linked to climate changes that could lead to heightened risk of adverse health impacts, damage to infrastructure and reduced agriculture and forestry production.

Motor vehicles are the major emitters of air pollutants in urban Australia, contributing more than 75 per cent of the carbon monoxide emissions and most of the oxides of nitrogen and organic compounds. Emissions include very fine particles that contribute to urban haze. High levels of air pollutants have a wide range of adverse health and visual impacts.

Total fuel consumption by passenger motor vehicles in Australia is affected, for better or worse, by the annual additions to the total stock of vehicles (the vehicle park) through new vehicle sales, whether imported or domestically produced.

Industry assistance arrangements have a direct impact on the make up of new vehicle sales in Australia. In 2000, 227,000 locally produced vehicles were sold in Australia, representing 41 per cent of total passenger vehicle sales. The majority of domestically produced vehicles fall into the large vehicle category and, in 2000, fleets (Government and non-government) purchased around three-quarters of these vehicles in Australia.

In addition, tariff levels may impact on the slow rate of turnover of Australian vehicles. Around 40 per cent of the Australian vehicle park is more than 10 years old. Therefore, improvements in fuel consumption and emissions performance take a long time to make a substantial impact.

- *Environment Australia and the Australian Greenhouse Office recommend that the Productivity Commission consider how best to include the costs of environmental externalities in the assessment of automotive policy arrangements.*

Increasing competitive pressure to improve environmental performance

Many other countries are introducing more stringent environmental requirements for passenger vehicles, including tighter emission standards and lower fuel consumption targets. For example, the members of the European Automobile Manufacturers Association have agreed to target a 25 per cent improvement in fuel consumption over a 13-year period. In addition, consumers are seeking greater fuel economy.

At a global level, automotive companies are starting to consider the importance of environmental issues such as climate change in their long-term strategic planning.

Innovative vehicles, designed around fuel economy, low or zero emission targets, or the use of alternative fuels, have already emerged internationally, and more are expected. For example, hybrid vehicles are already available and some companies expect that fuel cell vehicles could be available in international markets by 2010.

In the domestic market, the share of the larger passenger vehicles produced by Australian automotive manufacturers has fallen from 36 per cent to 29 per cent between 1995 and 2001. Smaller, lighter cars with better environmental performance have in part taken the share. All-terrain-wagons, with relatively poor environmental performance, have also increased share.

As their overall share of domestic market sales has fallen, Australian vehicle producers have looked to export markets to deliver growth. The challenge for Australian manufacturers will be to ensure their products meet the new environmental performance expectations in export markets in the future.

- *The Australian Greenhouse Office and Environment Australia recommend the Productivity Commission note that Australian automotive producers risk restrictions in export market prospects as environmental standards tighten.*

Australia's performance against international trends

Australia introduced changes affecting vehicle emission standards to the Australian Design Rules in 1999. The changes, which come into force by 2006, will match European standards adopted six years earlier. The next revision of Australian emission standards is not likely to take effect until after 2008.

The lag in adoption of these standards is likely to impact on potential commercial benefits.

National average fuel consumption (NAFC) for new vehicles in Australia is currently around 8.34 litres per 100km. In 1997, Government proposed a voluntary target for 2010 of 6.3 litres per 100km. This level of fuel economy could be expected in Europe between 2004 and 2007.

- *The Australian Greenhouse Office and Environment Australia recommend the Productivity Commission note that Australian automotive products are behind international standards for environmental performance.*

Post-2005 assistance arrangements for the automotive industry

Post-2005 assistance arrangements for the automotive industry could be used to address externality costs and to stimulate the improvements in vehicle design, particularly relating to fuel consumption, needed for long-term competitiveness.

More direct approaches to internalising the externality costs could be used, but an incentive-based approach is preferred.

The specific recommendations from the Australian Greenhouse Office and Environment Australia in the context of this inquiry are that the Productivity Commission consider:

- *Including environmental performance criteria, in particular fuel consumption targets, within any recommendation to extend the Australian Competitiveness and Investment Scheme or in parallel legislation;*
- *Adjusting tariffs to remove the existing distortion that favours vehicles with relatively poor environmental performance standards; and*
- *Adjusting other industry support mechanisms to align better with the aim of delivering improved environmental performance of the automotive industry. This could include government fleet purchasing policies.*

1 Introduction

There are a number of significant environmental impacts associated with the automotive industry. These include greenhouse gas emissions, other emissions of pollutants to air, generation of waste and contamination of landfill. The automotive industry in Australia can directly alter the impact of a number of these issues through vehicle design for fuel economy, introduction of improved emission control technologies and design for recyclability. Further improvements to manufacturing processes could also be pursued to reduce the externality costs associated with motor vehicle production and use. This submission provides information about the major environmental issues associated with the motor vehicle industry, the drivers of these issues and some cost estimates for the impacts (Section 2).

International environmental standards are becoming more stringent and consumer preferences are shifting towards products with better fuel economy and emission performance. The next generation of motor vehicles are being designed around better fuel consumption, low or zero emission targets or to use alternative fuels. In this context, environmental performance is directly relevant to competitiveness (Section 3).

Australian vehicle producers have a challenge ahead in maintaining their share of the domestic market and in growing exports. Aligning the vehicles produced in the future with international environmental standards will be a key factor (Section 4).

The Australian Greenhouse Office and Environment Australia consider that post-2005 assistance arrangements for the industry could be tailored to provide incentives to improve the environmental performance of Australian vehicles (Section 5).

The automotive industry has already made some good progress in reducing the environmental impact of manufacturing processes and reducing the impact of the disposal of products through recycling and de-pollution of end-of-life vehicles. In addition, those companies that employ environmental management systems are finding that they can generate cost advantages from waste minimisation. There are, however, still gains to be made (Section 6).

A cross-reference between this submission and the call for submissions issued by the Productivity Commission, is provided at Appendix A.

2 Environmental issues associated with the automotive industry

SECTION SUMMARY

The main environmental issues for the automotive industry are greenhouse gas emissions and air pollutant emissions related to fuel consumption by vehicles in service.

The transport sector contributed 16.1 per cent of Australia's net greenhouse gas emissions in 1999. Over half of those emissions were from passenger motor vehicles. The Australian Greenhouse Office project that, without reduction measures, greenhouse gas emissions from the transport sector will rise by 28 per cent between 1999 and 2010.

Increased greenhouse gas emissions are linked to climate changes that could lead to heightened risk of adverse health impacts, damage to infrastructure and reduced agriculture and forestry production.

Motor vehicles are the major emitters of air pollutants in urban Australia, contributing more than 75 per cent of the carbon monoxide emissions and most of the oxides of nitrogen and organic compounds. Emissions include very fine particles that contribute to urban haze. High levels of air pollutants have a wide range of adverse health and visual impacts.

Total fuel consumption by passenger motor vehicles in Australia is affected, for better or worse, by the annual additions to the total stock of vehicles through new vehicle sales, whether imported or domestically produced.

Industry assistance arrangements have a direct impact on the make up of new vehicle sales in Australia. In 2000, 227,000 locally produced vehicles were sold in Australia, representing 41 per cent of total passenger vehicle sales. The majority of domestically produced vehicles fall into the large vehicle category and, in 2000, fleets (Government and non-government) purchased around three-quarters of these vehicles in Australia.

In addition, tariff levels may impact on the slow rate of turnover of Australian vehicles. Around 40 per cent of the Australian vehicle park is more than 10 years old. Therefore, improvements in fuel consumption and emissions performance take a long time to make a substantial impact.

Recommendation

That the Productivity Commission should consider how best to include the costs of environmental externalities in the assessment of automotive policy arrangements.

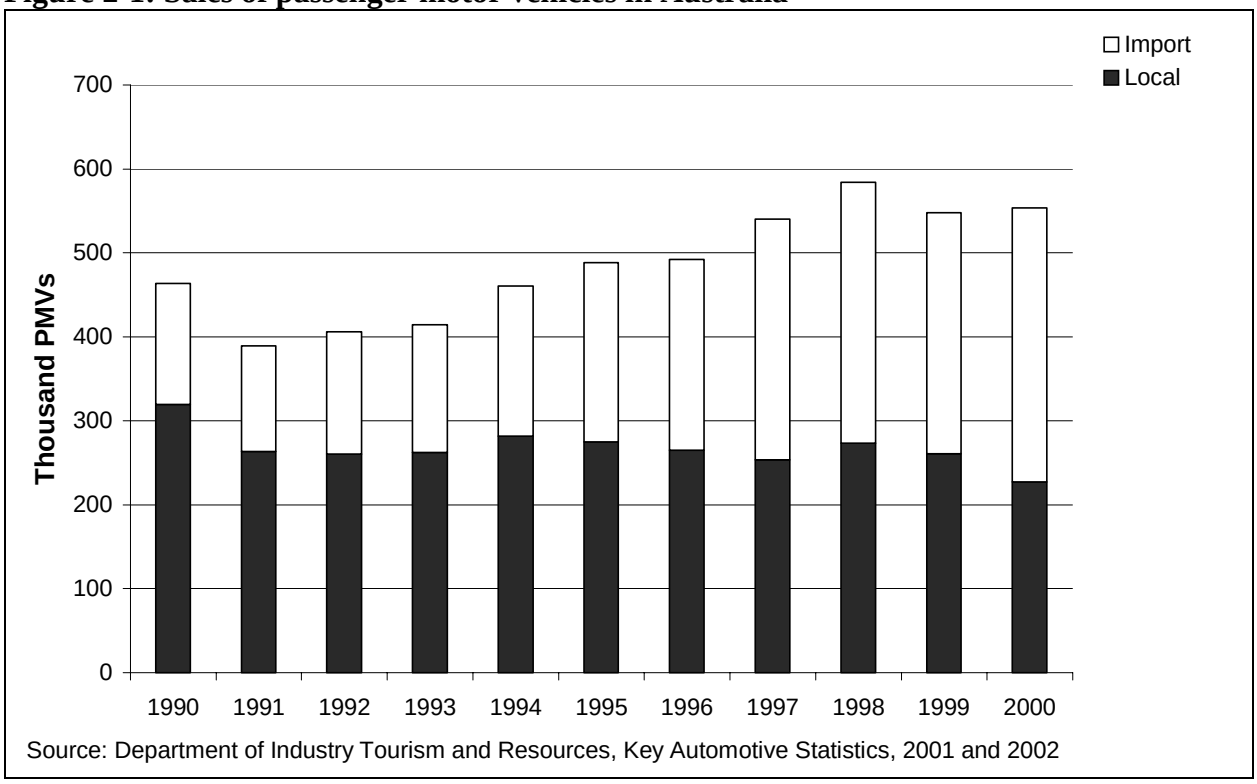
2.1 The Australian automotive industry

The Australian motor vehicle industry comprises four local motor vehicle producers (MVPs) and more than 200 automotive component producers (ACPs). It is supported by local providers of automotive services such as tooling and design.

In 2000, the four MVPs produced around 360,000 vehicles. The majority of these vehicles fall into the large vehicle category. In 2000, 227,000 locally produced vehicles were sold in Australia, representing 41 per cent of domestically sold passenger motor vehicles (Figure 2-1). Around three-quarters of sales of domestically produced vehicles are to fleet buyers, both Government and non-government, which tend to purchase larger vehicles (Figure 2-2).

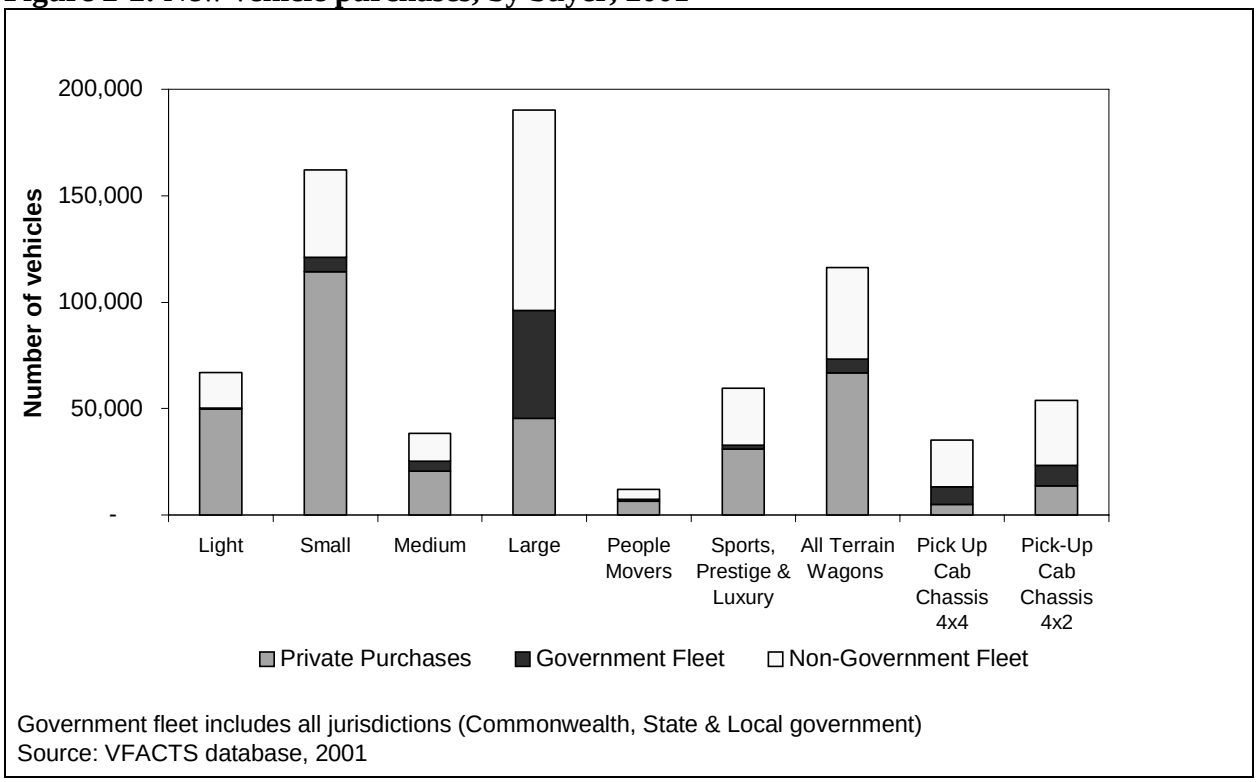
Exports of motor vehicles from the local MVPs have grown significantly over the last decade to around 100,000 vehicles in 2000. The ACPs predominantly supply the local market, although component exports are growing and reached $1.8 billion in 2000.

Figure 2-1: Sales of passenger motor vehicles in Australia



Source: Department of Industry Tourism and Resources, Key Automotive Statistics, 2001 and 2002

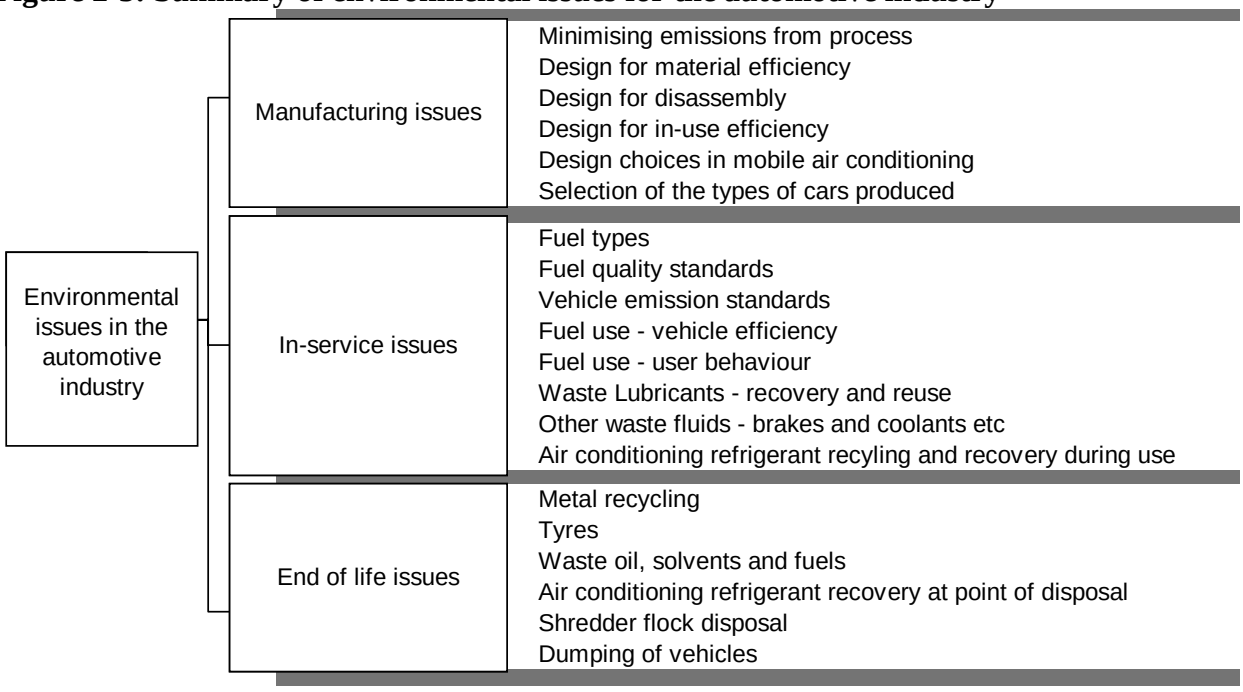
Figure 2-2: New vehicle purchases, by buyer, 2001



Government fleet includes all jurisdictions (Commonwealth, State & Local government)
Source: VFACTS database, 2001

Environmental issues for the automotive industry are broadly divided into manufacturing, in-service and end-of-life issues (Figure 2-3). The two environmental issues that present themselves as the most significant for the domestic industry are greenhouse gas emissions and emissions of air pollutants from vehicles in-service. Performance on these issues affects not only the Australian environment, but also the export potential of domestically produced vehicles. Greenhouse gas emissions and the impact of motor vehicle emissions on urban air quality, are therefore the focus of this submission. Information about other environmental issues related to the manufacture and disposal of end-of-life vehicles is provided in Section 6.

Figure 2-3: Summary of environmental issues for the automotive industry



2.2 Greenhouse gas emissions

The World Meteorological Organization and the United Nations Environment Programme established the Intergovernmental Panel on Climate Change (IPCC) in 1988 to assess the available scientific information on climate change. In its 2001 Third Assessment Report the IPCC concluded that there is new and stronger evidence that most of the warming of the Earth's surface over the last 50 years is attributable to the increase in greenhouse gas concentrations in the atmosphere resulting from human activities (IPCC 2001). The IPCC also reported that climate models show the globally averaged surface temperature increasing by between 1.4 to 5.8^0C by the end of this century.

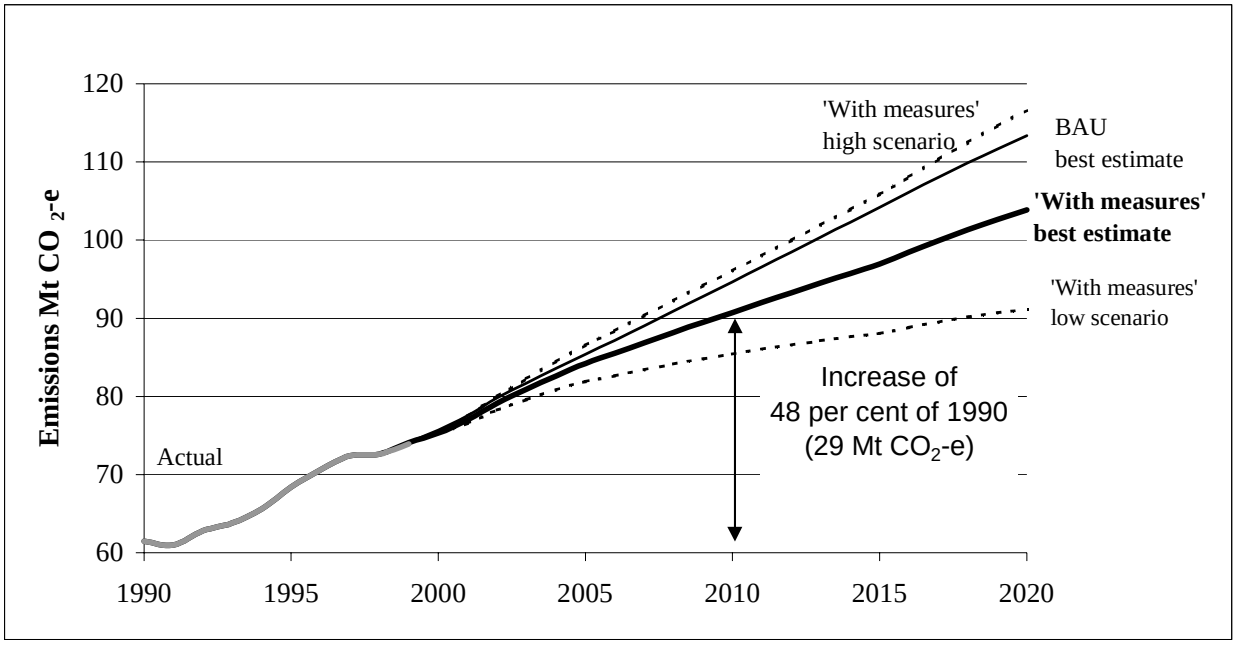
At a local level, the Commonwealth Science and Industrial Research Organisation (CSIRO) has predicted that the likely impacts of climate change for Australia by 2030 include a notably warmer and drier climate with enhanced extremes such as hot days, cyclonic activity, droughts and floods. These changes could lead to heightened risk of adverse health impacts, infrastructure damage and reduced agriculture and forestry production.

In 1999, the transport sector was responsible for 16.1 per cent of Australia's net anthropogenic related greenhouse gas emissions. Road transport is responsible for around 90 per cent of these

emissions and, of that, passenger motor vehicles account for more than half. Total transport emissions for 1999 were 20.3 per cent above 1990 levels.

The sector is projected to reach 148 per cent of 1990 levels (90.8 Mt CO_2-e) by 2010 including the impact of existing measures (Figure 2-4). Existing measures are estimated to contribute approximately 3.9 Mt CO_2-e savings in 2010. Without reduction measures, emissions would increase by 28 per cent between 1999 and 2010.

Figure 2-4: Projected growth in greenhouse gas emissions from the transport sector



Source: Australian Greenhouse Office

2.3 Urban air quality

Motor vehicles are the major emitters of air pollutants in urban Australia, contributing more than 75 per cent of the carbon monoxide emissions and most of the oxides of nitrogen and organic compounds. Emissions include very fine particles that contribute to urban haze and adverse health. Australians consistently nominate air pollution among their major environmental concerns (Department of Environment and Heritage, 2002).

High levels of air pollutants have a wide range of adverse health and visual impacts. Health impacts include respiratory effects ranging in severity from coughs, chest congestion and asthma, to chronic illness and possible premature death in susceptible people. Other effects of air pollutants include damage to vegetation, buildings and materials, and reduction in visibility.

Australian cities have already achieved air quality comparable with the better performing American, European and Asian cities (Department of Environment and Heritage, 2002), but improvements can still be achieved. For example, while ozone goals may not be exceeded as often they were in the mid 1980s, exceedences of goals still occur in major cities in most years and there has been no clear and sustained downward trend in photochemical smog since the early 1990s. This suggests that stricter vehicle emission limits will be needed to reach and maintain the standards in the Ambient Air National Environment Protection Measure finalised in 1998.

2.4 Fuel consumption

Total fuel consumption, linked to vehicle kilometres travelled and fuel consumption rates of passenger vehicles, is the primary driver of greenhouse gas and other emissions in the transport sector. Petrol powered vehicles (primarily passenger cars) account for over half of Australia's annual consumption of 30 billion litres of fuel used for transport (BTE, 2002). While the extent

of the transport task is beyond the control of vehicle manufacturers, vehicle design plays a key role in fuel economy. Vehicles can also be designed to increase their use of recycled materials and to allow for more convenient disassembly to assist with cost-effective recycling at the end of the vehicle life.

The total volume of transport services consumed (vehicle kilometres travelled or VKT) generally increases in step with population growth. Latest estimates by the Bureau of Transport Economics show total VKT growing at around 1.8 per cent per annum to just over 180 billion VKT by 2010 (BTE, 2002 forthcoming).

Australian drivers tend to travel longer distances than people in other countries, for example, Australia's 14,600 VKT per annum (1991) compares with 10,130 VKT in Japan (1991), 12,000-14,000 VKT in Europe (1991) and 17,862 VKT in the US (1993) (International Road Federation (1995) World Road Statistics, 1990-1994). BTE (2002, forthcoming) estimate that by 2000 VKT per car in Australia has reached around 15,500 and is relatively steady at that level. Despite the high share of larger vehicles in Australia, around 70 per cent of VKT are driven in urban environments.

Mechanisms to reduce private transport demand, such as the TravelSmart program trialed in South Perth (Socialdata Australia February 2001), have achieved good reductions in the average number of car trips (14 per cent). It is acknowledged that there is limited scope for motor vehicle manufacturers to impact on this particular driver of environmental performance. The point of leverage, where Australian vehicle manufacturers can reduce the environmental impact of their products, is the fuel consumption performance of individual vehicles.

The extent of greenhouse gas and air pollutant emissions associated with the vehicle is roughly proportional to fuel consumption and fuel type. As a general rule smaller, lighter vehicles with smaller engine capacity have better fuel consumption (Table 2-1). New technology vehicles, however, have the potential to reduce fuel consumption without compromising on vehicle size. Alternative fuels are considered in section 3.2.

2.5 Fuel consumption and industry assistance arrangements

Total fuel consumption by passenger motor vehicles in Australia is affected, for better or worse, by the annual additions to the total stock of vehicles (passenger vehicle park) through new vehicle sales, whether imported or domestically produced.

Industry assistance arrangements have a direct impact on the make up of new vehicle sales in Australia. In 2000, locally produced vehicles represented 41 per cent of total passenger vehicle sales. The majority of domestically produced vehicles, around three-quarters of them in 2000, are purchased by fleet buyers (Government and non-government). Domestically produced vehicles generally fall into the large vehicle category.

In addition, tariff levels may impact on the slow rate of turnover of Australian vehicles. Around 40 per cent of the Australian vehicle park is more than 10 years old (Figure 2-5). Therefore, improvements in fuel consumption take a long time to make a substantial impact.

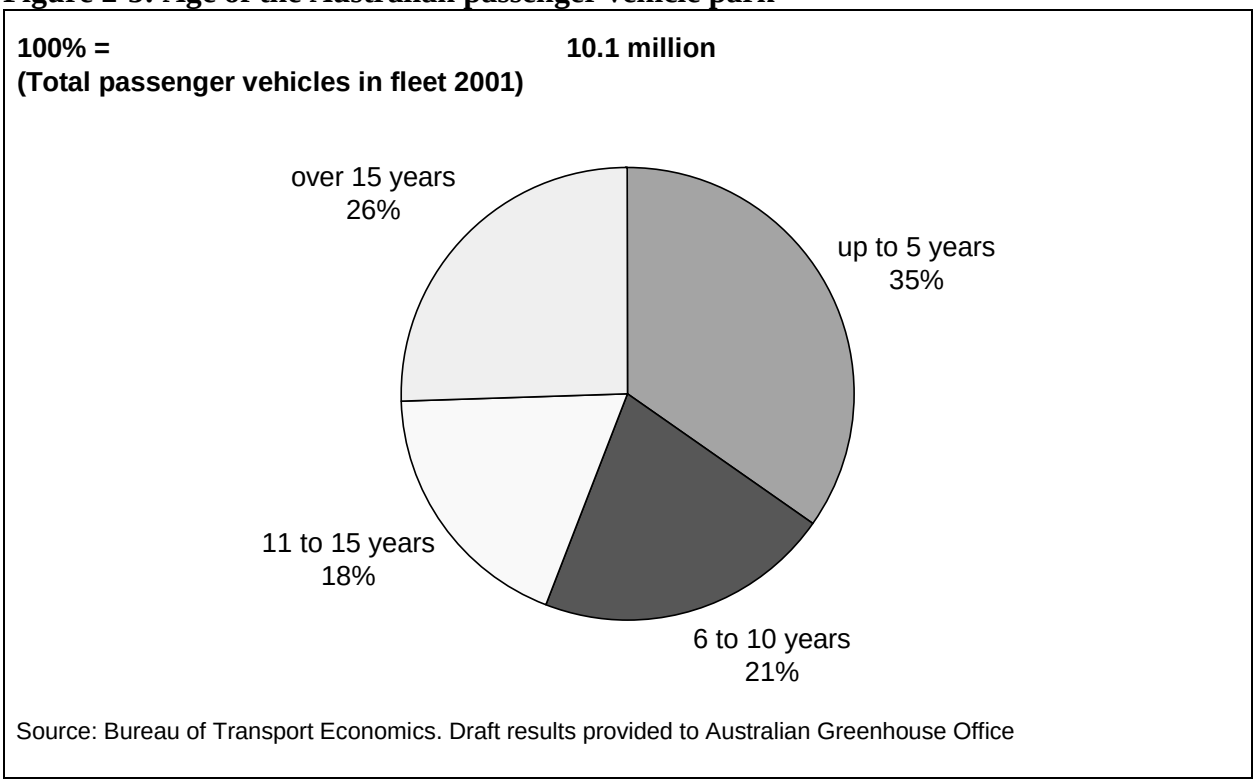
The age of the Australian vehicle park means that any new car entering the market could still be in use after 20 years (Figure 2-5). BTRE (2002a, forthcoming) suggest that it is likely that the higher prices for vehicles sold in Australia, resulting from the current tariff of 15 per cent, encourage motorists to hold on to their vehicles for longer, thereby slowing the penetration of emission-reduction technology and newer, more fuel efficient, vehicles in the national car park. Vehicle production itself is an energy intensive process, particularly from the production of steel and aluminium, but the high level of recycling of metal in vehicles suggests that turning the vehicle park over is likely to have a net benefit in terms of energy consumption and related emissions, so long as the newer vehicles consume less fuel than the older ones. The growth in all-terrain-wagon sales needs to be considered to reach a final conclusion.

Table 2-1: Fuel economy by vehicle class, 2001 (new vehicles)

Vehicle size or class	Petrol consumption (litres per 100km)*
Small/light vehicle	5.8 - 7.6
Medium vehicle	8.0 to 9.5
Large vehicle	9.0 - 10.0
All-terrain-wagons	9.5 to 14.0 plus
Other (luxury, sports, people movers)	8.5 - 10.0
New technology potential (eg. fuel cells, hybrids)	Negligible to 4.6

* Representative of best performers in the vehicle class
Source: Australian Greenhouse Office, Fuel Consumption Guide 2002

Figure 2-5: Age of the Australian passenger vehicle park



Source: Bureau of Transport Economics. Draft results provided to Australian Greenhouse Office

2.6 Estimated costs of environmental externalities

It is difficult to place a value on the impact of environmental externalities. However, it is possible to provide some indicative costs to understand the order of magnitude of the impacts.

In the context of improvements in fuel quality standards and tighter vehicle emission standards, the Environmental Economics Unit of Environment Australia estimated that from 2000 to 2019, avoided health costs from reduced levels of CO, hydrocarbon and particulate emissions, will amount to greater than $3.4 billion (Regulatory Impact Statement for the Fuel Quality Standards Bill 2000). An example of the costs per tonne is provided in Table 2-2 below. These estimates are based only on direct health costs, such as hospitalisation.

Table 2-2: Avoided health costs per tonne of emission

Emission type	AUD$ per tonne

Particulates	$17,600
Hydrocarbons	$1,500
Carbon monoxide	$13

Source: NSW EPA. Fuel Quality Standards Bill Regulatory Impact Statement, 2000.

The Inquiry into Urban Air Pollution (AATSE, 1997) points to improved air quality in Australia's large cities as not only having health benefits for the local community, but also wider benefits. The inquiry indicates that if just 5 per cent of international visitors were deterred from coming to Australia because of polluted cities, then the resultant drop in tourism income would be approximately $700 million per year.

Modeled estimates of the cost of greenhouse gas emission reduction range from $5 to $34 per tonne of CO_2-e (AGO, 1999). If the $5 per tonne estimate were used as a proxy for impact costs, it would suggest that the cost of abatement to offset the additional greenhouse gas emissions from the transport sector since 1990 might be in the order of $150 million per annum. It should be noted that this is based on estimated costs of abatement, rather than impact costs. The models that are currently used to estimate the costs of greenhouse gas emissions are not yet able to take into account the costs associated with the actual impact of climate change.

3 Increasing competitive pressure to improve environmental performance

SECTION SUMMARY

Many other countries are introducing more stringent environmental requirements for passenger vehicles, including tighter emission standards and lower fuel consumption targets. For example, the members of the European Automobile Manufacturers Association have agreed to target a 25 per cent improvement in fuel consumption over a 13-year period. In addition, consumers are seeking greater fuel economy.

At a global level, automotive companies are starting to consider the importance of environmental issues such as climate change in their long-term strategic planning.

Innovative vehicles, designed around fuel economy, low or zero emission targets, or the use of alternative fuels, have already emerged internationally, and more are expected. For example, hybrid vehicles are already available and some companies expect that fuel cell vehicles could be available in international markets by 2010.

In the domestic market, the share of the larger passenger vehicles produced by Australian automotive manufacturers has fallen from 36 per cent to 29 per cent between 1995 and 2001. Smaller, lighter cars with better environmental performance have in part taken the share. All-terrain-wagons, with relatively poor environmental performance, have also increased share.

As their overall share of domestic market sales has fallen, Australian vehicle producers have looked to export markets to deliver growth. The challenge for Australian manufacturers will be to ensure their products meet the new environmental performance expectations in export markets in the future.

Recommendation

That the Productivity Commission notes that Australian automotive producers risk restrictions in export market prospects as environmental standards tighten.

3.1 Consumer preferences and international environmental standards

Opinion on the role of consumer preferences in shifting towards greater environmental performance is varied. In 2000, the Australian Bureau of Statistics found that 'environmental impact rated last and had minimal impact on households in relation to buying a vehicle' (ABS Nov 2000). Only 2 years later, in 2002, British Petroleum found that Australian consumers are willing to pay as much as 6 cents a litre more for BP Ultimate. This came with the understanding that part of the purchase price will be used for investment in a series of recognised and accredited greenhouse gas abatement projects including methane gas capture, cleaner technology, renewable energy and tree planting. In Japan, car buyers are demanding low polluting vehicles that are equipped with clean exhaust systems. The Green Consumer Awareness Study (1997) found 74 per cent of buyers stated that they would buy an environmentally friendly vehicle even if it cost more (Japan Auto Trends, 1998). KPMG (2002) found that over 50 per cent of respondents to their survey of US car manufacturers and suppliers rated fuel consumption, alternative fuels and new technology as highly important or extremely important in the consumer's purchase decision over the next five years.

Many other countries are now introducing tighter environmental requirements using a range of policy instruments from voluntary agreements to taxes and regulated limits. Examples of these approaches, from the US and the EU, are provided below.

US

The US government has utilised both mandatory and voluntary agreements with the industry to drive down fuel consumption rates and emission levels.

- Corporate Average Fuel Economy (CAFE) standards are set under the Energy Policy and Conservation Act of 1975. It has been more than 20 years since the standard itself has been tightened, but it sets an important precedent in that if manufacturers do not meet the standards they are liable for a civil penalty (OECD, 2000).
- A government initiative known as the Partnership for a New Generation of Vehicles (PNGV) aimed to develop a prototype vehicle, by 2004, that would achieve a threefold improvement in fuel consumption while matching affordability, safety standards, performance and comfort of current passenger cars.
- Voluntary actions from industry have included the Ford Motor Company pledge to increase the fuel economy of its entire line of sports utility vehicles by 25 per cent, by the 2005 model year.
- The California Air Resources Board (CARB) program requires that 10 per cent of vehicle sales should comprise zero emission vehicles (ZEVs) by 2003. Partial ZEV 'credits' will be available for 'super-ultra-low emission vehicles' (SULEVs). Fuel cell and electric-hybrid vehicles may qualify for this category (OECD, 2000). Low emission vehicles can receive a tax credit of between US$1,000 and $4,000 over the period 2002-2006.

The European Union

The European Commission (EC) and the European Automobile Manufacturers Associations (ACEA) agreed, in July 1998, a voluntary average fuel consumption target that represents 140g CO_2/km in 2008. The target of 140g CO_2/km represents fuel consumption of 6.0 (petrol) or 5.3 (diesel) litres per 100km[1] and is an improvement of 25 per cent over a 13-year period. The European Commission also agreed a voluntary target of 140g CO_2/km with the Japan Automobile Manufacturers Association (JAMA) and the Korean Automobile Manufacturers Association (KAMA) for vehicles imported into Europe from Japan and Korea. JAMA and KAMA have until 2009 to meet the target. The EC has proposed another voluntary target of 120g CO_2/km for 2010 for the EU.

The ACEA agreement is already producing credible results with the average CO_2 emissions of new cars reduced from the 186g CO_2/km 1995 baseline to 174g CO_2/km in 1999. The CO_2 performance is consistent with achieving the 2008 commitment of 140g CO_2/km.

The OECD (2001) documents further initiatives across the European Union that demonstrate the move towards tighter environmental standards. These include: fuel tax increases to dampen private consumption in Denmark, Germany, Netherlands, Sweden and UK (the UK also has a CO_2 based excise duty that began in 2001); and vehicle ownership taxes proportional to engine displacement in Germany and Sweden. The latter includes some pollutant and CO_2 emission differentiation.

3.2 New technologies and alternative fuels

Emerging new automotive technology can significantly reduce greenhouse gas emissions and emissions affecting air quality. Although the new automotive technology is initially relatively high cost/low volume, significant progress is being made in bringing the technology to market. Internationally, some new technologies are on trial now and car companies expect others to be in

[1] Note that due to differences in the test cycle used to estimate fuel consumption it is not clear how the reported 6.0 litres per 100km compares with Australian targets. Figure 4-2 provides a more complete comparison.

production by 2010. Some of the new technologies are electric vehicles, including fuel cell vehicles and hybrid vehicles (these use a combination of petrol engines and electric motors, for example, Toyota Prius, and Honda Insight, of which low volumes are imported into Australia). Alternative fuels also have the potential to reduce greenhouse gas and air pollutant emissions.

Fuel cell vehicles eliminate exhaust emissions and have the potential to reduce greenhouse emissions. A fuel cell can be likened to a battery that uses the chemical reaction of hydrogen and oxygen to create electricity (Toyota - CARe for the Earth, 1997). The only emission is water vapour. Fuel cell vehicles would also achieve a major reduction in vehicle noise.

Several companies intend to have fuel cell cars available commercially in North America in the next few years. General Motors unveiled the fuel cell car 'AUTOnomy' in 2001. This is the first vehicle designed from the ground up around a fuel cell propulsion system and the first to combine fuel cells with drive-by-wire technology, which allows steering, braking and other vehicle systems to be controlled electronically rather than mechanically. General Motors has indicated a prototype will be available by the end of 2002 and production in the US could occur by 2010. PSA Peugeot-Citroen and Renault have also been engaged in a joint research program on the fuel cell and suggest that a fuel cell vehicle could be in production by 2010 at the latest.

The technology is also being applied to buses. By 2006 it is anticipated that, internationally, a fuel cell bus will cost the same as a compressed natural gas (CNG) bus, and that by 2008 costs will have reduced a further 10 per cent to be the same as a diesel bus. (*'Commercialization of Fuel Cell Buses: Potential Roles for the GEF'* workshop held by the United Nations in April/June 2000). The Western Australian Department of Transport proposes to work in collaboration with Daimler-Chrysler and BP Amoco in Australia to trial three hydrogen fuel cell buses in Perth for a period of 2 years as part of the Transperth fleet, starting in 2002. Environment Australia and the Australian Greenhouse Office are providing $2.5 million for the trial.

Hybrid technology, which combines a petrol engine with an electric motor to achieve significantly lower emissions and fuel consumption, is already available globally and in Australia. The Toyota Prius achieves 4.6 litres per 100km on the Australian city cycle test so that fuel consumption and CO_2 emissions are around half that of equivalent sized petrol engine car. Gross pollutant emissions are approximately 10 per cent of the levels specified in the Australian Design Rules. The vehicle does not compromise on safety or useability to deliver these results. It is comparable in cabin size to a Toyota Corolla Ultima Sedan, which has a fuel consumption of 8.5 litres per 100km. The Honda Civic Hybrid, which is on sale in Japan and the US, but not yet in Australia, is a 5 seat passenger vehicle and achieves fuel consumption of 3.4 litres per 100km.

Alternative fuels also have the potential to reduce greenhouse gas and air pollutant emissions, depending on the specific characteristics of the new fuel, whether or not they are blended with conventional fuels, and the nature of the manufacturing process used. For example, liquid petroleum gas (LPG) has up to 15 per cent lower carbon dioxide emissions, 20 per cent less ozone forming potential and 80 per cent lower air toxic emissions compared with petrol. LPG and CNG are examples of mature alternative fuels. Other alternative fuels include ethanol, biodiesel, biogas and hydrogen (the latter in the context of fuel cells described above). Ethanol and biodiesel are still relatively new and their environmental benefits depend on a range of factors (CSIRO, 2001). However, they do offer potential for a reduction in greenhouse gas emissions when used in compression ignition (diesel) engines.

A large number of governments already support and promote alternatively fuelled vehicles through infrastructure construction, price supports and public sector vehicle purchases. The primary goal is often to promote fuel self-sufficiency, for example in Pakistan and Argentina, but

other countries such as India and the EU are looking for both fuel self-sufficiency and environmental objectives. In Japan all assistance for CNG is based on environmental benefits, as there are no import-replacement benefits and negligible price advantages (various country reports, 7th International Conference and Exhibition on Natural Gas Vehicles, NGV: Transportation for the New Century, 17-19 October, Yokohama, Japan). Section 4.1 provides an overview of alternative fuel use and support in Australia.

There are currently around 7.5 million (mainly passenger) vehicles using LPG across more than 40 countries. Australia, Argentina, Italy, Pakistan and Brazil have small numbers of natural gas vehicles (using a combination of CNG and LNG). Ethanol has also been adopted in some countries (for example Brazil). The EC has a goal to replace about 20 per cent of petroleum and diesel used in the transport sector by 2020 with alternative fuels including natural gas, hydrogen and renewable biofuels such as ethanol and biogas. The use of gaseous fuels also has a role to play in easing the transition to a hydrogen-based economy since experience in storage, handling and pumping of gaseous fuels is directly transferable to hydrogen.

3.3 International automotive strategies

The selection of quotes from international automotive companies below illustrates that long-term strategies already reflect the importance of environmental issues and climate change.

– *Ford Motor Company, 2000 Corporate Citizenship report*

> ‘During the past year, we embarked on a process, informed by our stakeholders, of turning the climate change issue inside out, looking at it as an opportunity, as well as a fundamental challenge to our culture and way of doing business. Senior executives have made very clear their belief that the issue is real. The Company has moved to a position where we see climate change - and our response to it - as a key component of our long-term business strategies.
>
> There will be many ways to judge Ford in this first decade of the 21st century, many measures of success. None will be greater than our response to the issue of climate change.’

– *BMW Group Environmental Report, 1999/2000*

> ‘BMW aims to establish a future-oriented correlation between economy, ecology and society, to reduce environmental impact, to enhance the quality of life and to preserve individual mobility’.

– *Volkswagon, Environmental Report, 1999/2000*

> ‘Some of the key areas we all need to rethink include designing cars that are easier to dismantle, selecting appropriate materials and using secondary raw materials. Anyone who, like our suppliers, is involved in the creation of more than 60 per cent of a car’s added value must join forces with the manufacturers to share in the responsibility for responding to new end-of-life vehicle recycling issues and obtaining type approval for new models. This is a major new challenge that can only be compared to the introduction of catalytic converters in response to emissions limits’.

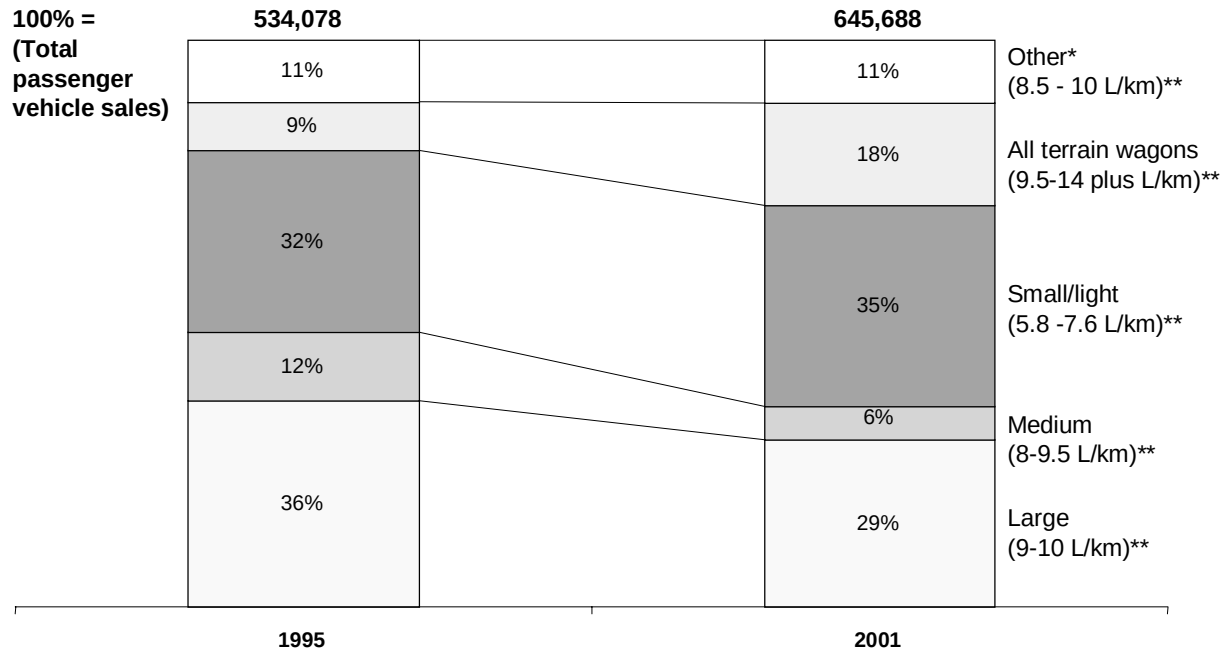
– *Toyota, CARe for the earth, 1997*

> ‘Toyota sees its mission as providing clean, safe products while working to ensure prosperous societies and a pleasant world to live in…we have set three important themes: global environmental measures for dealing with the causes of global warming, urban environmental measures for preventing air pollution caused by exhaust emissions; and effective utilisation of resources’.

3.4 Australian producers' target markets

The four Australian MVPs produced around 360,000 passenger motor vehicles in 2000. The majority of these vehicles fall into the large vehicle category and 227,000 of them were sold in Australia. The share of large vehicle sales has declined substantially in recent years, from 36 per cent to 29 per cent, with a switch to 'all-terrain-wagons' (up 9 percentage points) and smaller, lighter vehicles (up 3 percentage points) (Figure 3-1). While the shift to 'all-terrain-wagons' is of concern from an environmental perspective because of their higher rates of fuel consumption, the growth in popularity of the smaller vehicle segments is consistent with environmental trends outlined above.

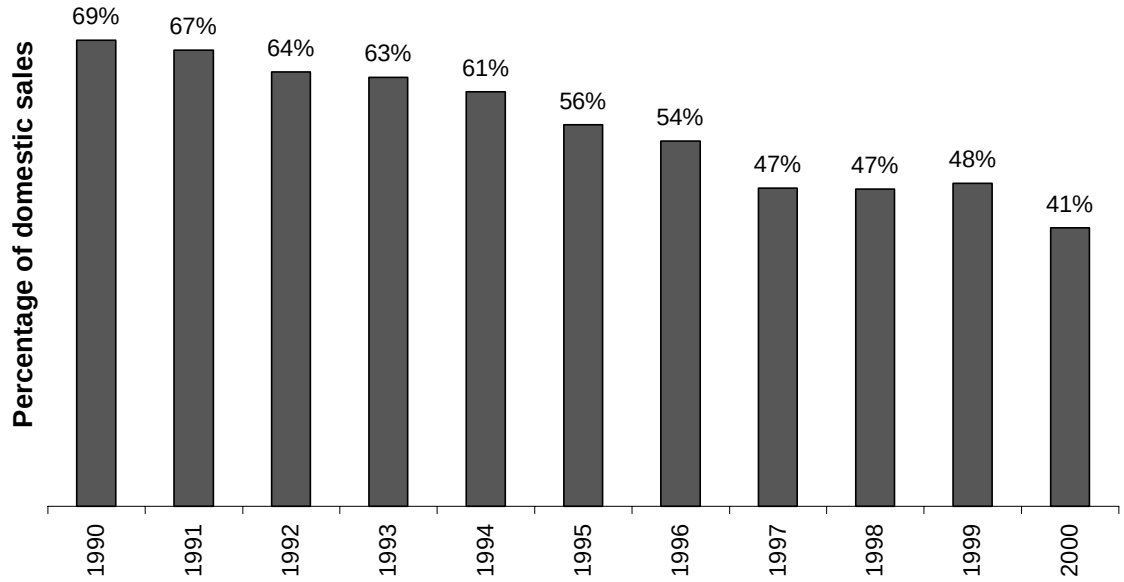
Figure 3-1: Share of new passenger vehicle sales, by vehicle type



* Sports, prestige, people movers, and luxury
** Range of fuel economy for top performers using city cycle, AGO fuel consumption guide
Source: VFACTS, market sales information 1990-2001; Australian Greenhouse Office, Fuel Consumption Guide, 2002

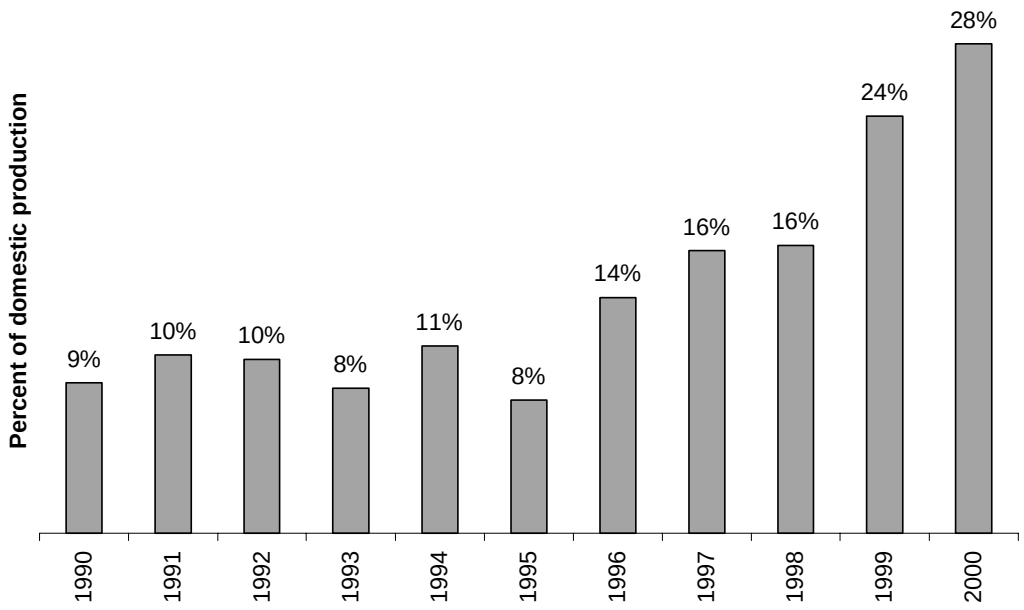
The overall share of domestically produced vehicles in the Australian market has fallen substantially from over 60 per cent in 1990 to 41 per cent of domestic sales in 2000 (Figure 3-2). Australian car manufacturers are therefore increasingly looking for export markets to deliver growth (Figure 3-3). There is a risk of restrictions in export market prospects as environmental standards tighten. The Middle East, where environmental standards are not stringent, currently represents a significant share of exports (31 per cent of the combined value of component and vehicle exports in 2000). Other key markets, such as USA (NAFTA), Korea and Japan (around 38 per cent of the combined value of component and vehicle exports in 2000), may become more difficult for Australian vehicle exports as standards tighten.

Figure 3-2: Locally produced vehicle share of domestic market



Source: Key Automotive Statistics, Department of Industry, Tourism and Resources, 2001, 2002

Figure 3-3: Share of domestic production exported, 1990-2000



Source: Key Automotive Statistics, Department of Industry, Tourism and Resources, 2001, 2002

4 Australia's performance against international trends

SECTION SUMMARY

Australia introduced changes affecting vehicle emission standards to the Australian Design Rules in 1999. The changes, which come into force by 2006, will match European standards adopted six years earlier. The next revision of Australian emission standards is not likely to take effect until after 2008.

The lag in adoption of these standards is likely to impact on potential commercial benefits.

National average fuel consumption (NAFC) for new vehicles in Australia is currently around 8.34 litres per 100km. In 1997, Government proposed a voluntary target for 2010 of 6.3 litres per 100km. This level of fuel economy could be expected in Europe between 2004 and 2007.

Recommendation

That the Productivity Commission note that Australian automotive products are behind international standards for environmental performance.

The Australian automotive industry has already made significant improvements in the management of environmental issues in the manufacturing process and in handling end-of-life vehicles, and is expected to continue to improve (section 6). On the other hand, the environmental performance of the Australian industry's product at the point of entry into 'in-service' life is behind standards set internationally.

4.1 Fuel and emission standards

Emission levels

The main regulatory mechanism for control of motor vehicle emissions in Australia is embedded in the Australian Design Rules (ADRs). The ADRs contain mandatory standards for motor vehicle safety and emissions under the Commonwealth *Motor Vehicle Standards Act 1989*. ADRs are applied to all vehicles when first supplied to the market prior to first registration in Australia, and are administered by the Commonwealth Department of Transport and Regional Services.

Through the 'Environmental Strategy for the Motor Vehicle Industry', the Commonwealth Government made a commitment to achieving harmonisation with international emissions standards by 2006. 'International standards' are taken to be those of the United Nations Economic Commission for Europe (UNECE). UNECE standards are technically equivalent to standards adopted in the European Union – known as the 'Euro' standards – and are to be adopted by most countries (NAFTA currently have their own standards).

A package of new vehicle emission ADRs became law under the Motor Vehicle Standards Act in December 1999. The new rules, ADRs 79/00, 79/01, 80/00 and 80/01, include the staged introduction of European standards for petrol and diesel vehicles, namely, *Euro 2*, *Euro 3* and *Euro 4* (for diesel only) emission standards over the period 2002 to 2006.

The ADRs to be introduced over the period to 2006 will lead to large reductions in emissions of oxides of nitrogen from petrol and diesel vehicles, and an 80-90 per cent reduction in particle emissions from diesel vehicles. Independent analysis indicates that the new vehicle standards, coupled with new standards for cleaner fuels, will deliver substantial reductions in all those emissions affecting air quality. Table 4-1 summarises the expected reductions in emissions by 2020.

Table 4-1: Estimated reduction emissions from new vehicle emission and fuel standards (associated with *Euro 2* and *Euro 3*)

Emission Type	Estimated Reductions in Emissions (2000-2020)
Carbon Monoxide	80%
Hydrocarbons	40%
Oxides of Nitrogen	70%
Particulates	35%

Source: Coffey Geoscience, 2000.

Australian adoption of *Euro 2* in 2003 will lag the EU by 7 years, adoption of *Euro 3* in 2005 will place Australia 5 years behind. The EU has already established *Euro 4* and *Euro 5* (heavy vehicles only) standards (Table 4-2) and will adopt *Euro 4* the year Australia moves to *Euro3*.

Table 4-2: Comparison of introduction times for emission standards

Euro Standard	Date Introduced in Europe	Date Introduced in Australia
Euro 2	1996	2003
Euro 3	2000	2005
Euro 4	2005	No date as yet

Source: DOTARS.

Increased market opportunities from higher standards

The adoption of UNECE standards at the *Euro 2* and *Euro 3* level is consistent with the Principles and Guidelines for National Standard Setting and Regulatory Action by Ministerial Councils and Standards Setting Bodies laid down by the Council of Australian Governments (COAG). The COAG principles state that wherever possible, regulatory measures or standards should be compatible with relevant international or internationally accepted standards or practices in order to minimise impediments to trade. Industry and Government are expected to achieve improvements in trade facilitation and administrative efficiency from adopting *Euro 2* and *Euro 3* standards.

In the regulatory impact statement for the introduction of fuel quality standards, the Department of Environment and Heritage (2001) noted that 'harmonisation with international fuel standards will result in commercial benefits for vehicle manufacturers as it facilitates the introduction of new technology and, therefore, market opportunities that would not be available without the cleaner fuels'. Manufacturers have stated that the engines designed to the higher emission standards have increased durability and improved fuel economy (DOTARS 1999).

The lag in adoption of these fuel and emission standards in Australia is likely to impact on these potential gains.

Fuel quality

Two fuel properties have the ability to affect the fuel consumption and the emissions profile of new motor vehicles directly: sulfur content (petrol and diesel) and research octane number (RON petrol).

Sulfur content is a relatively straightforward issue, the less sulfur the better for air quality reasons and catalytic converter longevity and performance. Information from vehicle manufacturers indicates that sulfur levels below 50ppm in petrol enable reliable use of new energy efficient technologies such as gasoline direct injection (GDI) and lean burn technologies. The Orbital Engine Company of Western Australia are world experts in GDI technology, and

expect in-service vehicle fuel consumption improvements of 8-12 per cent from GDI fitted to four stroke engines.

Higher octane rated fuels can support higher compression ratios, which are more fuel-efficient. As part of the research undertaken for the fuel quality review, vehicle manufacturers indicated a 2 per cent reduction in fuel consumption could be achieved by designing for higher-octane petrol (95 RON) compared with lower octane petrol (91 RON). This outweighs the 0.9 per cent increase in the energy intensity of production for the higher-octane rated fuel (Coffey Geoscience, 2000). Petrol is available at 95 RON in Australia, but higher prices for the higher-octane fuels and a lack of appropriately designed vehicles currently restrict more widespread use.

The quality of fuel in Australia was a key constraint to the introduction of new vehicle emission ADRs but the *Fuel Quality Standards Act 2000* now provides the framework for a national fuel quality standards regime. The first standards made under the Act for petrol and automotive diesel came into effect from 1 January 2002 (Department of Environment and Heritage, 2001).

Australia will introduce fuel quality standards for petrol to support *Euro 2* (500 ppm sulfur) and *Euro 3* (150 ppm sulfur) in time for adoption of those standards. However, the higher sulfur level in petrol until 2005 may inhibit the voluntary early supply of *Euro 3* vehicles to the market, as high sulfur levels can interfere with the operation of on board diagnostic systems required under the *Euro 3* standards.

The current EU standard for sulfur in diesel is 350 ppm with 50 ppm coming into effect in 2005 along with the *Euro4* emission standard. The EU is assessing introducing standards for zero sulfur in diesel and petrol (<10 ppm) but no date has been set. The current Australian standard for sulfur in diesel is 500 ppm, which comes into effect 31 December 2002 and will go to 50 ppm from 1 January 2006. Petrol is already at a maximum of 500ppm (premium unleaded petrol is at 150ppm) and will go to 150ppm from January 2005.

Future standards revision

Environment Australia and the Department of Transport and Regional Services will be jointly managing a 'Vehicle Emissions and Fuel Standards Review (*Euro 4* and *Euro 5*)' for further standard revision, starting mid to late 2002. The principal aim in reviewing the standards for both fuels (through the Fuel Quality Standard Act) and vehicle emissions (through ADRs) is to assess the benefits in air quality that could arise from the adoption of cost effective standards and engine operation. The oil and the automotive industries will be consulted during the review. Any new emissions or fuel standards will not come into effect before 2008 providing a five-year lead-time for the automotive and oil industries to adjust their practices to meet regulatory requirements. This implies that Australian emission standards will continue to lag international standards by a minimum of 3 years since *Euro 4* is scheduled for adoption in Europe in late 2005 (Table 4-2).

Alternative fuels

The *Fuel Quality Standards Act 2000* also provides the framework for the development of standards for other fuels. Environment Australia is currently developing standards for LPG and ethanol blends in petrol. It is also in the very early stages of assessing the development of standards for CNG and biodiesel.

The use of alternative fuels is beneficial where they are found to have positive greenhouse and air quality outcomes on a life-cycle basis. The use of alternative fuels is encouraged in Australia through excise exemptions for CNG, LPG and ethanol. In addition, the Commonwealth Government runs several programs designed to promote the use of alternative fuels.

- The Alternative Fuels Conversion Program (AFCP) provides a subsidy for converting original engines (petrol or diesel) to alternative fuel engines (LPG or CNG) in vehicles over 3.5 tonnes gross vehicle mass. This program does not target the markets of locally manufactured vehicles, which fall under the weight threshold.
- The CNG infrastructure program provides a subsidy towards the provision of publicly available refuelling points for CNG over four years. The Commonwealth expects that the level of funding available will lead to the development of up to 20 publicly accessible refuelling stations.
- The Diesel and Alternative Fuels Grants Scheme (DAFGS) provides a subsidy to alternative fuel purchases.

LPG provides an example of the potential for alternatively fuelled vehicles. LPG has been used in passenger vehicles in Australia since the 1960s and Australia now has the world's largest per capita consumption of 'Autogas' (LPG). There are close to 500,000 vehicles running on 'Autogas' in Australia. This is around 5 per cent of the Australian vehicle park (www.alpga.asn.au). The major users in Australia are taxi and government fleets. The rate of conversion from petrol to LPG powered vehicles peaked in the mid 1990s at around 60,000 vehicles per annum (Australian Liquid Petroleum Gas Association) but has declined in recent years as all Australian automotive manufacturers now offer either factory fitted dedicated or duel fuel options for an increasing proportion of their vehicles.

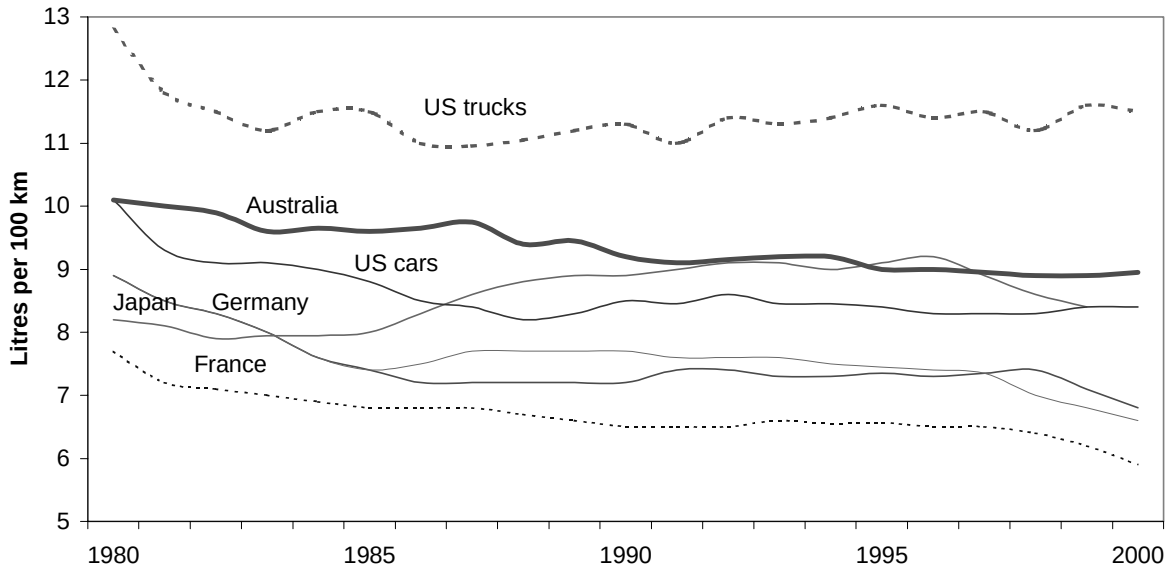
Ford Australia is the only Australian manufacturer that currently offers dedicated LPG vehicles. Dedicated LPG is available on automatic transmission Forte, Futura, Falcon S and XL/XLS Ute models. Ford has capitalised on their ability to manufacture these vehicles, and the international demand for them, to boost exports of Ford Falcon V6 and V8 dedicated LPG utilities. These vehicles comply with *Euro3* standards and are exported to the UK as 'Verte Tempests' (www.bordersautogas.co.uk/verte.htm).

4.2 Fuel economy

Improvement in fuel consumption has the potential to deliver significant long-term reductions in greenhouse gas and air pollutant emissions and is therefore a priority. In addition, small improvements in fuel economy are valuable to Australian car owners. At the average rate of 15,500 km travelled per car per year, an improvement in average fuel economy of new cars of one litre per 100km, assuming a fuel cost of 90c per litre, translates into an annual cost saving of $140 for every new vehicle owner. With around 500,000 passenger vehicles sold each year in Australia, that is an annual saving of $69.8 million dollars for Australian vehicle owners.

The current fuel consumption rate of new vehicle purchases in Australia is above international comparisons (Figure 4-1). National average fuel consumption (NAFC) targets have been in place since 1983 to encourage improved performance. NAFC is calculated as a weighted average of the fuel consumption rate of new vehicles sold in a given year. NAFC does not currently include vehicles with gross vehicle mass over 2.7 tonnes (such as all-terrain-wagons). As of 1 January 2003, ADR 79/00 will ensure the fuel consumption information is available so that these vehicles can be included in future NAFC targets.

Figure 4-1: New car fuel economy in selected IEA countries 1980 to 2000



Note: Data are for gasoline and diesel vehicles, with 1997-2000 European data adjusted to the older (pre-1997) test cycle for comparative purposes; fuel consumption is about 9 per cent higher with the new EU test cycle.
Source: IEA, 2001. Saving oil and Reducing Emissions in Transport, Options and Strategies.

In his 1997 statement 'Safeguarding the Future', the Prime Minister indicated the 'Environmental Strategy for the Motor Vehicle Industry' would include 'a 15 per cent fuel efficiency improvement target by 2010 over business as usual (BAU) through negotiation with automotive companies'.

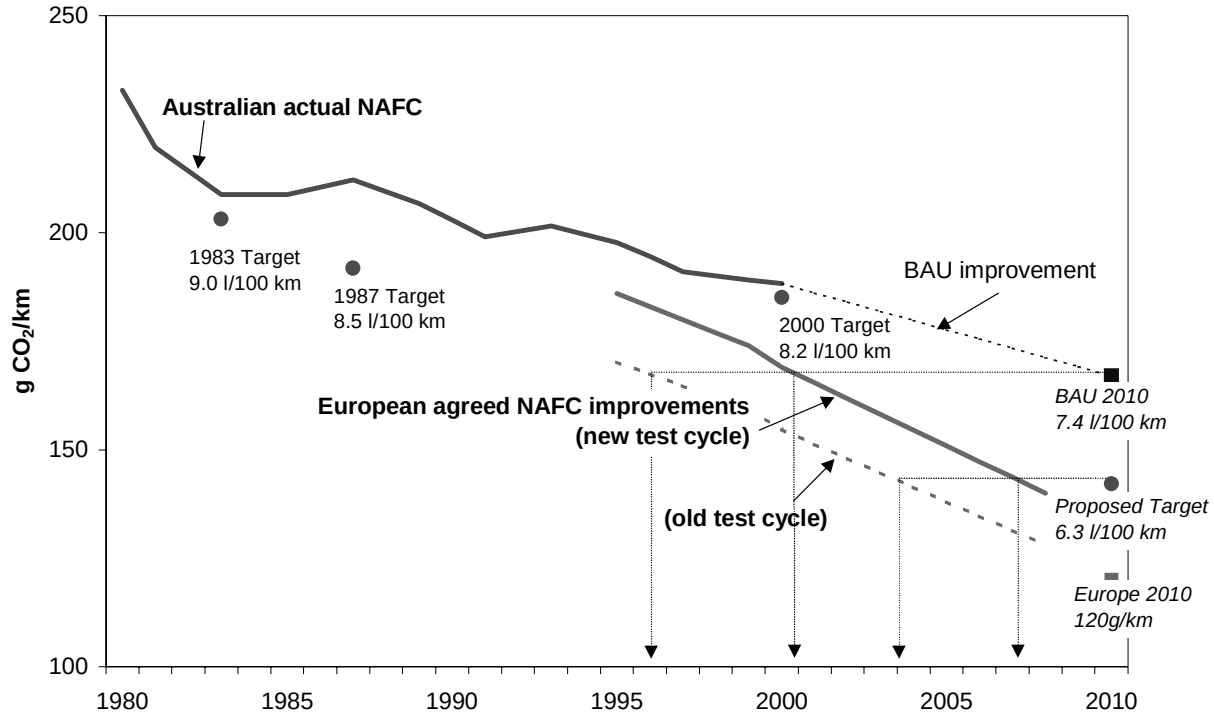
In 1999, the Australian Greenhouse Office and the Federal Chamber of Automotive Industries (FCAI) estimated BAU fuel consumption rates to 2010 (ACIL, 1999). The expected average fuel consumption in 2010 was estimated at 7.4 litres per 100km (ACIL, 1999). Recent analysis by the Bureau of Transport and Regional Economics (BTRE) also estimates 7.4 litres per 100km in 2010 under BAU (BTRE 2002, forthcoming).

In this context, the target of 15 per cent below BAU translates to 6.3 litres per 100km (Figure 4-2). To move from current fuel consumption rates to 6.3 litres per 100km by 2010, is in line with the rate of improvement expected in Europe, that is a 25 per cent reduction in the average fuel consumption of new vehicles over a 13-year period (1995-2008 for the EU and 1997-2010 for Australia).

Negotiations with industry on the target proposed in 1997 of 15 per cent below BAU have not yet concluded. Industry proposed a target in 2001 of 6.8 litres per 100km by 2010 (8 per cent below BAU) based on a 'cooperative' approach with Government.

Figure 4-2 provides a comparison of NAFC in Australia and Europe. If Australia reached 6.3 litres per 100km in 2010, we would be about 3 to 6 years behind Europe. Australia would be 10 to 14 years behind Europe if it improves at BAU rates to reach 7.4 litres per 100km in 2010.

Figure 4-2: Australian NAFC target versus actual, comparison with European targets



Note: The figures are presented in terms of g per km travelled rather than litres per 100km because the European target is expressed in these terms and is not easily converted to litres per 100km due to the mix of diesel and petrol engines. The Australian figures can be converted into g/km using the energy content of fuel (MJ/litre) and emission factor (g/MJ) since very few cars in Australia run on diesel. European data is shown for both the new UNECE R101 test cycle and the test used pre 1997. Australia will adopt UNECE R101 for consistency with Europe in 2003.

Source: European Automobile Manufacturers Associations (ACEA), ACIL (1999), and Australian Greenhouse Office analysis.

Actions to improve fuel economy

New vehicle technologies have the potential to reduce consumption of fossil fuels significantly. For example, fuel cell cars can potentially run on hydrogen derived from renewable sources (Section 3.2). In the meantime, engine design and vehicle size and weight of more conventional vehicles are the most significant ways fuel consumption can be reduced. A vehicle's weight is central to its performance (acceleration, handling characteristics, towing ability, fuel consumption and emissions) and its safety (braking, kinetic energy upon impact, component durability). A 10 per cent reduction in the average weight of a passenger car would lead to an 8-10 per cent improvement in fuel consumption (Australian Magnesium Corporation-Environmental Impact Statement 2000).

Motor vehicle manufacturers have sought to reduce vehicle weight through redesigning steel components using aluminium, magnesium and plastic. A number of aluminium-intensive cars are already being produced overseas, for example the Audi A2 and Subaru Liberty series. These lightweight metals are very energy-intensive to produce and underline the importance of designing vehicles for end-of-life recycling to capture the embodied emissions associated with the metals production (see also section 6). As an indicator of interest in magnesium, the Ford Motor Company has a invested some $30 million in the development of the Australian Magnesium Corporation's pilot production facility in Gladstone Queensland and has entered into a contract that would see it purchase nearly 50 per cent of the production of the full scale plant.

Apart from material substitution to reduce weight, the BTRE (2002a, forthcoming) lists a number of 'known technologies' available in the short to medium term that could improve fuel

consumption. These include aerodynamic improvements, advanced tyres and materials, electronic controls, gasoline direct injection, advanced diesel engines and advanced automatic transmissions. Improvements to spark ignition engines are estimated to have the potential for 5 to 15 per cent improvements in fuel consumption, for a cost of US$100-$200 per vehicle, within 5 years.

In addition, information can be made available to consumers to ensure that they are fully informed about the fuel consumption and other environmental performance characteristics of their vehicle choice.

Since January 2001, the Australian Design Rule 81/00 *Fuel Consumption Labelling for Light Vehicles* has required that all new vehicles up to 2.7 tonnes gross vehicle mass must carry a fuel consumption label on the windscreen at the point of sale. The label indicates the fuel consumption of the vehicle expressed as litres used to drive 100km and aims to raise consumer awareness of fuel-efficient cars and their role in reducing greenhouse gas emissions. The Government proposes, from 1 January 2003, to extend the application of the fuel consumption label to vehicles up to 3.5 tonnes gross vehicle mass and to show carbon dioxide emissions in grams per kilometre. The latter is aimed at raising consumer awareness of the greenhouse impacts of different fuel types.

A ‘Green Vehicles Guide’ has been proposed and would include information on measures of regulated noxious emissions, fuel consumption and greenhouse gas emissions, to allow comparison of performance on both greenhouse gas emissions and air pollution (DoTARS, 2002).

5 Post-2005 assistance arrangements for the automotive industry

SECTION SUMMARY

Post-2005 assistance arrangements for the automotive industry could be used to address externality costs and to stimulate the improvements in vehicle design, particularly relating to fuel consumption, needed for long-term competitiveness.

More direct approaches to internalising the externality costs could be used, but an incentive-based approach is preferred.

Recommendations

That the Productivity Commission consider:

- *Including environmental performance criteria, in particular fuel consumption targets, within any recommendation to extend the Australian Competitiveness and Investment Scheme or in parallel legislation;*
- *Adjusting tariffs to remove the existing distortion that favours vehicles with relatively poor environmental performance standards; and*
- *Adjusting other industry support mechanisms to align better with the aim of delivering improved environmental performance of the automotive industry. This could include government fleet purchasing policies.*

Improved environmental performance will reduce externality costs created by motor vehicle production and use. It will also allow Australian manufactured motor vehicles to compete in overseas markets with increasingly stringent environmental standards. Linking future automotive industry assistance to encouraging further improvements in vehicle design, particularly fuel consumption, can help achieve these benefits. In addition, adjusting other policies that affect the motor vehicle industry to align better with the objective of improved environmental performance would also be valuable.

5.1 Modification to the Australian Competitiveness and Investment Scheme (ACIS)

The ACIS takes the form of a production subsidy, an investment subsidy for plant and equipment and a research and development subsidy (the latter for component producers and tooling or service providers only).

There are a number of mechanisms by which environmental performance could be introduced into the ACIS to reduce environmental impacts and stimulate innovation. Considerations include the need to ensure the criteria are measurable, to ensure a link between the performance criteria and compensation under the ACIS and to maintain administrative simplicity.

Fuel consumption is a measurable performance criterion that could be incorporated into the ACIS.

The link between the performance criteria and compensation could potentially be achieved if any of the following were employed:

- Registration for participation in the ACIS was contingent on achievement of the performance criteria in the preceding year;
- Duty credits relating to production were only allocated to products that meet the performance criteria; or
- Application of duty credits was restricted to vehicle and component imports (particularly engines) that meet the performance criteria.

An example of an existing program that has included environmental targets that are linked with Commonwealth support is provided at Attachment B (Commercial-in-Confidence).

Alternatively, focusing the ACIS program more directly on research and development, or on investment for production of low emission vehicles, could assist vehicle producers to improve fuel economy or to address other design issues such as recyclability. This would have the effect of improving both environmental performance and competitiveness.

5.2 Parallel legislation of differential vehicle taxes or emission targets

Alternative approaches to stimulating improvements in fuel economy include differential vehicle taxes to encourage low emission vehicles, or mandated emission levels. These would be implemented in parallel with any extension to the ACIS scheme.

For example, on 20 November 2001, the NSW Premier announced a 'Cleaner Vehicle Plan' at the NSW Clean Air Forum. The plan includes a reduction in stamp duty for new clean vehicles, which are expected to have lower carbon dioxide and noxious emissions. The reduction in stamp duty is expected to be revenue neutral, which infers that vehicles that are less clean would pay a higher rate of stamp duty. A similar approach could be adopted nationally but would require parallel legislation in each jurisdiction. Another alternative would be mandatory fuel consumption targets.

While it is possible to regulate industry action, approaches based on incentives are likely to be more effective and are preferred under the existing light handed regulatory policy environment.

5.3 Preferential treatment of vehicles supplied by local producers for government fleet purchases

Fleet purchasing has been a significant contributor to the share of larger vehicles in the Australian vehicle park (Figure 2-2). Fleet purchases (non-government and government combined) represent three-quarters of the sales of domestically produced new vehicles. Ex-fleet vehicles are the major supply of large vehicles to the second hand car market. Once in service, they are likely to stay in operation for up to 20 years.

In 2001, Australian government fleet purchases comprised approximately 72,000 vehicles. This represents around 11 per cent of total PMV and all-terrain-wagon sales. The vehicle fleet for Commonwealth agencies under the *Financial Management and Accountability Act 1997* (FMA agencies) comprises about 14,500 vehicles, most of which are on leases of around 2 years.

Local manufacturers provide an incentive to the government in the form of price discounts for sales of domestic vehicles. Monthly leasing costs are based on the differential between the purchase price and the residual (resale) value of the vehicles. The newer, relatively unknown, technologies, such as the Toyota Prius or Honda Insight, have uncertain resale values (a market failure from incomplete information), and therefore give the domestic cars, with established resale markets a further advantage, due to information failure.

Many governments are considering how best to approach improving the environmental performance of their fleets. For example, in 1998, the Commonwealth indicated it would consider fuel economy and greenhouse gas emissions when deciding which vehicles to purchase or lease under the National Greenhouse Strategy. The NSW Cleaner Vehicle Plan mentioned above provides another example.

Consideration should be given to adjusting the existing purchasing arrangements to provide for the uptake of newer technology vehicles.

5.4 Tariffs and fuel efficient or low emission vehicles

As noted previously, over 40 per cent of the Australian vehicle park are greater than 10 years of age (BTE 2002). Older vehicles have poorer environmental operating performance in terms of

both fuel economy and air pollutant emissions. Although tariffs on PMVs have declined significantly, from 57.5 per cent in the mid-1980s to the current rate of 15 per cent (10 per cent from 2005), the tariff that remains on motor vehicles has a part to play in the slow turnover of the vehicle park. The tariff holds the cost of vehicles to the consumer above its natural level (BTRE, 2002a forthcoming).

Consideration could be given to exempting particularly low emission or low fuel consumption vehicles from the tariff post-2005.

5.5 Tariff on all-terrain-wagons

All-terrain-wagons (ATW), which are classified as commercial vehicles attract a 5 per cent tariff, but other passenger vehicles attract a 15 per cent tariff (10 per cent from 2005). This may create some distortion in the market towards greater purchases of larger, heavier vehicles in the ATW segment over smaller more fuel-efficient vehicles. Reclassifying ATW as passenger motor vehicles would induce a change in price of 10 per cent and could create a shift in demand towards passenger vehicles. However, these vehicles have remained popular in the US, even where the tariff rates on sports utility vehicles (a type of ATW) are set above PMVs.

6 Other environmental issues for the automotive industry to improve

SECTION SUMMARY

The automotive industry in Australia has reduced the environmental impact of its manufacturing processes and product disposal significantly over the past five to ten years. Further progress can be made through:

- Increasing disclosure of environmental performance through public environment reports by all members of the Australian automotive sector.
- Encouraging increased adoption and application of eco-efficiency frameworks and practices by the Australian automotive industry.
- Encouraging Australian manufacturers to promote and adopt the use of recycled oils as they become available both as in-service (post-sale) lubricants and as 'factory-fill'.
- Providing additional support from the Australian automotive sector for a consistent national approach to tyre recycling.
- Encouraging the use of warranty agreements to stimulate regular vehicle servicing.
- Phasing out the use of hazardous materials from locally produced vehicles over the next five years.
- Designing vehicles and components for disassembly to improve the efficiency and economics of recycling.
- Incorporating other vehicle design characteristics to improve general environmental performance.
- Investigating means of changing driver behaviour.

Recommendations*:*

That the Productivity Commission consider:

- *Providing incentives to pursue these environmental initiatives as part of assistance arrangements.*
- *Including consideration of environmental performance, on the dimensions above, into government fleet purchasing policy.*

Manufacturing issues - Environmental Management Systems and Performance Reporting

Throughout the world the manufacturing industry is seeking to improve its environmental performance. The most widely used mechanism for environmental management planning and improvement is the use of environmental management systems such as the International Standards Organisation's Environmental Management System (ISO 14001). Australian car manufacturers are using, or adopting, ISO14001 standards. Ford, Toyota and Holden have been accredited, Mitsubishi expects to reach accreditation standard in 2002. Many fewer of their component suppliers have such systems.

Eco-efficiency is recommended by the World Business Council for Sustainable Development as the key mechanism to improve both business and environmental outcomes simultaneously. The benefits to business include efficiency savings in energy and materials inputs, increased product output and reduced costs associated with waste generation and pollution. Environment Australia has produced an eco-efficiency booklet to assist business— *Profiting from Environmental Improvement in Business: an eco-efficiency kit for Australian industry*, Commonwealth of

Australia, January 2002. Increased adoption and application of these frameworks and practices by the Australian automotive industry would benefit both the environment and the industry.

Ford Motor Corporation Australia provided information to the Australian Greenhouse Office describing how their 'decision to pursue ISO 14001 certification and to require the same of its business partners benefits the environment and makes good business sense'.

In recent times, the company has issued a mandate to its suppliers providing goods and services that they too need to be certified to the International Standard ISO 14001. The establishment of an environmental management system (EMS) and the discipline that goes along with it has allowed Ford and its suppliers to identify opportunities to reduce energy and resource use and minimise waste, resulting in significant cost savings in addition to reduced environmental impacts.

Ford indicated to the Australian Greenhouse Office that there is evidence that implementation costs of projects identified through EMS can be paid back in less than one year.

As the trend to greater use of sub-assemblies continues, substantial amounts of the vehicles are manufactured and supplied by other businesses. To improve the environmental performance of the Australian automotive sector it is therefore necessary to improve performance throughout the supply chain (that is tier 1, tier 2 suppliers and so on). Greater adoption of EMS would assist.

It is also important that businesses publicly report their environmental performance in a robust and transparent manner, using such frameworks as the Global Reporting Initiative (GRI). An Australian guide for environmental reporting, consistent with the GRI has been developed by Environment Australia— *A Framework for Public Environment Reporting: An Australian Approach*, Commonwealth of Australia, March 2000. Increased disclosure through public environment reports by all members in the supply chains of the Australian automotive sector would assist in identifying further improvement opportunities.

In-service issues – waste lubricants and other fluids, tyres and air conditioning refrigerants and maintenance

Oil: On 1 January 2002 the Commonwealth commenced the Product Stewardship Arrangements for Waste Oil Scheme to encourage the increased collection and recycling of waste lubricating oils. These arrangements are directed at oil producers, collectors, recyclers and consumers of oil rather than at vehicle manufacturers. However, a primary objective of the arrangements is to encourage the environmentally sustainable management and *re-refining* of waste oil and its use. At least one business in Australia expects to be re-refining waste oil back into engine lubricant within the next year. During the development of the arrangements in late 1999, the Minister for the Environment and Heritage wrote to the CEOs of the MVPs in Australia to ascertain their company policies on the use of re-refined lubricant. All four MVPs replied indicating that providing that the re-refined oils meet the appropriate standards there are no obstacles to their use in their vehicles and that this would not compromise warranties. The Australian manufacturers should be encouraged to promote and adopt the use of re-refined oils as they become available both as in-service (post-sale) lubricants and as 'factory-fill'. Around 11 European manufacturers are known to accept the use of a re-refined oil, made by Viscolube in Italy, in their vehicles. Amongst these manufacturers, both Mercedes Benz and Volkswagon are known to use re-refined lubricants as factory fill in some models.

Tyres: Around 18 million equivalent passenger units of waste tyres are generated annually in Australia. Seventy per cent of tyres are not recycled: 57 per cent are currently going to landfill with a further 13 per cent being disposed of inappropriately into the environment. Environment Australia is currently exploring options for increasing the recycling of tyres to reduce waste. The domestic tyre manufacturers and importers broadly support improved environmental

outcomes by reducing tyre waste. Additional support from the Australian automotive sector for a consistent national approach to tyre recycling would be beneficial.

Refrigerant: Vehicle air conditioning systems are a growing source of synthetic greenhouse gas emissions. Synthetic greenhouse gases have a very high Global Warming Potential (GWP) relative to CO_2. In 1990 approximately 50 per cent of passenger vehicles had air conditioning systems, today that figure is closer to 90 per cent and is expected to continue to grow towards saturation. New vehicles are using a synthetic hydrofluorocarbon refrigerant, HFC-134a with an average charge of 1.5kgs per vehicle. As the GWP of HFC-134a is 1,300, and leakage rates from the system can be as high as 20 per cent per annum, each vehicle could emit around the equivalent of 400kgs of CO_2 per annum. Given the growth in air-conditioned vehicles, the Australian Greenhouse Office expects that leakage from air conditioning systems will be the major source of synthetic greenhouse gas emissions in the future. A move to hydrocarbon-based refrigerants in air conditioning requires design changes to prevent leakage, but results in significant greenhouse savings. The United Nations Environment Program and the European Commission have established the Mobile Air Conditioning Climate Action Partnership. Australian industry would benefit by becoming involved.

Vehicle maintenance remains an important factor in continuing the emissions benefits gained through tighter vehicle emissions and fuel standards. The National In-Service Vehicle Emissions Study (NISE 1) reported in 1996 that effective maintenance practices could save up to 26 per cent of CO emissions, 9 per cent of NOx and 21 per cent of hydrocarbons (Table 6-1). Once in service, vehicles' emission performance can gradually deteriorate and inevitably some will be subject to abuse and tampering. Current trends suggest that increases in both car usage and total vehicle population will outweigh the benefits of these tighter standards unless strategies for maintaining vehicles whilst in-service are developed.

Table 6-1: Average emission reduction from tuning and maintenance

	All Cars in Study	ADR27 Cars	ADR37/00 Cars
HC	16%	14%	21%
CO	25%	26%	24%
NOx	9%	8%	9%

Source: Federal Office of Road Safety, 1996. Report on the National In-Service Vehicle Emissions Study.

Current ADR standards only apply to new vehicles entering the market prior to registration and not vehicles once they are in-service. Environment Australia is currently developing a project to update Australia's in-service emissions profile for passenger vehicles (NISE 2). Vehicle manufacturers could be encouraged to use warranty systems to stimulate more regular vehicle servicing.

End-of-life and vehicle disposal issues – recycling and de-pollution

Environment Australia has researched the environmental impacts of end-of-life vehicles and expects to release a public information paper shortly (Department of Environment and Heritage, 2002a).

Vehicles are already amongst the most highly recycled of consumer products with an estimated 90 per cent of the half million vehicles that reach the end of their lives each year in Australia, being recycled to recover metals (comprising 70 per cent of vehicles by mass). The increasing use of plastics (from 5 per cent in the mid 70s to around 10 per cent currently), while having benefits in reduced fuel consumption, has not improved the viability of recycling vehicles due to low commodity value of plastics (currently at around $2 per kilogram). However, the increasing use of light alloy non-ferrous metals with much higher commodity values than ferrous metals creates incentives.

In the process of recycling metals, the vehicles are shredded. The non-metallic shredder waste is known as 'flock'. Estimates suggest that up to 195,000 tonnes of 'flock' may be going to landfill each year. Flock is comprised of plastics (a rapidly increasing portion of vehicles), foams, glass, rubber and some portion of metals that are not captured during the shredding process. Flock contains a significant quantity of potentially useable resources that are currently lost if landfilled. The flock contains potentially hazardous materials such as lead, zinc, cadmium, mercury, hexavalent chromium, PCBs, some motor oil, petrol and other fluids (transmission, brakes etc) all with the potential to leach into the environment. Recycling of non-metallic materials is greater in Europe than in Australia.

The simplification of plastics and foam 'recipes' coupled with appropriate *uniform* coding to identify plastics so that they can potentially be recycled would assist recyclers to strip, identify and recover plastics for aggregation and recycling. In addition, designing vehicles and their components for disassembly would greatly improve the efficiency of recyclers and improve the economic viability of recovering some materials, particularly plastics, that are currently lost into shredder flock. Design for disassembly is also often compatible with, or complementary to, design for assembly and may provide assembly and energy savings for manufacturers. Manufacturers should be encouraged to pursue and consider these issues when designing new models and to work with the automotive recycling industry to increase material recovery for appropriate recycling.

While de-pollution of vehicles by recyclers (ie draining of petrol, oils and other fluids) will reduce some of the environmental risk of flock disposal, it is clearly desirable to reduce, and if possible eliminate, the hazardous material content of new vehicles to improve end-of-life outcomes. Elimination of toxic metals such as chromium is already occurring in Europe. Materials such as lead and PCBs have been used in many plastics to provide UV stability and to plasticise the material. Reducing these materials or using more benign alternatives will reduce the environmental risks. During recent research, Australian manufacturers identified that they would be willing to consider phasing out the use of a range of hazardous materials from locally produced vehicles over the next five years.

Other vehicle design issues

Australian vehicle manufacturers can also use other specific design considerations to improve the environmental performance of their vehicles:

- Particle traps/filters can deliver large particulate matter emission reductions in specific applications. To be effective they need to be carefully tailored to particular engines and in-service use patterns.
- Use of on-board diagnostics (OBD), for example OBD can provide information on levels of oxygen and carbon monoxide in the exhaust and signals the computer with information on the most effective fuel mix to maximise performance. OBDs will be included as a requirement to meet ADRs relating to *Euro 3* (though not necessarily giving emissions performance data).

Changing driver behaviour

The Parliamentary Secretary to the Minister for Transport and Regional Services, met with the Australian Association of National Advertisers (AANA) in April 2002, over concern that an increasing number of ads place undue emphasis on speed, power, and aggressive driving behaviour. Advertising codes in both the United Kingdom and New Zealand have already set a precedent for more stringent codes regarding the portrayal of excessive speed. The Government is seeking to amend the Australian 'Advertiser code of ethics' to improve safety concerns. There is a strong connection between motor vehicle safety and environmental concerns. For example,

higher vehicle speeds result in higher fuel consumption as well as increased safety risk. At 110 km/hour a car uses up to 25 per cent more fuel than it does at 90 km/hour.

Motor vehicle advertising could be used to influence driver behaviour towards minimising environmental impacts and enhancing safety. For example, promoting low fuel consumption in advertising would enhance consumer demand for this characteristic and help reduce greenhouse gas emissions from transport.

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Appendix A: References to specific questions posed by the Productivity Commission in the first circular (Call for Submissions)

Issue raised in Productivity Commission call for submissions	Reference
Industry information and performance	
What are the main factors likely to influence demand for motor vehicles in Australia over the next decade?	Section 2.5 Section 3
Industry opportunities and impediments	
What are the emerging opportunities for the Australian Automotive industry? Will these mainly arise in export markets or will the domestic market provide new opportunities?	Section 3
To what extent do tariffs and tax arrangements influence the range of vehicles sold in Australia	Section 2.5 Section 5.4 Section 5.5
Are firms encountering significant trade barriers (tariff and non-tariff) or other difficulties in furthering development of export markets?	Section 3.3
What are the implications for the Automotive sector of Government initiatives such as: • The national average fuel consumption target of 15 per cent over business as usual by 2010 • The international harmonisation of ADRs • Other road safety and environmental initiatives	 Section 4.2 Section 4.1 Section 6
Post-2005 assistance arrangements	
How have previous and current assistance arrangements influenced the structure, competitiveness …of the automotive manufacturing industry?	Section 2.5 Section 4 Section 5
In the period between 2005 and 2010 is there a case for changing the current tariff arrangements for LCV and 4WD vehicles?	Section 5.4 Section 5.5
How effective is ACIS in meeting its objectives? Has it had any unintended or undesirable impacts? …would modifications to the system be required?	Section 5.1
Is there a case for retaining/modifying the preferential treatment for vehicles supplied by local producers under government vehicle park arrangements?	Section 5.3

Appendix B: Commercial in Confidence