Response to the Public Discussion Paper on Vehicle Fuel Efficiency

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OVERVIEW

The FCAI is the peak industry organisation representing vehicle manufacturers and importers of passenger vehicles, light commercial vehicles and motor cycles in Australia.

The Federal Chamber of Automotive Industries (FCAI) provides the following submission in response to the *Public Discussion Paper: Vehicle Fuel Efficiency*, November 2008.

The FCAI acknowledges that the growth in road transport contributes to global greenhouse gas emissions and that the automotive industry has a responsibility to contribute to efforts to mitigate the impact of climate change.

However, placing the burden of emissions abatement disproportionately on the automotive industry will fail to achieve sufficient environmental gains, place the vehicle manufacturing industry at risk and compromise the efficiency of the Carbon Pollution Reduction Scheme (CPRS).

Australian passenger motor vehicles accounted for just 7.8per cent of Australia's total greenhouse gas (GHG) emissions in 2005[1], one of the lowest in developed economies and around half of the emissions from Australian agriculture. A comprehensive approach to emissions abetment is required if Australia is to achieve the Government's greenhouse gas emission reduction target of 60 per cent by 2050.

The most efficient and equitable mechanism to achieve carbon emission reductions and improve fuel efficiency is through an economy wide emissions trading scheme which includes passenger transport fuels, as recommended in the Australian Governments *Carbon Pollution Reduction Scheme Green Paper*.

In adopting a CPRS, Australia is 'world's best practice' in the pursuit of measures to promote fuel efficiency. The CPRS will incorporate the cost of emitting carbon into fuel prices, affecting consumers' driving behaviour and vehicle purchasing decisions and it can efficiently determine the least cost method of emissions abatement within the Australian economy.

Introducing any additional emissions strategies, in addition to the CPRS, on the automotive industry assumes that a reduction of one tonne of CO_2 from a passenger motor vehicle is more important than a reduction of one tonne of CO_2 from any other sector of the economy.

Countries including Japan, the United States and the EU have introduced second best measures to address fuel efficiency and emissions, such as mandatory emissions targets, in the absence of a more efficient, market based measure such as a CPRS.

The Australian automotive industry accepts the challenge presented by the Prime Minister, Kevin Rudd, during his 2008 World Environment Day[2] speech, *Towards a New Car Plan for Australia's Future,* to achieve a car industry that uses frontier technologies to increase fuel-efficiency and reduce greenhouse gas emissions. The Government's initiative, *A New car Plan for a Greener Future,*

[1] Australian Greenhouse Office, April 2007, State and Territory Greenhouse Gas Inventories 2005

[2] Kevin Rudd, 5 June 2008

underpins this challenge by providing funding which encourages the development and production of low-emission, fuel efficient vehicles and components[3].

Automotive manufacturers have invested heavily and are continuing to invest heavily, in research and development of a range of technologies and advances in vehicle design that have the potential to make further significant contributions to reducing motor vehicle $C0_2$ emissions.

The rate of improvement in average carbon emissions from new motor vehicles in Australia exceeds even the most ambitious targets set for the Australian economy. The 10.5 per cent improvement in average carbon emissions from new vehicles from 2002 to 2007 exceeds the targets recommended by the Garnaut Review (10 per cent reduction by 2020) and is progressing toward achieving the aspirational target announced by the Australian Government of 60 per cent reduction by 2050.

Improving vehicle technology however, is only part of the solution to reduce passenger transport emissions. Reducing emissions through vehicle technology alone can be up to ten times more expensive than similarly, or even more, effective measures such as the increased use of biofuels, reduced traffic congestion and adopting an economic driving style or 'eco-driving'.

Whilst Australian consumers have access to the global automotive market and the most advanced vehicles it produces, Australia also has one of the oldest vehicle fleets in the developed world therefore failing to take full advantage of the fuel efficient technologies.

What is required to reduce emissions and improve fuel economy in the Australian vehicle fleet is an integrated and comprehensive approach, including measures that will not only affect new cars, but also existing cars and traffic as a whole.

These measures must be complementary to the CPRS and the R&D of fuel efficient technologies undertaken by vehicle manufacturers.

Initiatives which could be undertaken to reduce passenger transport emissions that could complement a CPRS include:

- Promotion of eco-driving
- Initiatives that reduce the average age of the Australian motor vehicle fleet (such as the abolition of Stamp Duty on new vehicles)
- Improved infrastructure, including traffic management systems, to minimise travel time
- Initiatives to ensure vehicles are appropriately maintained
- Appropriate public transport infrastructure
- Signals delivered through fuel pricing which indicates the carbon content of the fuel (i.e. a CPRS)

These initiatives would maximise the benefit of improved vehicle technology by modernising the Australian vehicle fleet and minimise emissions whilst vehicles are in service. This approach would ensure environmental and economic interests are balanced, all relevant stakeholders are involved, and cost-effectiveness is used as guiding principle.

[3] Australian Government, A New Car Plan for a Greener Future, Page 3, November 2008.

BACKGROUND

Road transport and passenger road transport, are integral to economic development and have "dramatically enhanced mobility, economic prosperity and quality of life for billions of people".[4]

The growth in demand for passenger vehicles in Australia and globally, and their increased use will deliver greater benefits. The challenge for the industry and governments is to enable future road transport demands to be met in a sustainable and environmentally responsible way.

The FCAI acknowledges that the growth in road transport contributes to global greenhouse gas emissions and that the automotive industry, internationally and in Australia, has a responsibility to contribute to efforts to mitigate the impact of climate change.

Globally, automotive manufacturers are investing heavily in a range of technologies and advances in vehicle design that have the potential to make further significant contributions to reducing vehicle $C0_2$ emissions. Some of the key approaches being pursued include:

- Development of advances in electric vehicle capability and design, including advanced battery technologies;
- Improvements in vehicle design, including increased thermal efficiency in engines; reduced friction loss; enhanced aerodynamics; reduced rolling resistance; and reductions in vehicle weight;
- Advances in hybrid vehicle technology;
- Development of enhanced alternative fuels capability, including new generation renewable biofuels; and
- Hydrogen fuel cell vehicles.

Significant opportunities exist for the uptake and the further development of a range of these technologies by the Australian automotive industry.

Passenger motor vehicles contribution to Australia's total greenhouse emissions is one of the lowest in developed countries. Australian passenger motor vehicles accounted for 7.8 per cent of Australia's total greenhouse gas (GHG) emissions in 2005.[5] This is around half of the emissions from passenger motor vehicles in the EU[6] (12.5%)[7] and the United States (20%)[8].

With an average age of 10.0 years[9], Australia has one of the oldest vehicle fleets among developed economies (EU = 7.1 years[10], Canada = 7.6 years[11] and the United States = 9.0 years[12]). Consequently, as new vehicle technologies are developed and become available to the market, the benefits of the improved technologies takes a long time to diffuse through the vehicle stock.

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[4] Julia King, *The King Review of Low Carbon Cars (UK),* March 2008, Page 3

[5] Australian Greenhouse Office, April 2007, *State and Territory Greenhouse Gas Inventories 2005*

6 The EU does not include emissions from light commercial vehicles in this calculation whilst the Australian and US figures include emission from light commercial vehicles. A comparative figure for the EU would therefore be higher than 12.5%.

[7] ACEA Website, accessed 24 October 2008:
http://www.acea.be/index.php/faq/how_much_co2_does_the_european_car_fleet_emit1

[8] *Climate Change Policy and CO2 Emissions from Passenger Vehicles*, Congressional Budget Office, October 2008

[9] Australian Bureau of Statistics, 2007, *Motor Vehicle Census, catalogue no. 9309.0*

[10] European Environment Agency: http://themes.eea.europa.eu/Sectors_and_activities/transport/indicators/TERM33,2002

[11] Office of Energy Efficiency: http://oee.nrcan.gc.ca/Publications/statistics/cvs05/chapter1.cfm?attr=0

[12] US Department of Transport: http://www.fhwa.dot.gov/ohim/onh00/onh2p3.htm

AUSTRALIA IS WORLD LEADING

The *Vehicle Fuel Efficiency Discussion Paper* seeks to evaluate measures that would deliver world's best practice in vehicle fuel efficiency to address the problem of increased CO_2 emissions from transport.

It is essential to recognise that Australia is leading the world in the pursuit of measures to promote fuel efficiency by adopting a CPRS which includes passenger transport. The Australian Government has stated that an unconstrained CPRS will allow the market to provide efficient emissions reductions by exploiting the least cost opportunities available. The major attribute of a CPRS, is that it is "the most efficient, lowest cost and most economically responsible way to reduce carbon pollution".[13]

Countries including Japan, the United States and the EU have introduced second best measures to address fuel efficiency in the absence of a more efficient, market based measure such as a CPRS. Furthermore, a CPRS also has the great advantage that it avoids requiring the government to 'pick winners' and indentify businesses, industries or processes that can achieve emissions abatement. Under a CPRS, "the market will reward companies and industries that find ways to produce their goods in a way that contributes less carbon pollution to the atmosphere."[14]

EQUITY IN EMISSIONS ABATEMENT

The Minister for Climate Change and Water, Penny Wong, in her address to the National Press Club, on 16 July 2008 stated: "The best way to reduce carbon pollution is to spread the work across the economy, so all sectors of the economy are doing their bit."[15]

An economy-wide CPRS is aimed at achieving an equitable burden sharing of the cost of emissions abatement. Companies and industries which are more easily able to abate emissions will do so at a lower carbon price than those which do not have the capability to abate.

To exclude any industry or sector of the economy will require all other industries to increase their emissions abatement, and therefore costs, to achieve a given level of abatement. Achieving the broadest coverage of a CPRS therefore ensures the most equitable burden sharing of the cost of emissions abatement throughout the economy.

Similarly, requiring any individual industry sector to bear a greater burden of Australia's emissions abatement than what is determined through the market based mechanisms of the CPRS will not only result in an inequitable outcome but also undermine the efficiency of the carbon trading market. Since one tonne of CO_2 emitted has the same impact whatever its source, this implies that the cheapest abatement opportunities would be accepted first, wherever these opportunities may occur. If however, one industry sector is required to abate emissions faster than the rest of the economy then the emissions market and the price of carbon will be distorted.

[13] Penny Wong: National Press Club Address, 16 July 2008
[14] Penny Wong: National Press Club Address, 16 July 2008
[15] Penny Wong: National Press Club Address, 16 July 2008

The Australian Government's Green paper on CPRS also makes it clear that it is their preferred position that "Transport emissions would be covered from scheme commencement, with scheme obligations applied to upstream fuel suppliers."[16]

Given that a CPRS is the most efficient approach to emissions abatement and that transport will be included in a CPRS then to impose an additional constraint on CO_2 emissions from passenger motor vehicles assumes that one of the following two arguments must be true, either:

a) That one tonne of CO_2 from passenger motor vehicles has a greater impact on the environment than one tonne of CO_2 from any other sector of the economy.

b) The burden of emissions abatement will not be borne equitably throughout the economy.

One major benefit of a CPRS is that it avoids requiring the government to indentify the most cost effective abatement initiatives.

The *Discussion Paper* must be explicit in its analysis of all policy options to improve fuel efficiency, or reduce emissions, to ensure that these measures do not undermine the efficiency or effectiveness of the CPRS to abate emissions. Not-with-standing this, there are a number of measures which would complement the effectiveness of a CPRS to abate emissions.

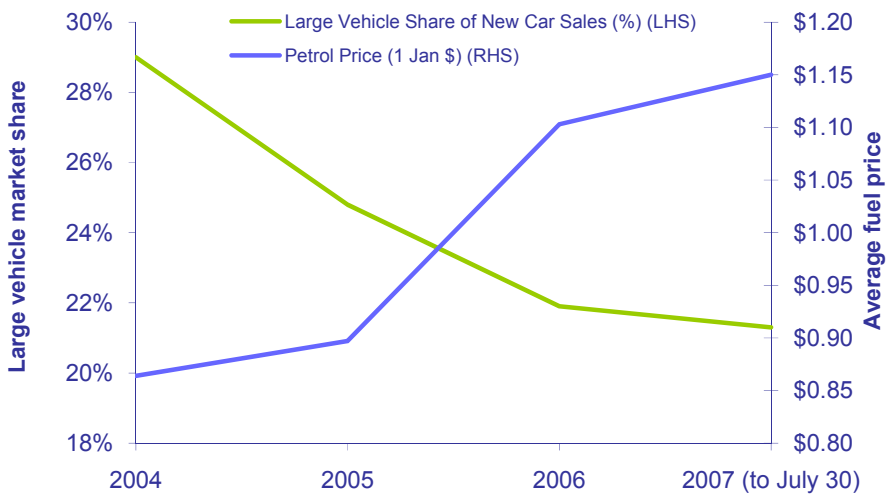
IMPACT OF A CPRS

The effect of a CPRS on the transport sector would be to influence driver behaviour through an increase in the fuel price. For example, if there were a carbon permit price of $30 per tonne of CO_2, the expected increase in the price of petrol would be around 7-8 cents per litre.[17]

Based on recent evidence, an increase in the price of fuel as a result of the establishment of a CPRS, will drive emissions reductions both by reducing vehicle use and by inducing consumers to buy smaller cars. As illustrated in Chart 1 below, increases in petrol prices over the last few years have resulted in a significant shift in market segmentation, suggesting a link between petrol prices and new vehicle purchasing decisions.

[16] CPRS Green Paper, Page 102.
[17] Caltex Australia, 2007, Caltex Tackles Climate Change, The Star, Issue 37

Figure 1: Petrol Price versus Large Vehicle Sales

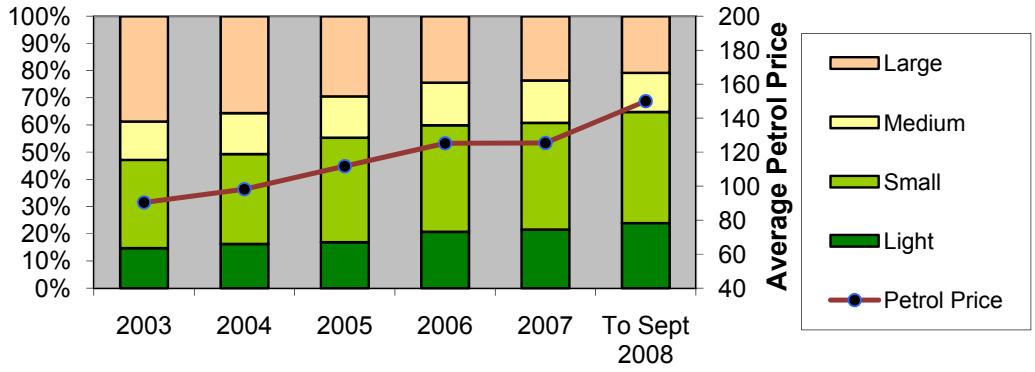


Source: FCAI VFACTS and Department of Innovation, Industry, Science and Research: Australian Petroleum Statistics.

The Australian Bureau of Statistics reports that the three most important factors considered when buying a motor vehicle are cost, fuel economy and vehicle size[18].

This consumer preference is illustrated in Figure 2 below which shows the growth in sales of small and medium sized vehicles as the petrol price has risen. The elasticity of demand for large cars is most dramatically demonstrated in the shift away from large vehicles in 2008 due to a rapid rise in petrol prices.

Figure 2: Market Segment and Petrol Price



Similar demand elasticises have been demonstrated internationally. The US car market experienced a 20 per cent to 30 per cent drop in sales of large vehicles corresponding to the large rise in fuel prices in the first quarter of 2008.

[18] ABS: Year Book Australia 2007 (1301.0), Transport Use by Households.

This shows that even in the short term (less than three months) demand for fuel efficient vehicles is relatively elastic and therefore has a significant impact on consumer purchasing behaviour.

VEHICLE TECHNOLOGY

Demand for improved fuel economy in passenger motor vehicles has driven investment in R&D within the automotive industry for many decades and a large range of new CO_2 efficient solutions have been brought to market. The vast majority of R&D effort is done independently, with each manufacturer pursuing its own initiatives. The desire to achieve a competitive advantage is strong in this area.

Areas of automotive industry R&D include:

- Conventional Powertrain (based on conventional and alternative fuels);
- Alternative Powertrain (energy management such as hybrid ICE/electric, fuel cells and hydrogen combustion engines respectively);
- Materials (e.g. high strength, low weight material);
- Aerodynamics;
- Improved energy efficiency of car components (e.g. power steering, air conditioning, alternator); and
- Driver information devices.

Attachment #1, lists technologies which have been developed over the past decade to reduce emissions and improve fuel economy[19].

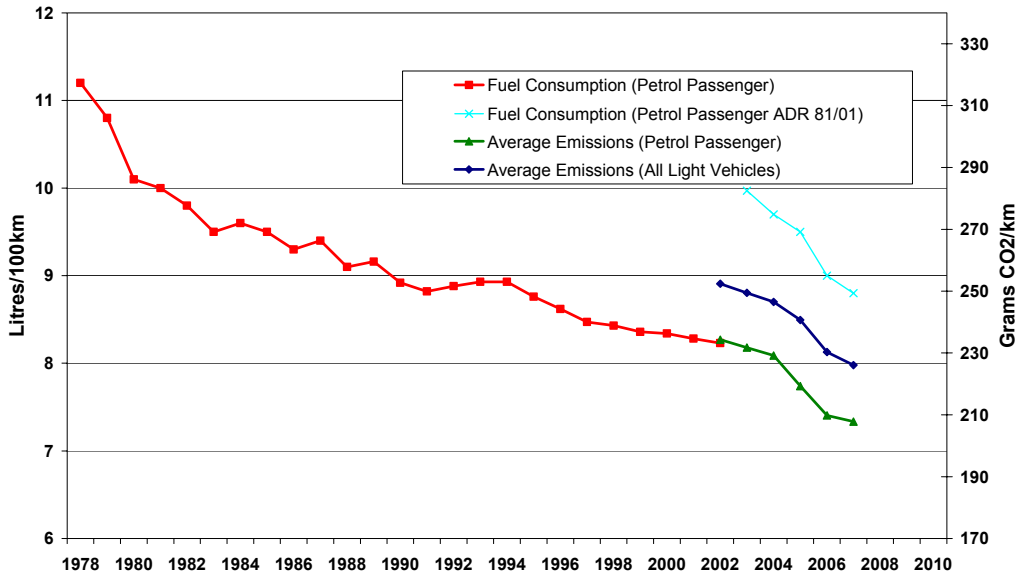
AUSTRALIAN INDUSTRY PERFORMANCE

The three Australian vehicle manufacturers are members of the Australian Government's Greenhouse Challenge Plus program which enables companies to form working partnerships with the Government to improve energy efficiency and reduce greenhouse gas emissions.

The Australian industry also has a long history of pursuing voluntary targets to reduce fuel consumption, dating back to the 1970's.

[19] www.acea.be

Figure 3: Fuel Economy and Emissions in Australia



Note: There is a break in the fuel consumption data in 2003 due to the introduction of a new measurement standard and test cycle)

Different methods of measuring improved fuel consumption and emissions have been adopted by the industry. The two most recent methods, the 2003 NAFC target and the 2005 NACE target are discussed in more detail.

THE 2003 NAFC TARGET

In March 2003 the Australian automotive industry agreed to improve National Average Fuel Consumption (NAFC) to 6.8 litres/100km by 2010 for new petrol passenger vehicles.

This target was based on a number of assumptions including that by 2010 the minimum fuel quality standard in Australia would be 95 RON with a maximum 10 ppm sulphur (i.e. Euro 4 standard). By 2005, it was evident that Australia would not have achieved the Euro 4 fuel quality standard by 2010.[20]

In 2003 the 'test cycle' used to calculate fuel consumption in Australia was changed from ADR 37/01 cycle based on the US EPA regulations to the new European Drive Cycle (NEDC) as part of ADR 79/00. While both of these test cycles were primarily designed to measure motor vehicle emissions they are substantially different in terms of cycle time, length, maximum speed and accelerations.

[20] The RIS for 'Vehicle emissions and fuel quality standards for the post 2006 period', prepared by the Australian Department of Transport and Regional Services concluded that "applying the sulphur limit to regular unleaded or lead replacement petrol is not warranted on cost benefit grounds."

As a consequence of the change in the 'test cycle', average fuel efficiency increased from 8.82 l/100 km in 2002 to 9.97 l/100km in 2003 (this is highlighted in Figure 3 above). Given the significant downward trend in fuel economy, this dramatic increase can only be attributed to the changes in the test cycle.

All new vehicles sold in Australia from 2003 are required to be tested against the new test cycle (ADR 79/00). This data is made available through the Government website, the Green Vehicle Guide, and on the fuel consumption label displayed on new vehicles.

As a consequence of the change in test cycles, vehicles are no longer tested to the old test cycle (ADR 37/01) and no data is available to record the industries progress toward the 2003 NAFC target.

Conversion of the NAFC target to the new testing protocols also appears an impossible task, as will be described below (Standardisation of Test Cycles, page 17).

Consequently, the FCAI sought to establish a new industry target for 2010 based on average CO_2 emissions in a single summary measure of industry performance.

THE 2005 NACE TARGET

In 2005, the FCAI established a voluntary target to reduce National Average Carbon Emissions (NACE) for all new vehicles (under 3.5 tonnes GVM) to 222 grams of CO_2/km by 2010. At the request of the Australian Government, the 2010 NACE target was expanded to include all vehicles under 3.5 tonnes, not just passenger vehicles, and therefore includes SUVs, light trucks and vans. Obviously, with these larger vehicles any new target for reduction in CO_2 emissions becomes more challenging.

The NACE target also includes all fuel types unlike the NAFC target which only incorporated petrol vehicles.

The NACE has improved continuously since data was first collected in 2002 from 252 grams CO_2/km to 226.1 grams CO_2/km in 2007, a reduction of more than 10 per cent.

Current trends suggest that this National Average Carbon Emissions target will be achieved before 2010. Continued improvements in vehicle technology and a move toward smaller vehicles have continued the downward trend of the NACE throughout 2008.

Future industry targets will be considered in 2010, or when the NACE target is achieved, whichever occurs first and will take into account other policy initiatives to reduce emissions including the CPRS.

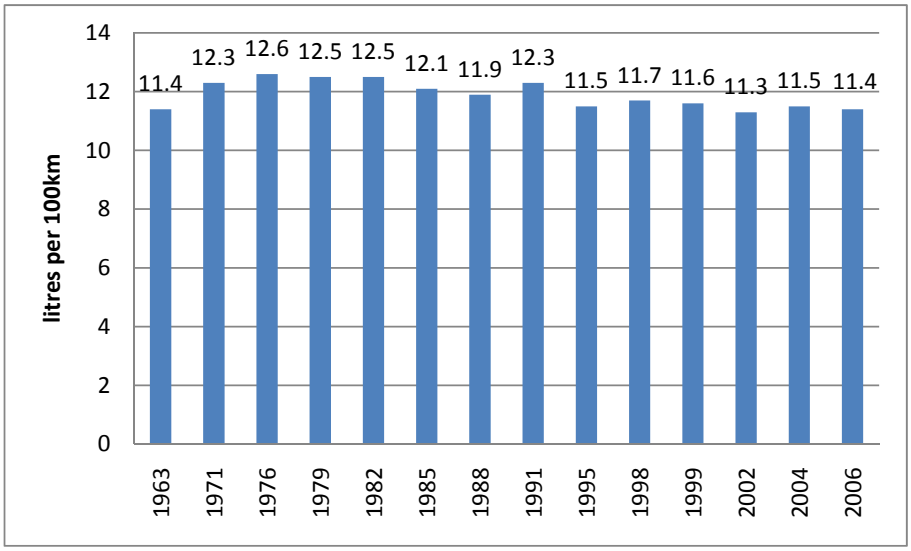
Importantly, the improvement in fuel economy from new cars however only benefits the environment if this improved performance results in a reduction in emission of CO_2 into the atmosphere.

AUSTRALIAN VEHICLE FLEET EMISSIONS

Given the significant reduction in emissions from new vehicles since 1979 (Figure 3 above) it would be reasonable to conclude that this improvement should result in an improvement in fuel consumption from the Australian Vehicle fleet.

The Australian Bureau of Statistics Survey of Motor Vehicle Use (9208.0) reports that average fuel consumption of the Australian motor vehicle fleet has remained relatively constant at around 11.4 litres/100km since 2000 despite the improvement in the fuel consumption of new vehicles entering the fleet. In fact the ABS data shows that the average fuel consumption in 2007 is the same as it was in 1963 when fuel consumption data was first collected.

Figure 4: Fuel Efficiency of the Australian Passenger Vehicle Fleet



*Source: Paul Mees, originally data calculated by the Australian Bureau of Statistics.

It seems counter-intuitive that if new vehicle fuel consumption has improved continuously since 1979 that this would not flow through to the Australian vehicle fleet.

The only possible explanation for this outcome is that as new vehicle fuel consumption has improved it has been offset by either:

1. Increased travel time caused by increased traffic congestion and/or
2. A deterioration in driver behaviour, including rapid acceleration and braking.

The Bureau of Transport and Regional Economics estimates a "total of about $9.4 billion for the 2005 social costs of congestion (on the basis of potentially avoidable costs, calculated from the deadweight losses associated with current congestion levels across the Australian capitals)[21]. This calculation does not include the environmental costs associated with increased fuel consumption caused by traffic congestion.

Driver behaviour has a direct impact on vehicle emissions. The concept of Eco-driving is one of the most effective ways of reducing vehicle emissions and perhaps the least cost method of emissions

[21] Estimating urban traffic congestion cost trends for Australian Cities, Working Paper No. 71, BTRE, 2007.

abatement for passenger motor vehicles. For example, accelerating gradually to 20km/h in five seconds can reduce fuel consumption by as much as 11%.[22]

Any improvement in the fuel economy of new vehicles will not flow though to a reduction in emissions unless other factors, including urban congestion, public transport, driver behaviour and the quality of infrastructure are also improved.

Whilst the automotive industry is only able to improve fuel consumption and emissions in new passenger vehicles the Governments responsibility is much broader and should aim to reduce emissions in the Australian economy, including the Australian vehicle fleet.

MEASURES TO INCREASE THE SUPPLY OF LOW EMISSION VEHICLES

1.1 CO2 Emission Standards for New Light Vehicles

Proposal: Establish revised sales weighted average CO_2 emissions standards for new light vehicles, which aim to significantly reduce the average level of CO_2 emissions from the Australian light vehicle fleet. This has the effect of improving the average fuel efficiency for new vehicles.

CO_2 emissions standards are an extremely blunt and ineffective approach to reducing emissions from the passenger vehicle fleet.

National Average Carbon Emissions (NACE) data is a valuable monitoring tool which should be used to measure the change in CO_2 average emissions of new passenger motor vehicles in Australia over time. It is not however, a policy tool to drive reductions in Australia's national carbon emissions.

The Australian experience shows that even continuous improvements in NACE does not result in reduced emissions from passenger transport. As the NACE has reduced over time it has been offset by increased annual travel time negating the benefit to the environment of reduced emissions per kilometre.

Countries including Japan, the United States and the EU have introduced second best measures to address fuel efficiency and emissions, such as mandatory emissions targets, because they do not have a more efficient, market based measure such as a CPRS.

International comparisons of NACE data, such as that provided in the *Discussion Paper,* are highly mis-leading and should not be the basis for policy decisions. Different testing procedures adopting in each country makes international comparison of NACE effectively impossible.

Importantly, Australian consumers have access to the most fuel efficient vehicles from around the world. There are over 40 different vehicle brands and over 300 vehicle models on sale in Australia which is more than many larger markets.

[22] Australian Automobile Association, *On the Road to Greener Motoring*, www.aaa.asn.au.

The Australian government is already responsible for regulating the three factors which determine vehicle technology, which are:

1. vehicle design
2. engine design
3. fuel quality

Vehicle manufacturers have, and continue to invest heavily in research and development of new technologies to improve vehicle fuel economy and carbon emissions. As a consequence fuel economy and emissions from new vehicles have improved significantly over many decades.

International experience does shows that mandatory emissions standards are a relatively expensive method of reducing emissions from passenger vehicles. Reducing CO_2 emissions through vehicle technology can be up to ten times more expensive than similarly, or even more, effective measures such as the increasing use of biofuels, better infrastructure and traffic management, and adopting an economic driving style or "eco-driving".

Finally, placing a higher value on abatement of emissions from new motor vehicles is inconsistent with the market based carbon pricing mechanism preferred by the Australian Government of a CPRS. CO_2 emissions standards assume that a reduction of one tonne of CO_2 from motor vehicles is more important to the environment that a tonne of CO_2 from any other part of the economy.

A more comprehensive approach is required to reduce emissions from passenger vehicles than CO_2 emissions standards.

EMISSIONS TRAJECTORY

As stated above, the Australian automotive industry has established a target to reduce National Average Carbon Emissions (NACE) to 222grams of CO_2 by 2010. It appears that the industry will achieve this target ahead of schedule and perhaps as early as 2008.

In considering future NACE targets, whether they be voluntary or mandatory, it is important to take into consideration changes in the policy environment since the current NACE target was established in 2004.

The *Discussion Paper* considers a number of difference trajectories and possible NACE targets beyond 2010. These trajectories appear to have been developed in isolation from the Australian Government's stated emissions abatement targets.

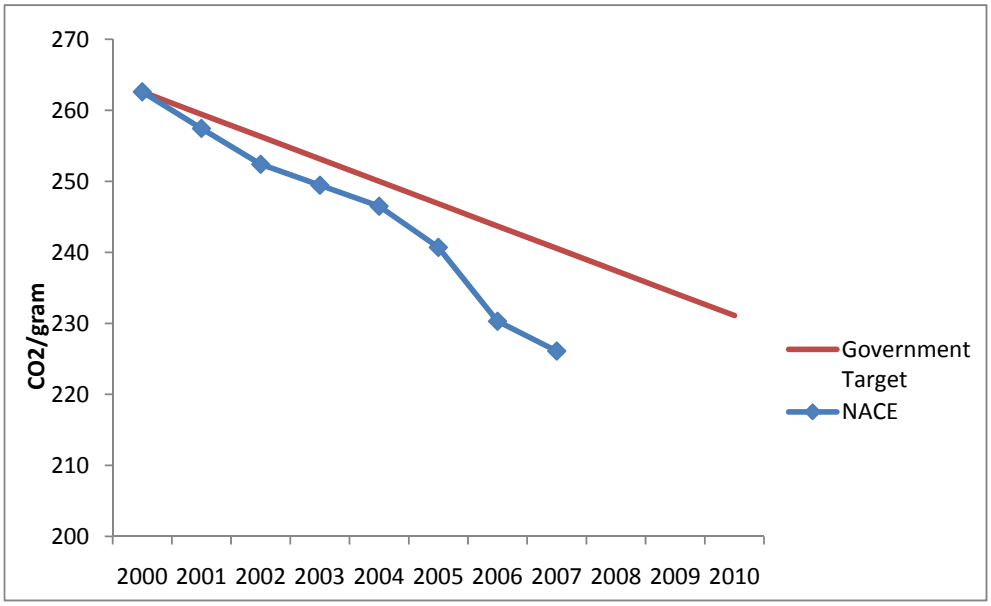
The Australian Government has announced its intention to introduce a CPRS which will include an aspirational target to reduce Australia's emissions to 60% compared to 2000 levels by 2050. The Government is also considering a range of different options for interim targets. The Garnuat Climate Change Review recommended an interim target of 25% by 2020 "in the context of an international agreement."[23] The Government's Green Paper on CPRS proposes an emissions cap be reported 10 years in advance.

[23] Garnaut Climate Change Review, page 30

The transport sector, along with most industry sectors will be bound to reduce emissions consistent with the short and long – term goals, as set by the Australian Government.

Figure 5 below shows the Governments stated emissions reduction target (based upon a linear reduction of 3.15 grams of CO_2 per year) as applied to Australia's NACE and the actual reduction in NACE since 2000. This Graph shows that even against the Governments aspirational target the NACE is reducing rapidly.

Figure 5: 60 per cent Reduction in NACE by 2050



- CO_2 data has only been collected since 2002. FCAI has estimated that the 2000 NACE would be approximately 262 grams of CO_2 in 2000 by assuming that emissions from 2000 to 2002 were reduced at the same rate as they have in the period 2002 to 2007.

The *Discussion Paper* raises a number of different abatement scenarios for the NACE. Given the Governments stated goal to reduce emissions by 60% by 2050 and its intention to have short-term abatement goals which will apply to the automotive industry any alternative abatement pathway must be able to clearly demonstrate that the impact of passenger vehicles on the economy is greater than that of other industry sectors.

In the absence of any alternative emissions reduction target, the industry will be bound by the Governments national emissions targets.

THE COST OF ABATEMENT

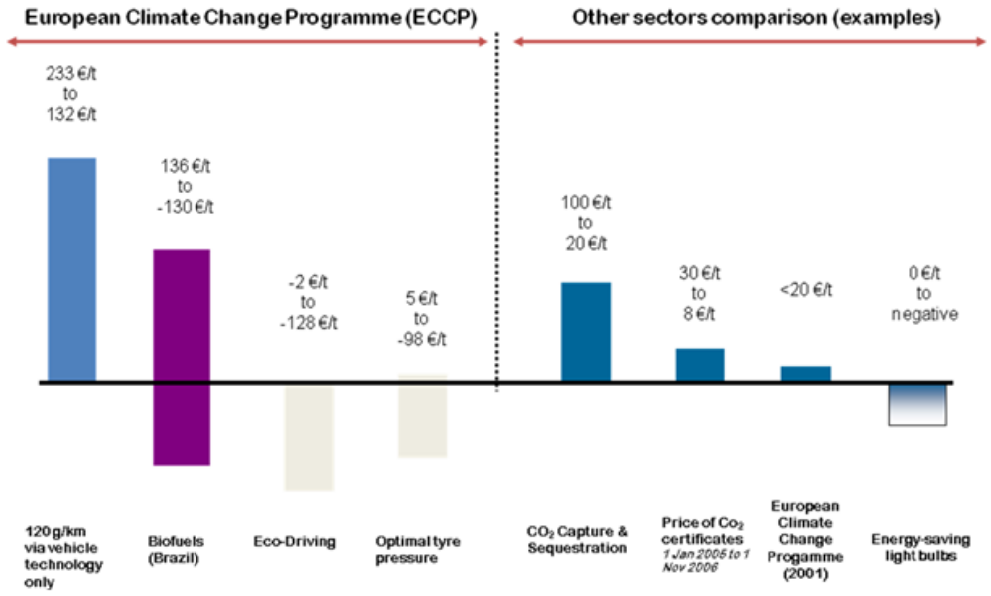
As outlined in the *Discussion Paper*, the EU had a voluntary agreement with car makers to reduce average CO_2 emissions for new passenger vehicles to 140g CO_2 by 2008. This target was not achieved. A new target of 130grams of CO_2/KM by 2012 has been adopted in the EU however, recent financial problems within the industry may see this target delayed.

An analysis of this mandatory target by the European Automobile Manufacturers Association (ACEA) has estimated that the cost of this regulation will be up to 475 Euros per tonne of CO_2 during the period 2012 to 2015[24]. Moreover, a separate analysis undertaken by RWI Essen, has estimated the cost of this approach equates to a carbon price of around 200 Euros per tonne of CO_2 and could be as high as 950 Euros per tonne of CO_2 after 2015.[25]

Carbon permits in the EU are currently trading at around 25 to 30 Euros per tonne for emissions from electricity generation. Therefore, the cost of abatement from passenger cars would range from 10 to more than 30 times the cost of abatement of carbon emissions from other sources.

Figure 6 below shows the relative abatement cost of carbon abatement of one tonne of CO_2 from a number of different technologies in Europe[26].

Figure 6: Comparative Abatement Costs



INTERNATIONAL COMPARISONS

Around the world, a variety of different approaches have been adopted in an effort to reduce CO_2 emissions. The common challenge has been the introduction of incrementally stricter regulations for individual vehicle emissions and the progressive introduction and uptake of standards for improved fuel quality.

In some cases, the automotive industry has also had to take account of prescriptive requirements for corporate average fleet performance. In other cases, partnerships between industry and government

[24] www.acea.be
[25] *A Regression on Climate Policy*: The European Commission's Proposal to Reduce CO2 emissions from Transport, Manuel Frondel, Christoph M. Schmidt and Colin Vance, 2008
[26] www.acea.be

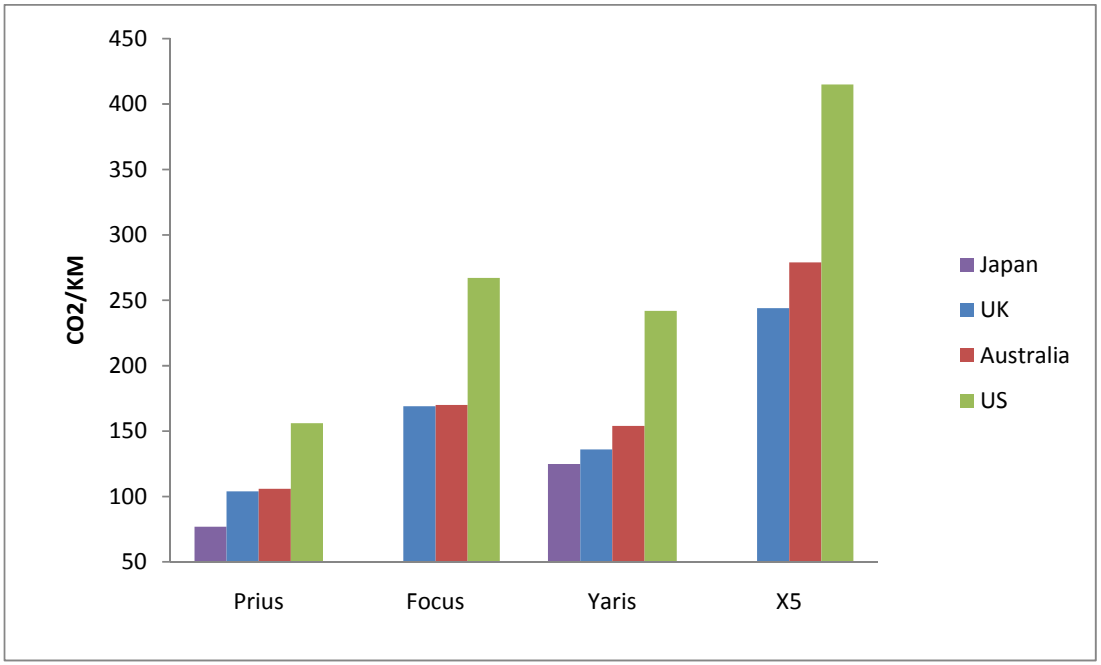
have been forged on the basis of voluntary commitments to contribute to improved environmental outcomes.

The different approaches to reducing vehicle emissions combined with different testing protocols make it extremely difficult to compare national CO_2 or fuel consumption data.

Figure 7 below shows the reported emissions from selected vehicles across a number of different markets. This data was collected from respective Government websites:

- Green Vehicle Guide; www.greenvehicleguide.gov.au
- US EPA; www.epa.gov/greenvehicles/index
- UK UCA; www.vcacarfuel data.org.uk

Figure 7: CO2 Emissions from Selected Vehicles



* All efforts were made to compare identical vehicle models with the same drive-train however, variations in the specification of vehicle between countries is inevitable due to factors such as road resistance, ambient air temperature and altitude.

** Whilst Australia and the UK use the same testing methodology (NEDC) the graph above shows that reported vehicle CO_2 emissions in Australia are consistently higher than in the UK. This could perhaps be explained due to variations in testing procedures (i.e. different ambient temperatures or altitudes) and/or specification changes (such as tyre density).

Whilst the Toyota Prius is ostensibly identical throughout the world, the reported CO_2 emissions in each country are significantly different, ranging from 77 grams of CO_2 per Kilometre in Japan to 156 grams of CO_2 in the US. This variation is largely due to different testing protocols adopted in each country. These testing protocols require different ratios of city and highway driving and therefore result in significantly different reported CO_2 emissions for individual vehicles.

The differences in 'drive cycles' makes international comparisons difficult and potentially highly deceptive.

Importantly, Australia has access to the best and most efficient vehicles from throughout the world.

STANDARDISATION OF TEST CYCLES

The *Discussion Paper* presents a graph (Figure 20, page 40 "Comparison of International Greenhouse Gas Emissions Standards for New Passenger Cars") originally produced by the Pew Centre. This Graph aims to compare various national fuel consumption and greenhouse gas emissions data by converting different testing methodologies to a universal measure.

The report cited in the *Discussion Paper* was published in 2004 and is based on data that is at least five years old. The Pew Centre Report was updated and published by the International Council on Clean Transportation[27] in July 2007.

In considering this graph it is important to recognise that the Graph represents different information for each jurisdiction and is therefore not comparing 'apples with apples', for example:

1) The graph depicts aspirational targets in some jurisdictions (e.g. the EU) with minimum requirements in other jurisdictions (e.g. the US).

   a) The graph depicts an aspirational target for the EU of 140g CO_2 in 2008. Only a relatively small percentage of vehicles achieve this target and as a result, actual emissions are higher than those depicted in the graph.

   b) The US CAFÉ regulations set a minimum standard which is exceeded by all vehicles sold in that market. Therefore actual emissions in the US are lower than those depicted in the graph.

   c) Japan achieved its 2010 target (172g CO_2) in 2003 and actual emissions are below those shown in the graph.

2) Each jurisdiction uses a different definition of passenger vehicles. Australia measures emissions from all vehicles under 3.5 tonne whilst the EU measures emissions from light passenger vehicles therefore excluding many heavier vehicles such as people movers and light commercials.

Furthermore, the FCAI has concerns with the accuracy of the calculations used to develop this Graph. For example, using the equations provided in the ICCT paper it should be possible to convert Australian CO_2 data into an equivalent CAFÉ target in miles per gallon and subsequently converted back into the original Australian CO_2 data. A brief analysis shows that the equations are consistently inaccurate by between 10 per cent to 25 per cent across the entire Australian fleet.

For example, using the equations provided in the ICCT report the Australian NACE target of 222g CO_2/km is equivalent to a CAFÉ target of 27.8 miles per gallon. When converted back into the

[27] "*Passenger Vehicle Greenhouse Gas and Fuel Economy Standards: A Global Update*", ICCT, July 2007.

Australian CO_2 target, using the equations provided in the original paper, the results show a target of 176 g CO_2/km, or a 20% variation from the correct result.

The ICCT Report is explicit in explaining the relatively low level of correlation between the estimated national average CO_2 emissions reported in the graph and provides the following explanations:

1. The equations are developed for petrol vehicles and do not take account for alternative fuels including LPG or hybrid electric vehicles.

2. The equations used to convert the different test cycles are more accurate for smaller vehicles because "vehicles with higher fuel economies have smaller engines that operate more frequently under higher efficiency conditions. As a result, the fuel economy of those vehicles is less sensitive to driving conditions".[28]

3. The equations are based on only 12 vehicle models of which only 6 are available in the Australian market.

Previous attempts by the FCAI and the Australian Government to convert data from different test cycles to a common standard has resulted in equally low levels of correlation. The process is inherently unreliable due to differences in testing protocols and vehicle fleets.

AUSTRALIAN AND EUROPEAN EMISSIONS

The EU and Australia have both adopted the new European Drive Cycle (NEDC) to test vehicle emissions and fuel economy enabling a comparison of NACE data.

The EU reports a NACE of around 160 grams of CO_2/km compared to 226 grams of CO_2/km in Australia in 2007.

The most significant difference between the reported EU and Australian NACE results is that EU emissions are reported for 'light vehicles' only whilst the Australian NACE target includes all vehicles under 3.5 tonne. The Australian NACE therefore includes a range of heavier vehicles including light buses, people movers and light commercial vehicles which are excluded from the European emissions target.

The remaining difference in NACE values for Australia and the EU are due to other factors including:

1. Incentives aimed at increasing the uptake of diesel fuel in the EU have succeeded in increasing sales of diesel vehicles to around 40% of new passenger cars compared to only around 8% in Australia. Diesel produces less CO_2 per kilometre than equivalent petrol vehicles.

[28] "*Passenger Vehicle Greenhouse Gas and Fuel Economy Standards: A Global Update*", ICCT, July 2007, Page 31.

2. Historically, the quality of passenger car fuel in Europe has been higher than in Australia. Improved fuel quality allows car manufacturers to use more advanced technologies to improve fuel consumption and reduce vehicle emissions.

3. Consumer preferences have as significant an impact on the NACE as vehicle technology. Consumers purchasing decisions are influenced by factors including the price of fuel, geography/topography, availability of public transport and urban densities.

The table below compares the market segmentation for petrol passenger cars in Australia with key EU countries. On average, consumers in Australia purchase larger cars than in Europe and because the average car is larger it uses relatively more fuel. The reasons why Australians purchase larger vehicles are likely due to factors including the distance between metropolitan areas, lower urban density and the quality of alternative public transport.

Market Segmentation

	Australia	France	Germany	UK	Italy
Light	22%	47%	32%	39%	39%
Small	39%	35%	36%	35%	33%
Medium	16%	11%	24%	20%	16%
Large	24%	7%	8%	5%	5%

Both the Australian and European new vehicle markets have access to the global automotive market and as a result have access to the leading technologies available from throughout the world. The differences in the reported NACE values for each jurisdiction are principally due to differences in consumer preferences for factors such as fuel type and vehicle size.

VEHICLE TECHNOLOGY AND FUEL

There are various possible technology solutions to reducing fuel consumption and future exhaust emissions standards. It is not possible to exactly identify the vehicle technologies that will be used as different solutions could be used by different manufacturers and the forecast of future technologies is a competitive issue. However, the likely technologies to be employed in passenger cars and light commercial vehicles to improve fuel consumption, or reduce CO_2 emissions, are;

- Gasoline stoichiometric with three-way catalysts;
- Gasoline lean-burn with NOx storage catalysts;
- Diesel with;

- NOX storage catalysts, or
- SCR systems with Continuously Regenerative Traps, or
- Diesel particulate filters.

All of these technologies will benefit from and produce their best results with sulphur-free fuels. Due to the sensitivity of gasoline NOx storage catalysts to sulphur the full potential of lean burn engines, in terms of fuel consumption, can only be achieved with 10ppm sulphur petrol. Research from some European car manufacturers indicates that improvements in fuel consumption in the range of 3 per cent to 5% can be achieved with lean-burn engines and 10 ppm sulphur fuel.

Diesel NOx storage catalysts and Continuously Regenerative Traps (CRT) can only function correctly when operated with sulphur free (i.e. 10 ppm) diesel.

In addition to improvements in fuel efficiency, 10 ppm sulphur fuels (both petrol and diesel) contribute to technology to improve other gaseous vehicle emissions.

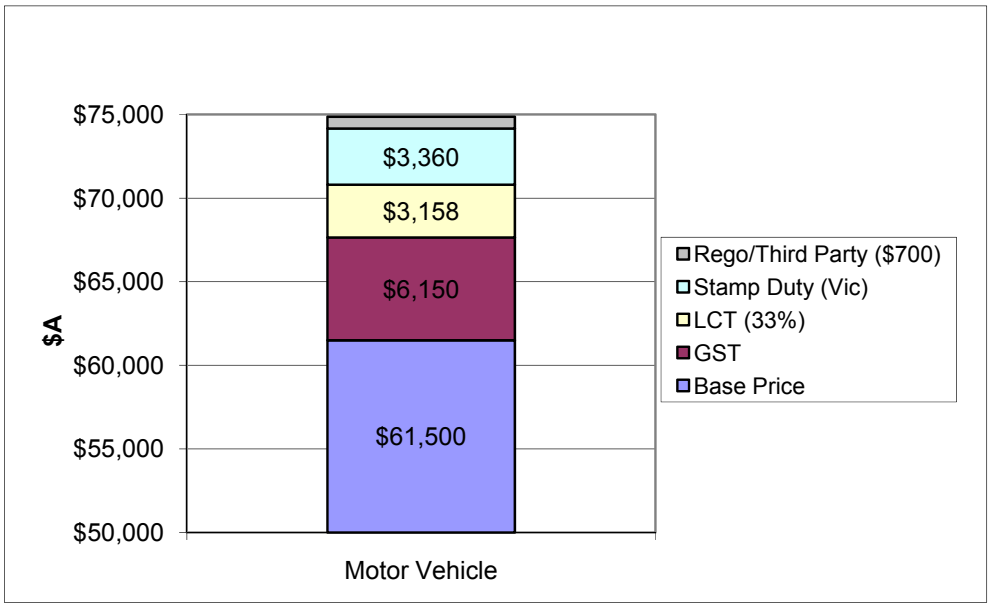
1.2 Restructure State and Territory registration and Stamp Duty Charges for Light vehicles.

Proposal: Realign Existing State and Territory stamp duty and/or registration changes for light motor vehicles on a sliding scale based on greenhouse (CO_2) emissions.

The abolition of stamp duty would greatly assist in reducing carbon emissions and improving average fuel efficiency by encouraging the modernisation of the Australian vehicle fleet. The removal of the oldest and least efficient vehicles from our roads and replacing them with new fuel efficient vehicles can achieve a significant reduction in emissions.

The up grading of the Australian fleet is however hindered by a multitude of distorsionary taxation arrangements imposed by Federal and State governments. Figure 8 below shows the cascading effect of these multiple taxes on a motor vehicle with a base price of $61,500.

Figure 8: Multiple Taxation of Motor Vehicles



The impact of the numerous taxes on motor vehicles increases the price of this vehicle (approximately the cost of a Toyota Tarago Ultima, a basic Toyota LandCruiser and a Ford Territory Ghia) by $12,500 from $61,500 to over $74,000. The final price of the vehicle will vary between states depending on registration and stamp duty charges.

Stamp Duty creates a disincentive for consumers to move away from older vehicles into newer, more technologically advanced, safer and more fuel efficient vehicles.

1.3 Provision of direct financial incentives/disincentives based on vehicle CO2 emissions

Proposal: encourage consumer uptake of low emission vehicles by establishing a balanced set of direct financial incentives and disincentives based on the CO_2 emissions performance of a vehicle.

As outlined above fuel consumption is already a major decision criteria when purchasing a new car and additional financial incentives/disincentives such as restructuring stamp duty charges would have little, if any, impact on the car purchasing decisions.

1.4 Develop fleet purchasing frameworks that incorporate greenhouse reduction objectives

Proposal: a voluntary scheme that supports the adoption of best practice fuel efficiency strategies in government and business light vehicle fleets.

The FCAI supports the concept of providing information to government and business fleets to assist with adopting best practice strategies for selecting and operating vehicles to achieve reduced fuel consumption. As noted in the discussion paper many government and business fleets currently have fleet strategies that take into account fuel consumption or emissions.

As outlined above, while vehicle manufacturers have responded with improvements in fuel consumption of new vehicles, there has not been a corresponding reduction in overall fuel consumption. Consequently, fleets could produce a more significant impact on transport CO_2 emissions with strategies that incorporate fleet operational aspects. The discussion paper provides various examples that have operated within Australia and overseas that incorporate both fleet selection and operation.

1.5 Including fuel consumption data in vehicle advertisements

Proposal: Require standard fuel consumption and CO_2 data to be provide in vehicle advertisements to reinforce the current fuel consumption and greenhouse information provided to consumers via the current fuel consumption label and the Green vehicle Guide. The measure is aimed at improving fuel efficiency but providing consumers with a capacity to choose better performing models from among those models that meet their needs.

The Australian Bureau of Statistics reports that the three most important factors consumers considered when buying a motor vehicle are[29]:

1. Cost
2. Fuel economy
3. Vehicle size

There are numerous avenues for new car buyers to access this information including;

- Mandatory fuel consumption label on all new light vehicles.
- The Green Vehicles Guide
- Car road test reports produced by various media outlets and Australia's motoring clubs.

From 1 January 2004, ADR 81/01 Fuel *Consumption Labelling for Light Vehicles* has required fuel consumption labelling of all new vehicles up to 3.5 tonnes irrespective of fuel source. The label indicates how many litres of fuel a vehicle will use to travel 100 kms, as well as the greenhouse gas emissions per kilometre.

The Green Vehicles Guide, and associated websites provide consumers with this fuel economy and emissions data for all vehicles sold in Australia and allows consumers to directly compare vehicles.

A VOLUNTARY SCHEME

Whilst non-regulatory mechanisms can have lower administrative costs than their alternatives, they do have administrative costs which need to be taken into consideration.

The FCAI has an existing Advertising Code of Practice for the industry which applies to all new motor vehicle advertisements. The purpose of the Code is to provide guidance to advertisers in relation to appropriate standards for the portrayal of images, themes and messages relating to road safety.

[29] ABS: Year Book Australia (1301.0), Transport Use by Households.

Vehicle occupant protection and road safety are primary concerns for the automotive industry in the design and operation of all motor vehicles supplied to the Australian market.

The FCAI would not consider amending the Advertising Code of Practice to include objectives other that could undermine the objective of promoting road safety messages.

1.6 Standards/labelling requirements for non-engine components which impact on fuel consumption

Proposal: Introduce standards or labelling requirements for non-engine components – such as tyres, tyre pressure monitors and vehicle air conditioning units – which impact on vehicle fuel consumption and CO_2 emissions.

The FCAI supports the *Discussion Paper's* conclusions not to pursue any standards or labelling of non-engine components outside of the existing policy approach of harmonising vehicle standards with international standards.

The *Discussion Paper* noted that development of standards for tyre pressure monitoring systems is already underway. The FCAI considers that the Australian government should continue to participate in the development of a global technical regulation (*GTR*) for tyre pressure monitoring systems. Once the GTR is completed the Australian Government will then be able to subject the introduction of the GTR into Australia (as an Australian Design Rule).

CONCLUSION

Reducing CO_2 emissions is a complex challenge. Improving vehicle technology is only part of the solution to reduce passenger transport emissions.

Whilst the automotive industry concentrates on undertaking research and development of new technologies to improve the fuel economy and lower the emissions from new passenger cars this is a long-term process, results of research programmes initiated today can only be expected to reap benefits in a medium-long term.

Reducing CO_2 emissions through vehicle technology can be up to ten times more expensive than similarly, or even more, effective measures such as the increasing use of biofuels, better infrastructure and traffic management, and adopting an economic driving style or "eco-driving".

The European vehicle manufacturers report that regulations, in particular on safety and air quality, have "had a huge impact on cars: within car segments, models have increased by an average 16% in weight. Today, cars are an additional 20 cm longer, mainly as a consequence of pedestrian safety measures."[30]

A strategy to reduce vehicle emissions cannot focus excessively on vehicle technology to improve fuel economy and reducing emissions within the Australian vehicle fleet.

[30] *Reducing CO2 Emissions: Working Together to Achieve Better Resul*t, European Automobile Manufacturers' Association.

A comprehensive and economy-wide approach will result in larger, cost-effective CO_2 emission reductions from road transport. A comprehensive approach will not only affect new cars, but also the existing vehicle fleet, fuel quality, traffic infrastructure growing, congestion, and a rise in annual vehicle travel time.

An economy-wide approach would not rely exclusively on expensive R&D activities of the industry to reduce emissions. Sharing efforts and responsibilities will result in larger, cost-effective CO_2 emission reductions from road transport.

Initiatives which could be undertaken to reduce passenger transport emissions include:

- Promotion of eco-driving
- Initiatives that reduce the average fleet age
- Improved infrastructure to minimise travel time
- Initiatives to ensure vehicles are appropriately maintained
- Appropriate public transport infrastructure
- Price signals delivered through fuel pricing which indicates the carbon content of the fuel (i.e. an emissions trading scheme)

This integrated approach would ensure environmental and economic interest are balanced, all relevant actors are involved, and use cost-effectiveness as guiding principle. The most effective mechanism to achieve this outcome is a CPRS. Any additional initiatives must be complementary to a CPRS.

Introduction Year	New CO_2 Efficient Technology
1995-1996	• Direct-injection diesel engines
1997-2000	• New generation of advanced diesel engines, notably incorporating common rail technology • Automated Manual Transmission • Gasoline direct injection (GDI) engine models launched
2001 2001	• Two-step variable valve timing • Valve train with roller finger followers (lower friction) • Fully variable valve lift & timing· Variable length Intake Manifold • 2nd generation diesel common rail injection (high pressure) • Exhaust gas turbochargers with variable nozzle geometry turbine • Application of advanced diesel technology to smaller engines, and consequently to small cars • 6-speed automatic gearbox. • New generation of bio-fuelled vehicles
2002	• Fully variable valve lift & timing technology combined with GDI • Variable length intake manifold on small gasoline engines • Fast warm-up cooling system • Torque converter lock-up for 1st gear on automatic transmissions • Low-viscosity/friction oil across model-range • Friction optimised rear-axle differential • Engine covering/under body panelling for vehicle aerodynamic improvement
2003	• Double clutch/Direct Shifting gearbox • 7-speed fuel-economy optimised automatic transmissions • Common rail injection system with 1600 bar • Unit injector of 2050 bar • Energy management control systems, including load levelling, to reduce engine idle speed • Electro-hydraulic power assisted steering system • Fully electric power assisted steering
2004	• New generation turbocharged small displacement diesel engines • Variable Twin Turbo technology on diesel engines • Piezo-injection systems on diesel engines • Stop-start with regenerative braking • 2nd generation friction optimised rear-axle gearbox • Torque converter lock-up for 1st gear on automatic transmissions across model-

	range • High efficiency alternator • Regulated electrical fuel pump
2005	• 2nd generation Valvetronic (fully variable valve lift & timing system) • Twin-charger technology for gasoline vehicle combined with downsizing of combustion engine • Roll-out of LED technology for high volume segments with benefits concerning electric energy consumption • Hydro-high-pressure forming for high strength structures with weight advantages • Advanced cooling system with electric water pump • Electronically controlled oil pump • 3rd generation common rail injection system