Closing the 4WD 'loophole' to Improve Australia's Energy Efficiency

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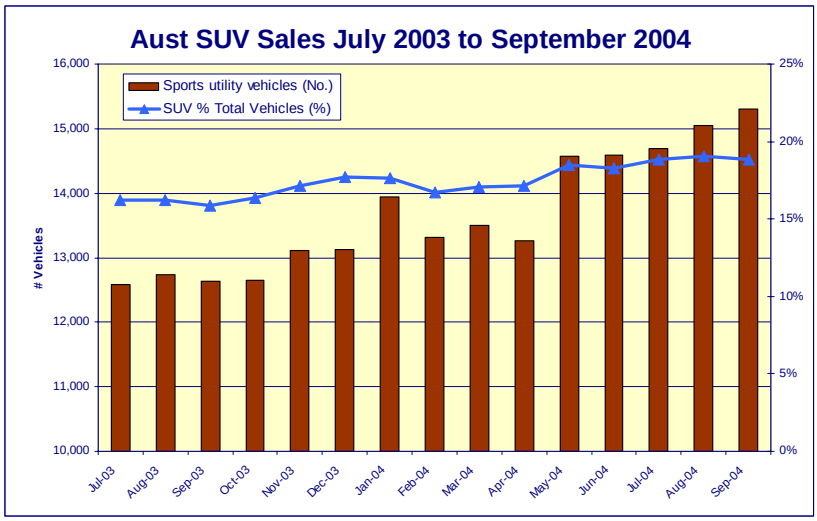
…" the critical objectives for environment and development policies which follow from the need for sustainable development must include ….satisfying human needs, addressing the problems of population growth and of conserving and enhancing the resource base, reorienting technology and managing risk, and merging environment and economics in decision-making;"
(World Commission for Environment and Development, 1987)

Contents

4WD's – What's the Fuss About?

Four Wheel Drives (4WDs) are now commonly called Sport Utility Vehicles[1] (SUVs) reflecting a change in the market perception of these passenger vehicles. Where previously 4WDs were considered workhorses for the mining and agricultural industries, they have now become reflective of a 'lifestyle' choice by many consumers in the Australian (and American) markets. Growth in 4WD sales in Australia has grown from a mere 3% of new vehicle sales in 1979 (Cregan et al, 2002) to approaching 20% in September 2004 (Australian Bureau of Statistics (ABS), 2004b). As shown in the graph below, even in the last year, the total number of passenger vehicles has not kept pace with the growth in SUVs leading to SUVs being a significant segment in the Australian fleet, mainly to the detriment of other, generally more fuel efficient passenger vehicles.



Source: ABS (2004b) Based on the seasonally adjusted monthly new sales statistics (Refer Appendix 1 for table)

As SUVs are relatively less fuel-efficient than other passenger vehicles, the result in growth of the SUV market has led to a relative decline in fuel efficiency of the fleet. Today, fossil fuel consumption across the world has increased 4.7 times on 1950 levels (Sawin, 2003) and now accounts for 77% of the world's energy production. Worldwide, SUV production reached 15.8 million units in 2002 (a 6% rise on 2001) (Renner, 2003). SUVs are now becoming a significant source of air pollution, including green house gases (Renner, 2003), which is primarily due to their reduced fuel efficiency compared to other passenger cars.

Increased Green House Gas Emissions

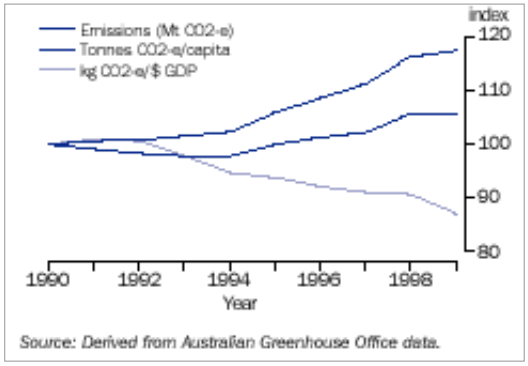
Disruption of the carbon cycled by increased carbon emissions from burning fossil fuels, is contributing to raised temperatures in the oceans, and on land, which results in 'climate change phenomena' (Intergovernmental Panel on Climate Change (IPCC), 2001). As a result, changes to the biosphere are highly likely including altered rainfall patterns, rising sea levels and increased probability of extreme weather events (IPCC, 2001).

These changes will detrimentally impact the medium to longer term productive capacity of the earth putting more strain on remaining arable lands to support a growing and increasingly consumptive population (Worldwatch Institute, 2003).

It is difficult to estimate the economic impacts that climate change will have on the Australian economy. The IPCC estimates predict that Australia will be hard hit (IPCC, 2001). Australian

[1] The terms '4WDs', 'SUVs' and 'ATVs' (All Terrain Vehicles) will be used interchangeably for the purpose of this discussion.

communities are already experiencing severe water shortages after years of drought. Recent violent storm events, particularly damaging hale storms and floods have resulted in enormous insurance payouts (Unknown, 2004).



If wealth is measured by Gross Domestic Product (GDP), then increased carbon dioxide emissions do not appear to have had an impact to date (refer Graph (ABS, 2002)). However, GDP though commonly used, is generally agreed to be a very poor measure of the well being of a country as it fails to measure the social and environmental consequences of economic activities but includes their destructive costs (Eslake, 2002; Redefining Progress, 2004). Other measures such as the Genuine Progress Indicator (Eslake, 2002; Redefining Progress, 2004) or the Well Being Index (Sawin, 2004, p41) may give a better indication of the impact of increased green house gas emissions on Australia's well being over time.

As previously stated, the impacts of climate change are difficult to quantify with confidence. In contrast, we hear nearly daily estimates by financial experts (Hay, 2004) of the impacts of increasing oil prices on the Australian economy. An increase of $10/barrel is predicted to subtract 0.3% from Australia's GDP (currently trending at 4.1% (ABS, 2004a)). Further 'downstream' negative impacts may also be observed. It is therefore timely, if merely for economic reasons, without considering the impact of climate change to consider the relative efficiency of Australia's energy consumption. As noted above, transport is the major consumer of oil in the Australian market and increasing the relative energy efficiency of transport will deliver economic benefits to Australia.

Productivity Commission Inquiry into Energy Efficiency

The Hon. Peter Costello, Treasurer of the Australian Government has commissioned the Australian Government Productivity Commission 'to inquire into the economic and environmental potential offered by energy efficiency' (Productivity Commission, 2004). Responses are specifically requested on:

- The **economic costs and benefits** arising from energy efficiency improvements
- Existing and recent **Australian and state government** energy efficiency programs
- **Barriers and impediments** to improving energy efficiency
- **Potential for energy efficiency improvements** that are **cost effective** for individual producers and consumers, and
- **Policy options** for energy efficiency improvements (Productivity Commission, 2004).

The focus of the inquiry is to 'examine energy improvements that are 'privately worthwhile'. Those energy efficiency improvements that may provide a net social benefit (including environmental benefits) but are absent of 'private benefit' are not specifically targeted by the terms of the inquiry' (Productivity Commission, 2004, p12). It should be noted that it is difficult

to separate social benefit from private benefit, particularly in terms of environmental good as the environment provides services such as productive soils and clean air that is a benefit 'privately' as well as 'publicly' received by individuals.

Aim

The aim of this paper is to analyse the energy efficiency of 4WDs in the context of the Australian fleet with reference to overseas experience. Recommendations for measures to contain the impact of SUVs on the environment and the economy will be made.

Energy Efficiency

Energy efficiency is defined as 'maintaining or increasing the level of useful output or outcome delivered, while reducing energy consumption' (Productivity Commission, 2004, p13). In considering the impact of energy efficiency, the energy consumed from all inputs to the service or product should be taken into account. This means that an energy saving in one step of production or operation may in fact cause an increase in energy use in a different part of the process. For example, to reduce fuel consumed per distance travelled by the substitution of more energy intensive materials, such as aluminium to reduce the weight of a vehicle. The net impact of energy consumption over the life of a vehicle should therefore be taken into account.

What are the benefits of cost-effective energy efficiency?

Economic, environmental and social cost effective energy benefits are available by changing the Australian passenger fleet mix.

Economic benefits

Improvements in the fuel efficiency of the Australian passenger fleet are a cost-effective mechanism to reduce the cost of living for families. The cost of the Australian fleet is a mix of purchase (capital) and operating costs. Information is freely available to consumers indicating the operating cost of their vehicles (Australian Government, 2003; RACV, 2004; USEPA, 2004). As shown in the table below, 4WDs are substantially more expensive to run than lighter passenger cars.[2]

Table: Comparative Private Vehicle Operating Costs (RACV, 2004)

	Toyota Corolla, 1.8L, 4cyl Auto	Toyota Camry Csi Sedan, Auto	Toyota RAV4, Edge 4D Auto	Toyota Land Cruiser, GXL Auto
Fuel (cents/km)	8.02	10.03	9.53	16.25
Total Average $/km	0.45	0.49	0.57	0.98
Total Average $/week	$130.34	$141.82	$165.30	$283.25

[2] Prior to 1 January, 2004, vehicles over 2.7 tonnes did not have to provide fuel efficiency or greenhouse information to the EPA under Australian design rules. This loophole has now been removed and only those vehicles >3.5 tonne fuel efficiency need not be reported. Note: Under the former rules, some manufacturers volunteered this information (Davis, 2003).

Switching from a Land Cruiser to a Camry generates after tax savings of $141.43/week or $7,355 per year. Burns (2004) suggests that merely changing from a heavy vehicle to a lighter choice is the equivalent of the return expected from an investment of over $100,000 on the stock market. It should be noted that not all of these savings will be achieved if drivers elect to increase kilometres travelled, creating the so-called 'rebound effect'. Estimates of the rebound effect range between 20 and 40 per cent depending on the price of fuel (IPCC, 2001). Using 40% rebound as a worst case scenario, this still return $4,410 per year for the consumer (or $48,500 after tax over the 11 years).

Technology Changes

Engine technologies have substantially improved over the last 20 years. These gains in efficiency have been largely offset by increased vehicle power and weight and by the large growth in the SUV market (Cregan et al., 2002). Review of energy efficiency as a product per unit of weight reveal that in both Australia and the United States, fuel use (L/km) per unit of weight (GVM in tonnes) have decreased on average by 1.3% per year for the last 20 years. In parallel, buyers are purchasing much heavier and more powerful cars. As a result; the average fuel use per maximum output has decreased by 45% but the fuel consumption of the new fleet has only slightly declined. The increase in 4WD sales is believed to be the major contributor to this effect. This growth means that instead of enjoying a potential 45% increase in engine fuel efficiency in the fleet; National Average Fuel Consumption (NAFC) improvement has been limited to 10% (Cregan et al., 2002). This effect mirrors the trends in the United States where the USEPA stated that a 20% saving in fuel efficiency could be achieved if the vehicle fleet had the same performance and weight distribution now as in 1987 (Hellman & Heavenrich, 2004). The BTRE (2002) study concludes that if markets continue to value power, weight and accessories, improvements in NAFC will not stem from technological change.

In summary, Australia has an average long fleet life (11 years) with over half the cars purchased 20 years ago, still on the road today (Cregan et al., 2002). These facts demonstrate that decisions that determine fleet mix today will impact the relative NAFC of the Australian passenger fleet in the medium to long term.

Environmental benefits

The Australian Bureau of Transport and Regional Economic (BTRE) (2002), reports that road transport is responsible for about 85% of total transport green house gas (GHG) emissions. Passenger vehicles account for over half of all transport GHG emissions. Greenhouse emissions are rising in absolute terms (17.4% between 1990 and 1999) as well as on a per capital basis. Road transport emissions are growing at a slightly higher rate than total GHG emissions (BTRE, 2002).

Different fuels contain different amounts of energy and carbon. Thus, combustion of one litre of fuel will generate different amounts of carbon dioxide depending on the fuel type and demand from the vehicle. This relationship is shown in the following table.

Table: Greenhouse Gas comparison by fuel efficiency and fuel type (Australian Government, 2003)

CO_2 Emissions (kg per 100 kms)	Petrol	Diesel	LPG
6L/100 km	13.8	16.2	9.0
8L/100 km	18.4	21.6	12.0
10L/100 km	23.0	27.0	15.0
12L/100 km	27.6	32.4	18.0
15L/100 km	34.5	40.5	22.5

As discussed above, SUVs have poorer fuel efficiency than the average passenger vehicle and thus contribute more to greenhouse gas emissions. By switching to a more fuel efficient passenger vehicle, travelling on average 15,000km per year for on average 11 years, will save ~19[3] tonnes CO_2 per vehicle. Given that over 205,000 new SUVs sales have been recorded in the last 12 months (ABS, 2004b), this would represent a total saving of ~3,890,000 tonnes of CO_2 emissions over the life of vehicles purchased in the past year. Substitution of lighter more energy intensive materials such as magnesium alloys will improve fuel efficiency (Australian Magnesium Corporation Australia, 2004) but may contribute to increased greenhouse emissions of the vehicle when production inputs are taken into account.

Social costs and benefits

Changes in the mix of Australia's light vehicle fleet (everything but trucks and buses) also impacts on the safety of the road transport. Recent research undertaken at the Monash University Accident Research Centre (MUARC) clearly demonstrates that SUVs increase the danger of injury to other motor vehicle passengers and pedestrians. By measuring crash worthiness[4] and aggressivity[5] towards other cars and pedestrians, MUARC calculates the Total Safety Index (TSI), which measures the average risk of death or serious injury amongst drivers or unprotected road users. The studies concluded that:

- **Removal of 4WDs** from the Australian fleet and replacement with a proportionate mix of other vehicles will **improve the overall safety** of the current or projected Australian fleet. (Newstead et al., 2004b).
- 4WDs, compared to other vehicle types are **over-involved in casualty and fatality crashes** occurring in high speed zones (>75km/hour), and particularly **overly represented in rollover crashes** in low and high speed zones (Federal Office of Road Safety, 2004).
- 4WDs have statistically significantly **worse crash worthiness** in single vehicle accidents than small, medium, large and luxury cars (irrespective of whether a rollover occurred).
- **Unprotected road users significantly suffer more severe outcomes** from a collision with a 4WD than with any other type of light vehicle (Newstead et al., 2004a).
- **90% of children killed** in driveways are run over by 4WDs (James, 2004).

[3] From 15L/100km to 10L/100km = 11.5kg/100kms for 15,000kms x 11 yrs = 18,975 kg CO_2/vehicle
[4] **Crash worthiness** is the risk of death or serious injury to the passenger of the light passenger vehicle involved in an accident where at least one vehicle is towed away from the scene
[5] **Agressivity** is the risk of death or serious injury to the unprotected road user in the crash given they were injured. (Newstead et al, 2004b)

- Drivers and passengers of other vehicles **are more likely to be severely injured** in crashes with 4WDs (Newstead et al, 2004a).

The MUARC studies conclude that 4WDs score poorly in crash worthiness and aggressivity because they are not subject to the same Australian safety design rules (ADRs) as other passenger cars as they are not currently classified as 'passenger vehicles or derivatives' (Federal office of Road Safety, 2004; Newstead et al, 2004a).

So what does this mean for the individual? Mr Harold Scuby, President of the Pedestrian Council of Australia sums up a view. "What a selfish thing to be buying. You gas guzzle, you block everyone's sight, you have more likelihood of killing someone in an accident with a normal car, and you are more likely to roll over and kill someone" (Coslovich, 2004).

Barriers to Improving Fleet Energy Efficiency

Market perception, favourable government policies and regulations and lack of information promote the further growth of the Australian SUVs fleet and therefore reduce the likelihood of improving the efficiency of the Australian passenger fleet.

Market Perception

Marketing pitches to encourage SUV sales focus on 'lifestyle' choices. Sales staff and catalogues use terms such as 'trendy', 'look better', 'offer a different lifestyle', 'security', 'versatility', 'increase road vision' and 'easier to carry children' (Ziffer, 2004) and some dealers call them 'badges of virility' (Coslovich, 2004). Fuel efficiency apparently is not a concern of light to medium sized 4WD buyers. (Ziffer, 2004) The following examples better illustrate the point:

2.4L VVT-I RAV4 'Its been beefed up'

Source: http://rav4.toyota.com.au/Rav403/HomePage/0,,,00.html

"It's new. It's tough. And it's ready to go. From the urban jungle to the great outdoors, this is a car built for the drive." (Honda Corporation, 2004).

The Automotive industry sees these changes in the market as an expression of customer choice. Peter Sturrock, Chief Executive of the Federal Chamber of Automotive Industries says "*very clearly people want to move to these types of vehicles as an alternative"* (Coslovich, 2004*).* To meet the demand, nearly every car manufacturer now imports SUV models into Australia (Ziffer,

2004). Whilst consumers continue to perceive SUVs as a lifestyle choice (regardless of whether they experience that lifestyle) it is unlikely that SUV sales will decline.

In the past, it could be argued that consumers did not have sufficient information to make informed decisions about the choice of vehicle. The introduction of the Fuel Consumption label on all new vehicles from 1 January 2004 provides fuel consumption and green house emission information to the consumer at the point of sale (Australian Greenhouse Office, 2003). Unfortunately, sales figures for the year to date (ABS, 2004b) suggest that either consumers' choices are not based on this information or they do not know what it means.

Favourable Government Policies and Regulations

4WDs currently enjoy a number of favourable policies that make them cheaper and therefore more affordable in comparison to other light passenger fleet cars. These policies include:

- **10% lower tariff** levied compared to other light passenger vehicles imported into Australia
- No requirement for some **safety design features** required for other passenger cars under Australian Design Rules (discussed earlier)
- Lack of requirement to report **fuel efficiency** for vehicles > 2.7 tonnes prior to 1 January 2004 (refer footnote # 2).

SUVs Lower Rate of Tariff

For more than 20 years, 4WDs (now 5%) have enjoyed a much lower rate of tariff than applied to other passenger vehicles (now 15%) though they are now on a path to alignment at 5% by 2010 (Refer Appendix 2 for tariff rates) (Priestly, 2003). By contrast the tax regime in Europe punishes fuel inefficiency (James, 2004). This difference in tariffs is the product of a government policy decision 20 years ago to separate off-road work use in agriculture and mining from other vehicles[6]. As discussed above, this separation no longer makes sense given the huge expansion of 4WDs into the passenger fleet market. A review of passenger vehicle tariffs by the Productivity Commission (2002) endorsed these reductions and the extension of the current industry support program beyond 2005. Ironically, these tariffs were put in place to protect the local Australian automotive industry, which is characterised by its 'uncertain future' (Productivity Commission, 2002). Recent changes in sales mix show that 4WDs are impacting the very market segment the tariff is trying to protect (ABS, 2004b).

The tariff differential also impacts customs revenue collected by Treasury. Based on 2002 sales of all SUVs, Customs collected an estimated $360 million less in customs duties in 2002 (Priestly, 2003).

In summary, the tariff loophole makes 4WDs more affordable when compared to other imported, generally more fuel-efficient passenger vehicles.

[6] The Fuel Excise Reform (Australian Government, 2004) now aims to deal more effectively with this separation of commercial and private use.

Policy Options to Improve Fleet Fuel Efficiency

The Australian Government is committed to improve the efficiency of the energy sector to deliver economic and environmental benefits to its citizens (Productivity Commission, 2004). This commitment coupled with its desire to restrict the growth in greenhouse gases (BTRE, 2002) should ensure that a co-ordinated approach is adopted to manage damaging trends in growth of 4WDs in the Australian fleet.

Role of the NFEE

The government has a responsibility, through its policies, regulations and actions to ensure that the 'correct' outcomes deliver the best overall benefits (Sustainable Energy Authority of Victoria, 2004). The National Framework for Energy Efficiency (NFEE) has been established to make recommendations to unlock untapped energy potential in Australia (Sustainable Energy Authority of Victoria, 2004).

Improvements in road transport, particularly 4WD energy efficiency can be achieved by:

- Reducing total vehicle kilometres travelled (VKT)
- Better driving and maintenance of vehicles
- Adjust motor vehicle tariffs to punish inefficient vehicles and to promote the update of cleaner technologies
- Mandatory fuel energy standards to improve efficiency and reduce 'emissions intensity'
- Voluntary agreements with manufactures
- Use of alternative fuels (BTRE, 2002), and
- Government Leadership

Mandatory Fuel Efficiency Standards

Of these, mandatory fuel efficiency standards for motor vehicles sets the biggest hurdle for 4WDs to leap to remain in the passenger vehicle market and are thus a mechanism to encourage consumers to switch to more fuel efficient alternatives (BTRE, 2002). This approach has been adopted in the United States under the Corporate Average Fuel Economy (CAFÉ) standards that mandate minimum fuel efficiency for the passenger and 'light truck' (Commercial) fleets. These standards require companies to maintain the average fuel efficiency of new vehicles at 28mpg for cars and 21 mpg for light trucks (BTRE, 2002). Again, SUVs have enjoyed a loophole that categorises them in the group with the lower efficiency target. To meet targets, 'the Big 3' car manufacturers discount lighter, more fuel-efficient vehicles thereby reducing margins to compete with particularly Japanese imports (Power et al, unknown). In effect, the standards are thereby achieving their required outcome even though SUVs sales contradict their effect. Mandatory improvements to the standards required were barred with a $50 billion (US) bill during the Clinton administration (Unknown, 1999). Efforts to remedy the SUV anomaly and significantly raise fuel efficiency standards (SUVs to 27.5 mpg by 2011) by amendment of the current Act (Feinstein, 2003) which aimed to prevent the release of 200 million tons (US) of carbon dioxide per year (Beaucar-Viahos, 2002) have been over ridden by the power of the automotive industry that fears the impact on their viability.

Use of mandatory fuel standards in Australia would be workable if they were consistent with the fuel standards already applied in those countries, such as Japan where a large proportion of the Australian fleet is sourced (BTRE, 2002).

Voluntary Agreements with Manufacturers

Australia has negotiated an 'Environmental Strategy for the Motor Vehicle Industry' to reduce the average fuel consumption of new cars by 15% by 2020. This approach is consistent with the European approach though it is not as aggressive (BTRE, 2002). Voluntary agreements are attractive as they avoid the impacts and costs of coercion but consumer preferences dictate how effective they are. Current Australian sales of 4WDs would minimise their effectiveness.

What Government's Can Do – California

California passed Senate Bill 552 (SB552) to impose dramatic restriction of the use of SUVs and to improve the efficiency of their fleet of approximately 73,000 vehicles (Californian Energy Commission, 2003; Dempsey, 2003). The outcomes generated by the SB552 are:

- Procurement policies that favour fuel efficient vehicles
- Encourage use of alternative fuel (including mandatory use of alternate fuel in dual fuel vehicles)
- Disposal of all non-essential SUVs with the aim to eliminate them from the fleet and replace them with hybrid vehicles
- Central office approval required for purchase of any SUVs (where SUVs can only be used for limited purposes (eg emergency vehicles)
- Compile and monitor data on fleet mix and efficiency

Measures such as these were considered by the Automotive Industry review (Productivity Commission, 2002). Changes to existing procurement policies that favour locally sourced large vehicles were not made in efforts to protect the viability of the local industry. However, elimination of 4WDs from the Australian fleet would favour the industry, not damage it.

Conclusion

4WDs have become a significant segment of the Australian passenger vehicle market at the expense of the environment, safety and fuel efficiency. Current import tariffs, Australian Design Standards and fuel efficiency targets all favour purchase of these vehicles for day-to-day purchases and are anti-fuel efficiency in effect. Consumers are currently not properly aware of the implications of their purchases though there have been recent efforts to improve their understanding.

The Australian Government has to ensure that the economic, environmental and social benefits are maximised to the Australian people. By closing the 4WD loopholes in current regulations and standards, it will ensure that access to safer and more fuel-efficient vehicles is more equitable. For example, 4WDs should be subject to 15% import tariff in line with other passenger cars. Furthermore, by its own procurement practices and actions it can lead industry and consumers alike in adopting more fuel efficient practices.

Perhaps this approach is best summarised in the Brundtland Report (1987) which stated:

*"It is clear that a low energy path is the best way towards a sustainable future. But given efficient and productive uses of primary energy, this need not mean a shortage of essential energy-services. Within the next 50 years, nations have the opportunity to produce the same levels of energy-services with as little as half the primary supply currently consumed. This requires profound structural changes in socio-economic and institutional arrangements and is an important challenge to global society" (*World Commission for the Environment and Development, 1987).

Appendix 1 – Seasonally Adjusted New Motor Vehicle Sales

Month	Passenger vehicles (No.)	Sports utility vehicles (No.)	Other vehicles (No.)	Total vehicles (No.)	SUV % Total Vehicles (%)
Jul-03	50,120	12,586	14,914	77,620	16.2%
Aug-03	51,315	12,733	14,617	78,665	16.2%
Sep-03	52,190	12,632	14,873	79,695	15.9%
Oct-03	49,420	12,653	15,140	77,213	16.4%
Nov-03	48,448	13,114	14,910	76,472	17.1%
Dec-03	46,075	13,124	14,892	74,091	17.7%
Jan-04	49,605	13,950	15,669	79,224	17.6%
Feb-04	50,360	13,310	16,011	79,681	16.7%
Mar-04	49,107	13,496	16,352	78,955	17.1%
Apr-04	48,236	13,264	15,919	77,419	17.1%
May-04	48,112	14,579	16,209	78,900	18.5%
Jun-04	49,861	14,582	15,413	79,856	18.3%
Jul-04	47,393	14,685	15,993	78,071	18.8%
Aug-04	48,217	15,053	15,732	79,002	19.1%
Sep-04	49,852	15,309	16,193	81,354	18.8%
TOTAL 2003-04	**738,311**	**205,070**	**232,837**	**1,176,218**	**17.4%**

Sources (ABS, 2004b).

Appendix 2 - Tariffs on Passenger Vehicles and 4WDs

Rates of tariff imposed on imported vehicles under the 'Button Plan' for reduced protection of the Australian car industry (Productivity Commission, 2002).

	Passenger motor vehicles	4WD vehicles[7]
1 Jan 1995	27.5%	7.5%
1 Jan 1996	25.0%	5.0%
1 Jan 1997	22.5%	5.0%
1 Jan 1998	20.0%	5.0%
1 Jan 1999	17.5%	5.0%
1 Jan 2000	**15.0%**	**5.0%**
1 Jan 2005	10.0%	5.0%
1 Jan 2010	5.0%	5.0%

Source: Priestly (2003).

[7] This category also applies to light commercial vehicles.

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