FCAI Response to "Setting Australia's post-2020 target for greenhouse gas emissions" Issues Paper

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EXECUTIVE SUMMARY

The FCAI welcomes the opportunity to respond to the Federal Government's "Setting Australia's post-2020 target for greenhouse gas emissions" Issues Paper. The Federal Chamber of Automotive Industries (FCAI) is the peak industry organisation representing the manufacturers and importers of passenger vehicles, light commercial vehicles and motorcycles in Australia. The Australian automotive industry is committed to making a strong contribution to national efforts to reduce the impact of global climate change.

The Australian Government has committed to reviewing Australia's greenhouse gas (GHG) reduction targets and settings in 2015, in the context of negotiations for a new global climate agreement. The new global agreement is to be concluded at the United Nations Framework Convention on Climate Change Conference of the Parties in Paris during 30 November to 11 December 2015.

Private road transport accounted for 7.8 per cent of Australia's GHG emissions in 2013-14 and annual light vehicle sales equate to less than 0.5 per cent of the National GHG Inventory. To achieve a reduction in CO_2 emissions from private road transport an "Integrated Approach" is required. The Integrated Approach includes vehicle technology, alternative fuels, driver behaviour, infrastructure measures, price signals and measures to reduce the average age of the in-service fleet.

The Issues paper outlines that the Australian Government is committed to achieving a five per cent reduction on 2000 emission levels by 2020 which is 13 per cent below 2005 emission levels. With continual significant investment in product development, the automotive industry has delivered new light vehicle average CO_2 emissions that have already exceeded these targets and have reduced average CO_2 emissions by more than 25.6 per cent since 2000, at an average annual reduction of 2.4 per cent.

This means that the new light vehicle fleet is now at least 25 per cent more fuel efficient than it was in 2000. The FCAI expects that this trend will continue and by 2030 a 50 per cent improvement compared to 2002 levels will have been achieved.

The annual reduction of new light vehicles in Australia is comparable to other developed countries when compared on a like-for-like basis, i.e. exhaust emissions measured in a drive cycle test across the same market segments. The ICCT reported that the average annual rate of improvement in the EU for passenger cars between 2006 and 2012 was 2.8 per cent and the GFEI reported that the average annual rates of improvement in fuel consumption in OECD countries during 2005-2013 was 2.6 per cent.

The average annual rate of improvement over 2011-14 in Australia was 4.11 per cent for passenger cars only and 3.55 per cent for passenger cars and SUVs.

A whole-of-Government approach is required that incorporates all associated issues, including fuel quality standards, that have a significant impact on vehicles' ability to meet both CO_2 targets and air pollution emission standards.

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1.0 INTRODUCTION

The FCAI welcomes the opportunity to respond to the Federal Government's "Setting Australia's post-2020 target for greenhouse gas emissions" Issues Paper[1]. The Federal Chamber of Automotive Industries (FCAI) is the peak industry organisation representing the manufacturers and importers of passenger vehicles, light commercial vehicles and motorcycles in Australia.

The Australian automotive industry is committed to making a strong contribution to national efforts to reduce the impact of global climate change. To achieve a reduction in CO_2 emissions from private road transport an "Integrated Approach" is required. The Integrated Approach includes vehicle technology, alternative fuels, driver behaviour, infrastructure measures and price signals.

With continual significant investment in product development, the automotive industry has reduced average CO_2 emissions by more than 25.6 per cent since 2000, at an average annual reduction of 2.4 per cent. This means that the new light vehicle fleet is now at least 25 per cent more fuel efficient than it was in 2000. When comparing on a like-for-like basis (i.e. using results of drive cycle tests across the same market segments) the annual reduction in Australia is comparable to the annual improvements in the EU and also the OECD average.

The FCAI expects that annual improvement in CO2 emissions will continue at a similar rate, i.e. 2.4 per cent, and by 2020 the national average CO_2 emissions (NACE) of new light vehicles delivered to the market in Australia will reduce by a further 13 per cent. By 2030 a 50 per cent improvement compared to 2002 levels will have been achieved.

The FCAI also notes that the Government recently released a Discussion Paper on "Working towards a National Clean Air Agreement". It is likely that the impact of pollutant emissions from new light vehicles will be considered during development of a National Clean Air Agreement. Vehicle pollutant emission standards, CO2 emissions and fuel quality standards are inter-related and must be considered as a single system to deliver improvements in both CO_2 emissions and vehicle pollutant emissions.

There are many different models for setting CO2 emission reduction targets with program flexibilities to encourage the introduction of newer and more expensive technology. Appendix B contains a brief overview of the main features of the both the EU and USA systems.

[1] Australian Government, Department of the Prime Minister and Cabinet, "Setting Australia's post-2020 target for greenhouse gas emissions", Issues Paper, March 2015

2.0 AN INTEGRATED APPROACH

The Australian automotive industry is committed to making a strong contribution to national efforts to reduce the impact of global climate change but it must be recognised that the operation of light vehicles also needs to be considered. For example, due to increasing congestion in our major cities owners of passenger cars, SUVs and light commercial vehicles are experiencing increasing travel times and consequently are using more fuel, and emitting more CO_2 emissions year-on-year.

In 2014 there were 17.6 million motor vehicles registered in Australia, of which 16.1 million were light vehicles[2]. In 2014, 1.08 million new passenger cars, SUVs and light commercial vehicles were sold. This was slightly down on the 2013 total of 1.1 million[3]. As at 31 January 2014 there were (approx.) 16.1 million light vehicles registered in Australia.[4] Therefore, annual sales of new light vehicles are equivalent to 1/16th or 6.75 per cent of the light vehicle in-service fleet.

The Australian Government's, *Australia's emissions projections 2014-2015*[5], states (pp.19-20) that transport emissions were 17 per cent of the National Greenhouse Gas Inventory in 2013-14 and that private road transport accounted for 46 per cent of transport emissions in 2013-14. Private road transport then accounted for 7.8 per cent of the National Greenhouse Gas (GHG) Inventory in 2013-14 and sales of new passenger cars, SUVs and light commercial vehicles can influence only around 1/16th of the private road transport annual GHG emissions. This equates to less than 0.5 per cent (i.e. 1/16th of 7.8 per cent) of the National Greenhouse Gas Inventory.

In 2014 the Bureau of Infrastructure, Transport and Regional Economics (BITRE) released a study on the fuel consumption trends of new passenger vehicles sold from 1979 to 2013.[6] The BITRE found that before 2005, the improvements in vehicle technology that produced improved fuel consumption were somewhat offset by a change in the market to increases in power, weight and four wheel drive vehicles. Since 2005, partly due to higher fuel prices, the BITRE found there have been increased sales of smaller and more fuel efficient vehicles.

The BITRE also reviewed the performance of the entire light vehicle fleet and found that since 1980;

> *"…the fuel intensity of entire light vehicle fleet has decreased a total of about 12.8 per cent"*

Despite the yearly improvements in fuel consumption s of new light vehicles (i.e. reduction in CO_2 emissions) and also the improvement in the overall light vehicle fleet, the transport GHG emissions have steadily increased since 1990 and are projected to continue to increase.[7]

Consumers purchasing choice, vehicle use, road infrastructure and fuel quality will continue to be major influences on the rate of growth of private transport related GHG emissions. Therefore, to achieve a reduction in CO_2 emissions from private road transport an Integrated Approach is needed.

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[2] Australian Bureau of Statistics, 9309.0 – Motor Vehicle Census, Australia, 31 Jan 2014.
[3] Vfacts National Report, New Vehicle Sales, December 2014.
[4] Australian Bureau of Statistics, 9309.0 Motor Vehicle Census, Australia, 31 Jan 2014.
[5] Commonwealth of Australian (Department of Environment) 2015, Australia's emissions projections 2014-15, p. 19.
[6] Australian Government, Bureau of Infrastructure and Regional Economics (BITRE), 2014, New *passenger vehicle fuel consumption trends, 1979 to 2013, Information* Sheet 66, BITE, Canberra.
[7] Commonwealth of Australian (Department of Environment) 2015, Australia's emissions projections 2014-15, pp. 19-20.

The Integrated Approach should include;

- Vehicle Technology – Improve the performance of new light vehicles (passenger cars, SUVs and light commercial vehicles) to reduce their average CO_2 emissions.
- Alternative Fuels and Energy Platforms – Support of alternative fuels and energy platforms and the infrastructure to deliver them.
- Driver Behaviour – Educate drivers on techniques to reduce fuel consumption and CO_2 emissions, which can also improve road safety (see the golden rules of eco-driving at www.ecodrive.org).
- Infrastructure Measures – Improve traffic flow and avoid wasteful congestion. Emerging Cooperative Intelligent Transport Systems (C-ITS) technology has the potential to deliver significant reductions in traffic congestion.
    - In 2008 Austroads estimated the use of C-ITS systems to improve traffic management systems and reduce congestion could reduce GHG emissions by 5.5 million tonnes in 2020, which is approximately 5 per cent of the estimated annual transport related GHG emissions[8].
- Price signals – Influence consumer choice to produce driving behaviour and purchase decisions for lower CO_2 emissions.
    - BITRE found that when petrol prices are relatively high buyers shifted to more fuel efficient vehicles.[9]
- Average fleet age – Incentives to increase the uptake of newer light vehicles and reduce the average age of the in-service fleet.
    - Increased concessions for importation of used (and near-new) parallel imports are likely to substitute sales of new vehicles in the short term and not have a longer term reduction of average fleet age.

Focusing on a single area, (e.g. vehicle technology) could increase overall cost to the community without delivering the expected benefits in the real world.

3.0 MOTOR VEHICLE CO2 EMISSIONS

New light vehicles[10] sold in Australia have provided a year-on-year reduction in CO_2 (or fuel consumption) as demonstrated by the National Road Transport Commission's (NTC) annual update[11].

3.1 National Average Carbon Emissions

All new passenger cars, SUVs and light commercial utilities, vans and buses (up to 3.5 tonnes) are included in calculating the National Average Carbon Emissions (NACE) figure. The Australian NACE is

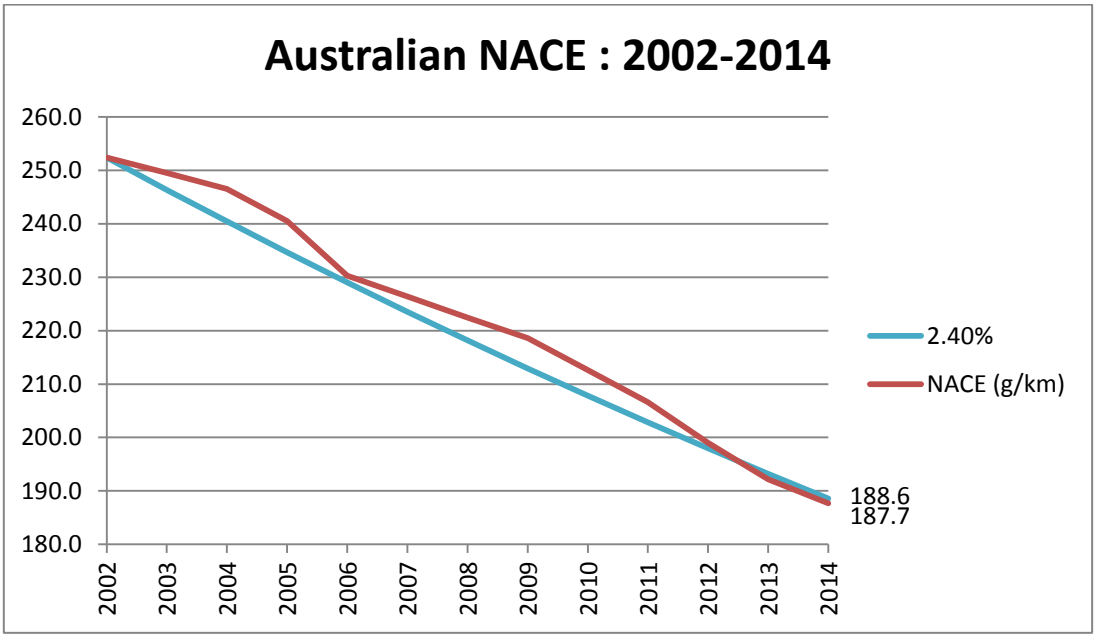
[8] Austroads, 2008, Intelligent Vehicles and Infrastructure: The Case for Securing 5.9 GHz
[9] Australian Government, Bureau of Infrastructure and Regional Economics (BITRE), 2014, *New passenger vehicle fuel consumption trends, 1979 to 2013,* Information Sheet 66, (p. 7) BITRE, Canberra.
[10] Light vehicles in this submission refers to passenger cars, sport utility vehicles (SUVs) and light commercial vehicles up to 3.5 tonne GVM (LCVs)
[11] NTC Australia, Carbon Dioxide Emissions from New Australian Vehicles 2013, Information Paper, May 2014

a broader measure than in most other advanced markets (including the US and Europe) as it includes many more vehicle types than CO_2 measures used in other markets. As such, face value comparisons of CO_2 data from other markets will be misleading unless appropriate adjustments are made.

The National Average Carbon Emissions (NACE) for all new light vehicles (including passenger cars, SUVs and light commercial vehicles) sold in Australia for each calendar year from 2002 to 2014 (Figure 1) reduced from 252.4 gCO_2/km to 187.7 gCO_2/km. This is an overall reduction of 25.6 per cent with an average annual reduction of 2.4 per cent.

The FCAI expects that this trend will continue and by 2020 the NACE of new light vehicles delivered to the market in Australia will reduce by another 13 per cent. By 2030 a 50 per cent improvement compared to 2002 levels will have been achieved.

Figure 1 – NACE 2002-2014



This is in excess of the Government's economy wide-target of a five per cent reduction on 2000 levels by 2020[12] and also the Department of Environment's expectation that light vehicle CO_2 emissions will fall by more than 25 per cent from 2012-14 to 2034-35.[13]

The FCAI's expectation that the annual reduction will continue at this rate assumes that the current market and operating environment will continue to change as has happened in the past 10 years, i.e. changes in both consumer preference and the introduction of new technology. As the Australian new vehicle market is one of the most competitive in the world, with around 65 brands offering more than 400 models, it is expected that the trend of an annual reduction in CO_2 will continue as brands continue to introduce state of the art fuel efficient vehicles.

[12] Australian Government, Department of the Prime Minister and Cabinet, "Setting Australia's post-2020 target for greenhouse gas emissions", Issues Paper, March 2015
[13] Commonwealth of Australian (Department of Environment) 2015, Australia's emissions projections 2014-15, pp. 19-20.

3.2 The Australian Car Market

If the Government considers the introduction of fuel consumption targets, it must acknowledge that the Australian car market is different to other major automotive (especially European) markets. In 2014, the National Transport Commission (NTC) released a Case Study comparing the Australian and UK markets[14]. The NTC found that:

- Australians have a preference for larger cars, SUVs and light commercial vehicles when compared to Europeans.
- Australians purchase vehicles with larger engines than Europeans.
- Australians purchase a higher proportion of vehicles with automatic transmissions than Europeans.

The NTC concluded that consumer preference was an important factor influencing the national average new vehicle carbon emissions and included in the key finding that:

> *Consumer preferences are an important factor affecting the national average of carbon emission for new vehicles. If all Australians who purchased new vehicles in 2013 had purchased vehicles with best-in-class emissions, the national average would be 34 per cent lower (126 g/km) than the actual national average that was achieved in 2013.*

The NTC report also acknowledged that consumer preferences can be influenced by government policies and found that compared to the UK, Australia had:

- fewer policies aimed at reducing the average CO_2 emissions from vehicles,
- fewer lower CO_2 vehicles available for purchase, and
- cheaper fuel.

On 17 April 2015, the National Transport Commission (NTC) released their update on new light vehicle CO_2 emissions[15] that included an analysis of the CO_2 emissions intensity of new light vehicles over the ten year period, 2005 to 2014. When releasing this report the NTC announced that[16];

> *Australians are choosing to buy far more fuel efficient cars than they were ten years ago.*

The Climate Change Authority (CCA) also recognised that consumer preference has been a factor in reducing CO_2 emissions. The CCA consider that shifts between vehicle class, within vehicle class and also technology improvements have contributed to CO_2 emission reduction.[17]

The average new light vehicle sold in Australia is now at least 25 per cent more fuel efficient than it was in 2000. The annual 2.4 per cent improvements in the NACE demonstrates the industry's

[14] National Transport Commission, 2014, Carbon Dioxide Emissions from New Australian Vehicles 2013; Information paper, May 2014
[15] National Transport Commission, 2015, Carbon Dioxide Emissions Intensity for New Australian Vehicles 2014; Information paper, April 2015
[16] National Transport Commission, 17 April 2015 Media Release "Ten years of data show Aussies choosing lower emissions vehicles", www.ntc,gov.au [accessed 19 April 2015]
[17] Climate Change Authority (CCA), 2014, Light Vehicle Emissions Standards for Australia Research Report, June 2014

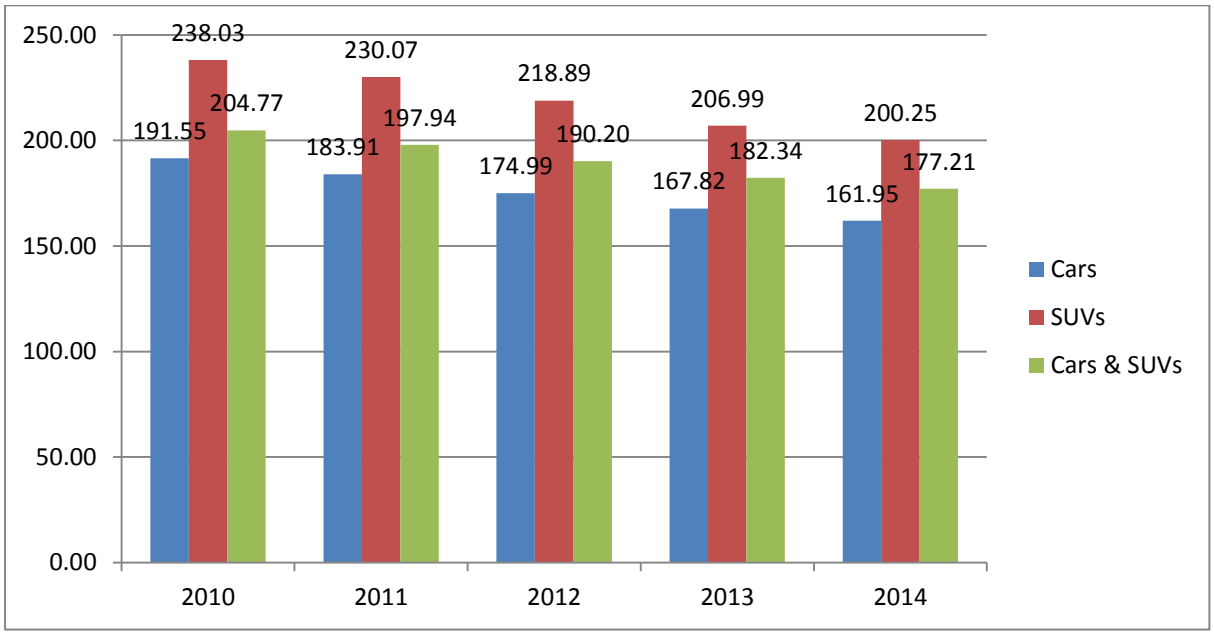
commitment to making a strong contribution to national efforts to reduce the impact of global climate change through continuing to improve fuel efficiency and reduce carbon dioxide emissions from new vehicles.

3.3 International Comparison

The average annual reduction in NACE of 2.4 per cent (for all light vehicles) is comparable to the annual CO_2 reduction of passenger cars in other developed countries. The average annual CO_2 reduction in the Australian new light vehicle market is even more comparable (and better in some cases) when considering only passenger cars or passenger cars and SUVs to provide a like-for-like comparison.

Using the data presented by the NTC in their Information Papers in 2011[18], 2012[19], 2013[20] and 2014[21] the CO_2 reductions from 2010 to 2014 for passenger cars and SUVs can be calculated (Figure 2 and Table 1).

Figure 2 – Sales Weighted CO2 for Cars and SUVs; 2010-2014



The European Commission reported that new cars sold in the EU in 2014 emit on average 2.6 per cent less CO_2 than those sold in 2013, when using the results from the European drive cycle (the same test as used for the NACE). Over the period from 2010 to 2014, CO_2 emissions from new cars

[18] National Transport Commission, 2012, Carbon Dioxide Emissions from New Australian Vehicles 2011; Information paper, March 2012
[19] National Transport Commission, 2013, Carbon Dioxide Emissions from New Australian Vehicles 2012; Information paper, March 2013
[20] National Transport Commission, 2014, Carbon Dioxide Emissions from New Australian Vehicles 2013; Information paper, May 2014
[21] National Transport Commission, 2015, Carbon Dioxide Emissions Intensity for New Australian Light Vehicles 2014; Information paper, April 2015

have decreased by 12 per cent, which is an average annual reduction of 3 per cent.[22] Over the same period CO2 emissions from new passenger cars in Australia decreased by more than 15 per cent and by more than 13 per cent for cars and SUVs combined (see Table 1).

Table 1 - CO2 Reductions (%) for Cars and SUVs; 2010-2014

Year	Cars	SUVs	Cars & SUVs
2011	3.99	3.34	3.34
2012	4.85	4.86	3.91
2013	4.10	5.44	4.13
2014	3.50	3.26	2.81
Total	15.45	15.87	13.46
Average	4.11	4.22	3.55

The ICCT reported that the average CO_2 emission levels for cars in Europe reduced by 17 per cent between 2006 and 2012; an average annual reduction of 2.8 per cent.[23]

The Global Fuel Economy Initiative (GFEI) analysed the global fuel economy trends in OECD and non-OECD countries. The GFEI found that during the 8 year period of 2005 to 2013 the annual improvement rates were:[24]

- For OECD countries; 2.6 per cent.
- For non-OECD countries; 0.2 per cent.
- Global average; 2.0 per cent.

The annual reduction of CO_2 emissions from new light vehicles in Australia is comparable to other developed countries when compared on a like-for-like basis, i.e. exhaust emissions measured in a drive cycle test across the same market segments.

4.0 DISRUPTIONS TO INCREASE RATE OF CO2 IMPROVEMENTS

To have a greater rate of CO_2 reduction, there would need to be a disruption that would result in a significant change in the new car market. Examples of disruptions include:

- Government incentives to accelerate the uptake of new and more expensive technology, such as electric vehicles and hybrid vehicles.

[22] European Commission, Climate Action, Reducing CO2 emissions from cars, www.ec.europa.eu/clima/policies/transport/vehicles/cars [accessed 22 April 2015]
[23] International Council on Clean Transport (ICCT), 2014, Policy Update, *EU CO_2 Emission Standards for Passenger Cars and Light-Commercial Vehicles,* January 2014
[24] Korner, A., Cazzola. P, Cuenot, F., (2014), International Comparison of light-duty vehicle fuel economy; Evolution over 8 years from 2005 to 2013, Working Paper 11

- An increase in the price of fuel to change consumer preference to a vehicle with a smaller engine.

4.1 CO_2 Targets

The industry worked with the (previous) Government during 2011-2013 to consider mandatory CO_2 targets. In our discussions with the (then) Department for Infrastructure and Transport (now Department of Infrastructure and Regional Development) the FCAI highlighted that both the introduction of new vehicle technologies and changing consumer preference would be required to meet any CO_2 target that is more aggressive than the long term historical trend. For example, the Australian market is behind both the US and Japanese markets in the adoption of hybrid and electric vehicles.

At that time, the FCAI supported a mandated CO_2 target that included:

- A realistic, achievable but challenging CO_2 emission target.
- A single industry wide target for all light vehicles (passenger cars, SUVs and light commercial vehicles up to 3.5 tonnes).
- All brands being part of the scheme with low volume brands negotiating directly with the Government to develop and then demonstrate a reduction at least equivalent to the industry long term average.
- Maximum flexibility in the scheme to provide options for brands.
- The standard is 'attribute' (e.g. footprint as in the US or mass as in the EU) based.
- Data being collected independently of the FCAI.
- Targets being set based on the operational and economic factors that are unique to Australia and may be different to either the US or EU.

The FCAI remains willing to work with the Government to consider developing a CO_2 target that is relevant to the Australian car market. For example, the different operating and economic factors in Europe[25] include:

- The EU has different targets for passenger cars and light commercial vehicles.
- Europeans tend to prefer smaller passenger cars with manual transmissions and smaller engines than Australian new car buyers.
- Vehicles have different specifications for the Australian market, e.g. larger engines and automatic transmissions for longer distance travel and towing under extreme (hot) conditions.

Additional information on the Australian, USA and EU methods of calculating CO_2 targets, off-cycle credits and program flexibilities are outlined in Appendix C.

[25] See the National Transport Commission's Information Paper, "Carbon Dioxide Emissions from New Australian Vehicles 2013", Section 5 Case Study; Why do European countries have new cars with lower average carbon dioxide emissions compared with Australia?.

4.2 Emissions Reduction Fund

An existing Government policy that is an example of disrupting the current market to increase the rate of CO_2 emission reductions is the Government's Emission Reduction Fund (ERF). However, light vehicles have effectively been excluded from the Government's signature climate change policy, the Emissions Reduction Fund (ERF), at this stage.

The proposal that initially appeared to be most likely to be taken up by FCAI members and subsequently allow light vehicles to be part of the ERF is not open to light vehicles. The proposal was being able to aggregate sales of low emission vehicles (e.g. electric vehicles, hybrids or alternative fuel vehicles) across many owners for the purpose of calculating emission reductions. The Government advised the proposal is no longer open to light vehicles due to:

- Concerns over how to establish a baseline rate of improvement and light vehicle turnover.
- Acknowledgment that light vehicles currently have a rate of improvement that is among the highest of any sectors.
- CO_2 reductions in light vehicles is high-cost (i.e. doesn't meet the Government's objective of lowest cost abatement).

4.3 Hybrid, Electric and Hydrogen Vehicles

An important part of an Integrated Approach is support of alternative fuel sources and the infrastructure required to deliver the alternative fuels.

The vehicle industry is delivering vehicles that are operating on many different energy platforms, including hybrid, electric and hydrogen vehicles. Australia needs to be aware of all these technologies and facilitate the entry into the market of all technologies, rather than locking the country into one approach.

Emerging vehicle technology, including hydrogen and electric vehicles, present an opportunity for achievement of further efficiencies. The Australian Government needs to consider what role it will play in this area. For example, in Japan, Government-led consumer incentives and infrastructure investment played significant roles in the uptake of vehicles with these technologies.

5.0 CO2, POLLUTANT EMISSIONS AND FUEL STANDARDS

5.1 Inter-relationship of CO2, Pollutant Emissions and Fuel Quality Standards

The FCAI's longstanding position is that GHG emission (i.e. CO_2) standards or targets, pollutant emission standards (i.e. ADR 79/0x or Euro 5/6), and fuel quality standards all need to be considered together, as they are all interrelated. This position is not unique and is shared by the global automotive industry, regulators and research organisations alike.

To continue to deliver reduced CO_2 emissions and corresponding expected air quality benefits (i.e. reduction in pollutant emissions) with the introduction of advanced vehicle emission standards, market fuel of the relevant standard (i.e. consistent with the certification fuel standard) must be available. If market fuel of the necessary standard is not available, higher exhausts emissions (both CO_2 and pollutants) will be generated during a vehicles' operation with lower than expected improvements to air quality and health outcomes.

Vehicles are designed and developed to meet GHG emissions (CO_2) targets and air pollutant emission standards with an expectation of fuel quality in a particular market. While air pollution emission standards (Euro 5 as ADR 79/04) have been introduced into Australian legislation, the Government has not mandated the concomitant fuel quality standards (95 RON 10 ppm sulphur petrol).

A whole-of-Government approach is required to incorporate all associated issues, including fuel quality standards, which have a significant impact on vehicles' ability to meet both GHG (CO_2) and air pollution emission standards. Otherwise, Australians will not receive the full benefit of the additional cost for improved emission technology in new cars.

5.2 Vehicle Pollutant Emission Standards

Through the Australian Design Rules, the Government has introduced successively more stringent air quality standards (pollutant emission standards) for vehicles. New light vehicles (passenger cars, SUVs and light commercial vehicles) introduced into Australia need to meet the Euro 5 pollutant emission standards (ADR 79/03 introduced from 1 November 2013 and ADR 79/04 introduced from 1 November 2016).[26]

(Note: Euro 5 pollutant emission standards set maximum allowable exhaust emissions for carbon monoxide, hydrocarbons, oxides of nitrogen and particulate matter. It does not set standards for CO_2 emissions.)

The progressive tightening of vehicle emissions standards, especially over the last 10+ years as Australia has progressed from Euro 2, through Euro 3 to Euro 4 and now Euro 5 standards, has contributed to improvements in air quality in Australian cities. For example, a 2013 study by the CSIRO for the Victorian EPA found that by 2030 total motor vehicle exhaust emissions will have significantly reduced and that improved technology is entering the vehicle fleet at a faster rate than the growth of vehicle use[27].

The successful introduction of the next step in light vehicle pollutant emission standards, Euro 6, is dependent on suitable fuel quality standards, i.e. 95 RON, 10 ppm sulphur petrol.

[26] DIRD Vehicle Emission Standards, www.infrastructure.gov.au [accessed 3 March 2015]
[27] EPA Victoria, Future air quality in Victoria-Final Report, Publication 1535 July 2013

5.3 Fuel Quality Standards

Vehicles are designed and developed to meet air pollutant emission standards and/or CO_2 targets with an expectation of fuel quality in a particular market. The choice of engine technology that can be introduced into Australia is limited by the national fuel quality standards and the resulting available market fuel (especially ULP; 91 RON and 150 ppm sulphur).

While air quality (or vehicle pollution emission) standards have been introduced into Australian legislation (ADR 79/05), the Government has not mandated the concomitant fuel quality standards (95 RON 10 ppm sulphur petrol).

Indeed, Australian transport fuels are of lower standard than other major markets, especially the EU, Japan and the USA. This restricts the introduction of some engine variants and inhibits the performance of the latest generation of engines (i.e. Euro 6 compliant), particularly due to high sulphur concentration. The later vehicle pollutant emission and fuel consumption technology requires access to lower sulphur fuels.

Additionally, poor fuel quality can lead to increased operating and maintenance costs for consumers. For example, poor fuel can lead to increased fuel consumption from the engine needing to run rich more often to increase the exhaust gas temperature to de-sulphurise the catalyst. More frequent de-sulphurisation cycles will also reduce the service life of the catalyst leading to more frequent replacements of the catalyst.

Maintaining multiple fuels (E10, E85, ULP & PULP, LPG, diesel, etc.) across all states (and metro/rural) creates additional complexity and costs to fuel suppliers that will be passed onto the consumer.

The consumer preferences in the new Australian light vehicle market have changed significantly from 2000 to 2014 (see figure A.1). This includes significant growth in the SUV segment, with a large proportion of diesel vehicles.

With much of Australia's automotive fuel now imported due to the decline of local refining and the introduction of international vehicle emission standards Australia needs to move towards international harmonisation of fuel quality standards. This will become increasingly important from around 2017/18 as vehicle brands will import vehicles with engines that are designed to achieve Euro 6 level emissions. If Australia does not align to higher world fuel quality standards there will be a risk that future vehicle models will shift Australia's vehicle fleet towards lower grade offerings.

Improving the quality of fuel available in Australia will deliver improvements for the entire motor vehicle fleet, not just new motor vehicles.

6.0 CONCLUSION

The Australian automotive industry is committed to making a strong contribution to national efforts to reduce the impact of global climate change, even though light vehicle sales do not have a major influence on Australia's annual GHG emissions as they equate to less than 0.5 per cent of the National Greenhouse Gas Inventory.

The FCAI supports improvement of fuel efficiency of motor vehicles through the consistent application of measures at technological, behavioral and regulatory levels. Reducing emissions through one area (e.g. vehicle technology) can be more expensive than a combination of measures such as the increasing use of alternative fuels, improved fuel quality, better infrastructure and traffic management, adopting an eco-driving style using price signals and reducing the average age of the in-service fleet.

To this end, the FCAI considers that an Integrated Approach to reducing emissions from passenger vehicles will result in larger, more cost-effective emission reductions from road transport than targeting one area in isolation. Focusing on a single area, could increase overall cost to the community without delivering the expected benefits in the real world.

New light vehicles have provided a year-on-year reduction in CO_2 emissions (or fuel consumption) as demonstrated by the National Road Transport Commission's (NTC) annual update. The National Average Carbon Emissions (NACE) for all new light vehicles (passenger cars, SUVs and light commercial vehicles) sold in Australia for each year from 2002 to 2014 have an overall reduction of 25.6 per cent with an average annual reduction of 2.4 per cent.

The annual reduction of new light vehicles in Australia is comparable to other developed countries when compared on a like-for-like basis, i.e. exhaust emissions measured in a drive cycle test across the same market segments.

The new light vehicle fleet is now at least 25 per cent more fuel efficient than it was in 2000. The FCAI expects that this trend will continue and by 2020 the national average CO_2 emissions (NACE) of new light vehicles delivered to the market in Australia will reduce by a further 13 per cent. By 2030 a 50 per cent improvement compared to 2002 levels will have been achieved.

Motor vehicle brands are reducing both CO_2 emissions and pollutant emissions year-on-year with the introduction of new technology in response to new regulations, market competition and consumer demand. An important component of being able to deliver new vehicle technology to continue to achieve improvements in vehicle emissions is improved fuel quality standards.

A whole-of-Government approach is required that incorporates all associated issues, including fuel quality standards, which have a significant impact on vehicles' ability to meet both CO_2 targets and air pollution emission standards. This approach is recognised as necessary globally by the automotive industry and regulators alike.

APPENDIX A THE AUSTRALIAN AUTOMOTIVE INDUSTRY

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

The automotive industry is a major contributor to Australia's lifestyle, economy and community and is Australia's largest manufacturing industry. The industry is wide-ranging and incorporates importers, manufacturers, component manufacture and distribution, retailers, servicing, logistics and transport, including activity through Australian ports and transport hubs.

There are now over 67 brands in the Australian market, with just over 1.1 million new vehicle sales per year. That is a lot of brands to service a market of our size equating to only around 16,000 new vehicles sold per brand. The following table provides a comparison of the competitiveness of global markets with double the number of new vehicles sold per brand in Canada, almost three times as many in the UK and more the 255,000 new vehicles sold per brand in the USA.

Table A.1 Competitiveness of Global Vehicle Markets[28]

	Australia	Canada	UK	USA
No. of brands in market	67	49	53	51
Sales	1,112,032	1,620,221	2,249,483	13,040,632
Market size per brand	**16,597**	**33,066**	**42,443**	**255,699**

In 2014, only 9 per cent of new vehicles sold were manufactured locally with the remaining 91 per cent of new vehicles imported from many countries and regions of the world including Asia (65 per cent), Europe (17 per cent), North and South America (6 per cent) and other countries including South Africa (3 per cent) (see Table A.2).

Table A.2 Country/Region of Origin for New Vehicle Sales in 2014[29]

Country/Region of Origin	% of New Vehicle Sales
Japan	30%
Thailand	20%
Europe	17%
Korea	12%
Australia	9%
Americas	6%
Other Asia (incl China and India)	3%
Other (incl South Africa)	3%

[28] Australian government, Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education, March 2013 Automotive Update.
[29] FCAI, VFACTS National Report, New Vehicle Sales, December 2014.

The motor vehicle is increasingly a global product and one of the most comprehensively regulated products. In considering regulations, the government's role is to balance social and economic benefits with safety and environmental performance.

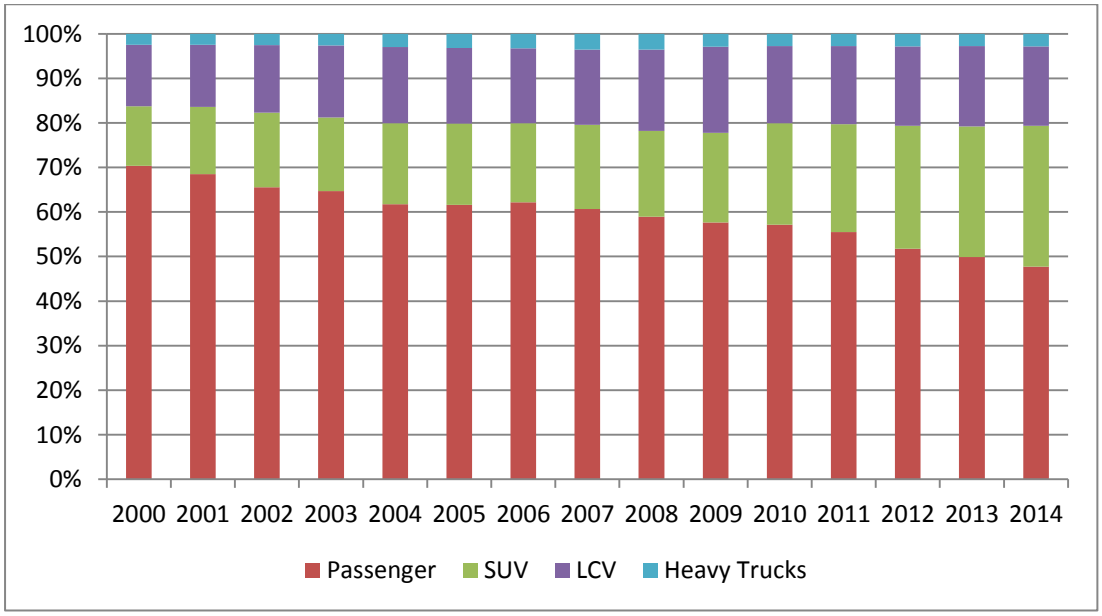
As economies of scale are critical in the automotive industry all manufacturers have tended to limit the number of locations any one model is produced and that model is then cross-shipped to markets where there is demand. This approach initially benefits the manufacturer through reducing costs and ultimately benefits the consumer by improving affordability and increasing product choice.

Australia is a small player with less than 1.5 per cent of the global build sold in this market. Consequently, Australia's ability to influence global design and investment is limited and as individual states are even a smaller proportion of the market and their ability to influence multi-national companies is correspondingly very limited.

The expansion of new and global brands and models into the market has led to the introduction of advanced security, safety and environmental features in motor vehicles. The introduction of these features is in response to increasingly strict environmental regulations and growing demands from consumers for advanced security and safety features.

The consumer preferences in the new Australian light vehicle market have changed significantly from 2000 to 2014 (see figure A.1). Over this time the share of passenger cars has decreased from around 70% to less than 50% of the market. The growth in the market has been in the SUV and light commercial vehicle segments. In 2014 SUVs were 31% and light commercial vehicles were (approx.) 18% of the new vehicle market.

Figure A1 – Australian New Vehicle Market; 2000-2014[30]



[30] FCAI, VFACTS National Report, New Vehicle Sales, December 2000 to 2014

APPENDIX B BACKGROUND OF CO2 STANDARDS

Appendix B contains a brief overview of the main features of the Australian NACE and both the EU and the US approaches to evaluating CO_2 emissions.

The intention is to provide background to how both the EU and US can mandate (and vehicle brands can achieve) CO_2 targets that are significantly higher than average annual reduction rate measured in the relevant drive cycles.

B1. Australian National Average Carbon Emissions (NACE)

The NACE calculated annually by the FCAI and the National Transport Commission is a simple sales weighted average of CO_2 emissions reported by each brand as part of their certification process. A weighted-average calculation is similar to an arithmetic average (the most common type of average), but instead of each data point contributing equally to the final average, some data points contribute more than others. In this case, the average was weighted to vehicle sales.

The carbon dioxide emissions for vehicles are calculated using the method described in the Australian Design Rule 81/02 – Fuel Consumption Labelling for Light Vehicles (ADR 81/02) and expressed in grams of carbon dioxide per kilometer (g/km). The CO_2 from each model is determined during a certification test cycle, called up in ADR 81/02 which is the United Nations Regulation 101[31] (UN R101).

The FCAI classifies motor vehicles into four main classes: passenger motor vehicles, sport utility vehicles (SUVs), light trucks and heavy trucks. These four classes are then broken down into subclasses; for example, the subclasses of SUVs are compact, medium, large and luxury.

However, the NACE is calculated for all light vehicles up to 3.5 tonnes GVM and includes;

- passenger motor vehicles
- SUVs
- light goods vehicles (light trucks and light vans)
- Light buses (up to 3.5 tonnes GVM).

[31] Nations Economic Commission for Europe Regulation No. 101 Uniform Provisions Concerning the Approval of Passenger Cars Powered by an Internal Combustion Engine only, or Powered by a Hybrid Electric Power Train with Regard to the Measurement of the Emission of Carbon Dioxide and Fuel Consumption and/or the Measurement of Electric Energy Consumption and Electric Range, and of Categories M1 and N1 Vehicles Powered by an Electric Power Train only with Regard to the Measurement of Electric Energy Consumption and Electric Range.

B2. EU CO_2 Targets[32,33,34,35]

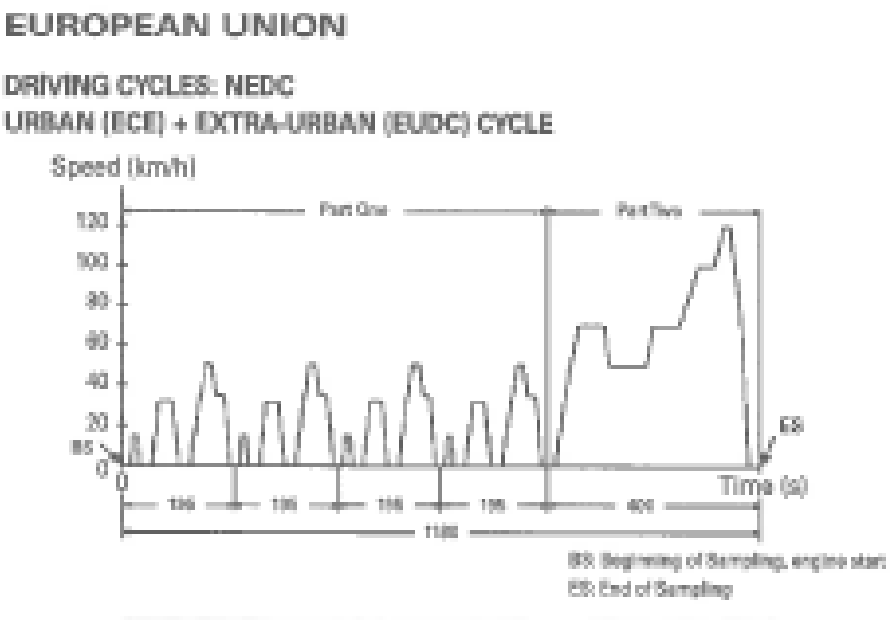
Cars are responsible for around 12% of the EU's total CO2 emissions.

The EU CO_2 targets for 2020 were introduced in 2014;

- Cars have a target of 95 gCO2/km; There is a one year phase in with;
  - 95% of sales need to comply in 2020
  - 100% of sales need to comply in 2021
  - In the previous 2015 target, the phase in was 65 % in 2012, 75 % in 2013, 80 % in 2014 and 100 % from 2015 to 2019
- Light commercial vehicles (LCVs) have a target of 147 gCO2/km;
  - Note: LCVs comprise only 5% of EU light vehicle market.

The EU uses the New European Drive Cycle (NEDC) to measure the CO2 emissions of each model/variant as part of the certification process;

Figure B1 – New European Drive Cycle[36]



[32] International Council on Clean Transport (ICCT), 2014, Policy Update, *EU CO_2 Emission Standards for Passenger Cars and Light-Commercial Vehicles,* January 2014
[33] European Commission, Climate Action, Reducing CO2 emissions from cars, www.ec.europa.eu/clima/policies/transport/vehicles/cars [accessed 22 April 2015]
[34] Regulation (EU) No 333/2014 of the European Parliament and of the Council of 11 March 2014
[35] Regulation (EC) No 443/ of the European Parliament and of the Council of 23 April 2009
[36] Delphi, 2015, Worldwide Emissions Standards for Passenger Cars and Light Duty Vehicles

CO_2 targets for each vehicle model are set according to the mass of each vehicle by a limit value curve. The curve is set in such a way that the targets set for new cars fleet average emissions are achieved.

Figure B2 – EU Passenger Car Limit Value Curve[37]

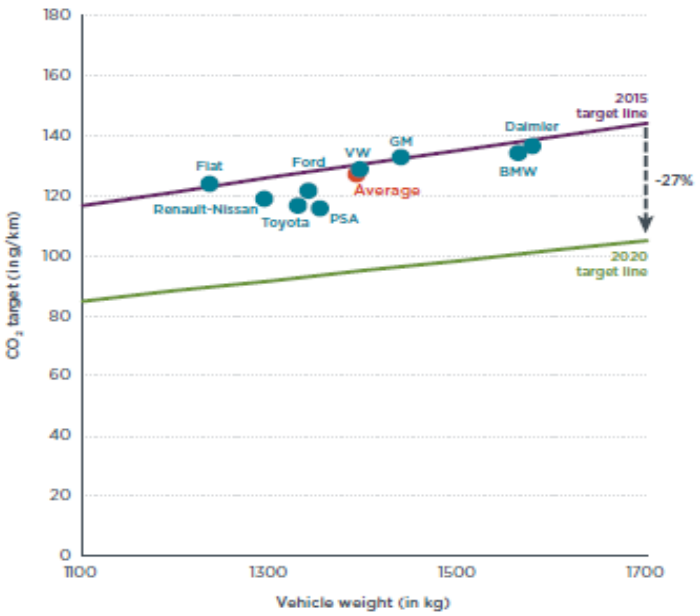


Figure 2: 2013 actual performance of the top-selling EU passenger car manufacturers, including 2015 and 2020 (effectively 2021) target lines.

The method for calculating the relevant brand target is demonstrated in the following extract from EC 443/2009 ANNEX I;

> SPECIFIC EMISSIONS TARGETS.
>
> The specific emissions of CO2 for each new passenger car, measured in grams per kilometer, shall, for the purposes of the calculations in this Annex, be determined in accordance with the following formulae:
>
> (a) From 2012 to 2015:
>
> Specific emissions of $CO_2 = 130 + a \times (M - M_0)$
>
> Where: M = mass of the vehicle in kilograms
>
> M_0 = 1 372.0 kg
>
> a = 0.0457

[37] The International Council on Clean Transportation (ICCT), 2014, CO2 Emissions from New Passenger Cars in the EU: Car Manufacturers Performance in 2013, June 2014

The limit value curve means that heavier cars are allowed higher emissions than lighter cars. Only the fleet average is regulated, so manufacturers are still able to make vehicles with emissions above the curve provided these are balanced by vehicles below the curve.

The EU includes flexibilities to encourage the introduction of new technologies;

- Eco-innovations;
    - Innovative technologies can help cut emissions, but in some cases it is not possible to demonstrate the CO2-reducing effects of a new technology during the test procedure used for vehicle type approval.
    - To encourage eco-innovation, manufacturers can be granted emission credits equivalent to a maximum emissions saving of 7g/km per year for their fleet if they equip vehicles with innovative technologies, based on independently verified data.
- Super Credits;
    - The Regulation gives manufacturers additional incentives to produce vehicles with extremely low emissions (below 50g/km). Each low-emitting car is counted as;
        - 3.5 vehicles in 2012 and 2013
        - 2.5 in 2014
        - 1.5 in 2015
        - 1 from 2016 to 2019.
    - Super-credits will also apply in the second stage of emission reductions, from 2020 to 2023.Each low-emitting car will be counted as
        - 2 vehicles in 2020
        - 1.67 in 2021
        - 1.33 in 2022
        - 1 from 2023.
    - For this second step, there will be a cap on the scheme's contribution to the target of 7.5g/km per manufacturer over the three years.
- Pooling;
    - Manufacturers can group together and act jointly to meet the emissions target.
    - In forming a pool, manufacturers must respect the rules of competition law. The information they exchange should be limited to average specific emissions of CO2, their specific emissions targets, and their total number of vehicles registered.

B3. US CO_2 Targets for Cars and Light Trucks[38]

The US CO_2 targets for cars and light trucks are a combination rules issued by both the US Environmental Protection Agency (EPA) and the US Department of Transportation's National Highway Traffic Safety Administration (NHTSA);

[38] US Environmental Protection Agency, 2012, Regulatory Announcement Information Sheet, *EPA and NHTSA Set Standards to Reduce Greenhouse Gases and Improve Fuel Economy for Model Years 2017-2025 Cars and Light Trucks*, EPA-420-f-12-051

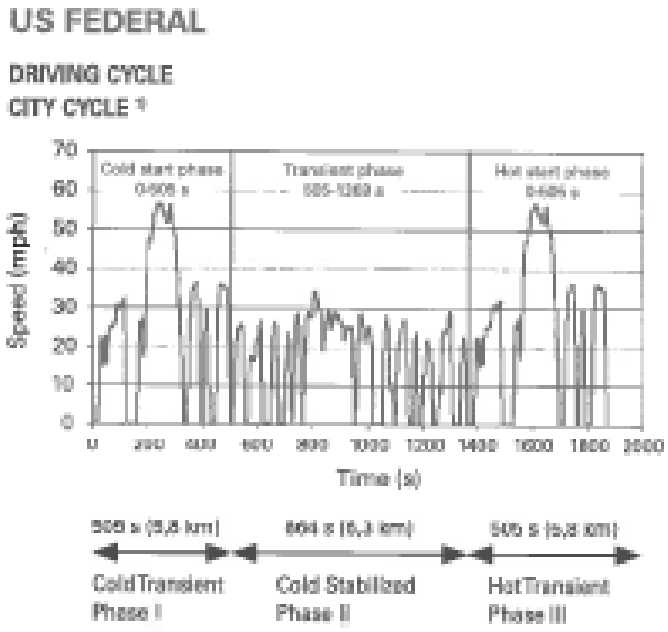
- The EPA established GHG emission standards
- NHTSA established Corporate Average Fuel Economy (CAFE) standards.

The US has set separate targets for passenger cars and light trucks (note: SUVs are considered to be light trucks);

	MY 2017	MY 2025	Total %Δ	Annual %Δ
Passenger cars	212	143	-32.5%	-3.4%
Light Trucks	295	203	-31%	-3.4%
Combined	243	163	-33%	-3.6%

The NTSA CAFE standards are based on the US FMVSS test drive cycle that is substantially different to the drive cycle used in the UN R101 (i.e. used by Australia and the EU).

Figure B3 – US Drive Cycle[39]



The CAFÉ standards use a footprint based approach where the standards (targets) to be met are based on emissions-footprint curves;

- Each vehicle model has a different CO_2 emission compliance target depending on its footprint value (related to the size of the vehicle). Generally, the larger the footprint, the higher the corresponding vehicle CO_2 emissions target.
- Each brand also has its own target based on the footprint curves and targets for each of their models and their annual sales.

[39] Delphi, 2015, Worldwide Emissions Standards for Passenger Cars and Light Duty Vehicles

Figure B4 – Footprint curves for Cars

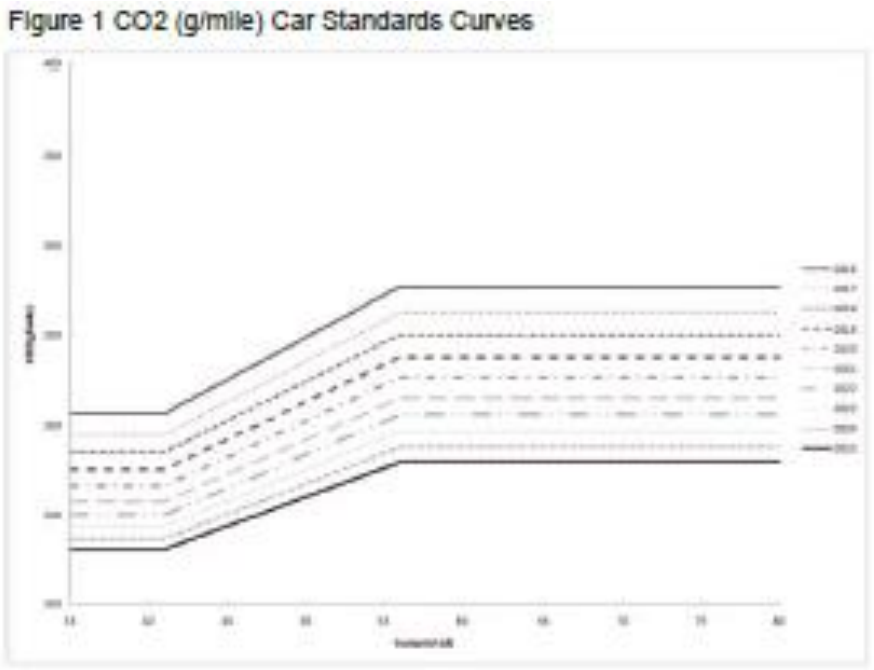
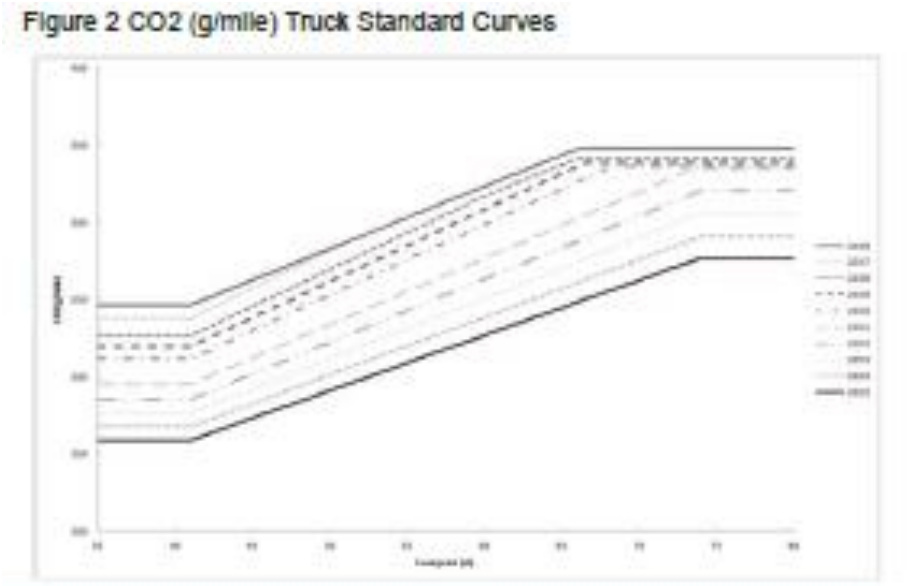


Figure B5 – Footprint Curves for Light Trucks (and SUVs)



The EPA GHG standard includes provisions for both compliance flexibility and provides incentives for manufacturers to introduce advanced technologies;

- Credit banking and trading. To provide flexibility in planning and introduction of new vehicles, credits may be carried forward for 5 years or back for 3 years to cover a deficit from a prior year.
- Air conditioning improvements.

- Off-cycle credits for technologies that achieve CO2 reductions, but are not reflected in the test procedures.
- Incentives for introduction of electric vehicles, plug-in hybrid vehicles, fuel cell vehicles and other advanced fuel/energy platforms.
- Provisions for small volume manufacturers.

APPENDIX C FCAI POSITION ON FUEL STANDARDS

The FCAI's longstanding position that fuel quality standards, Green House Gas emission standards (i.e. CO_2 standards) and pollutant emission standards (i.e. ADR 79/0x or Euro 5/6) all need to be considered together, as they are all interrelated, is not a unique one. It is shared by the global automotive industry, regulators and research organisations alike.

C1. US EPA:

The US EPA stated in their Tier 3 Motor Vehicle Emission and Fuel Standards;[40]

> *"This program includes new standards for both vehicle emissions and the sulfur content of gasoline, considering the vehicle and its fuel as an integrated system."*

and

> *"The systems approach enables emission reductions that are both technologically feasible and cost-effective beyond what would be possible looking at vehicle and fuel standards in isolation."*

and

> *"EPA is not the first regulatory agency to recognize the need for lower-sulfur gasoline. Agencies in Europe and Japan have already imposed gasoline sulfur caps of 10 ppm, and the State of California is already averaging 10 ppm sulfur with a per gallon cap of 20 ppm."*

C2. European Commission:

The European Commission (EC) also recognises fuel quality standards are linked to both pollutant and CO_2 standards. On their website page, "Road transport: Reducing CO2 emission from vehicles[41]" the EC state;

> *"Fuel quality is an important element in reducing greenhouse gas emissions from transport."*

[40] US Federal Register Vol. 79 No. 81, 28 April 2014, Part II Environmental Protection Agency 40 CFR Parts 79, 80, 85, et al. Control of Air Pollution from Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards: Final Rule

[41] European Commission (EC), Climate Action, Road transport: Reducing CO2 emissions from vehicles, http://ec.europa.eu/clima/policies/transport/vehicles/index_en.htm [accessed 21 November 2014]

C3. International Council on Clean Transportation:

The non-profit research organisation, the International Council on Clean Transportation (ICCT), also recognises the importance of fuel quality standards. In their inaugural *State of Clean Transport Policy*[42] report, released in 2014, the ICCT states;

> *"A key requirement to world-class vehicle standards, and thus cleaner vehicles, is the availability of ultralow-sulfur fuels."* (Page 4)

and

> *"Fuel quality, most notably the sulfur content of gasoline and diesel, is key to the implementation of advances emission controls. For optimal function of emission controls, … Euro 6/VI-equivalent vehicles require fuel as low as 10 ppm sulphur."* (Page 18)

C4. World Wide Fuel Charter:

The global auto industry position is based on the World Wide Fuel Charter[43] (WWFC) which is an extensive and comprehensive compilation of research and testing of engine, fuel and control systems by a wide group of expert contributors. The objective of the WWFC is to promote global harmonisation of fuel to:

- Reduce the impact of motor vehicles on the environment by enabling reduced vehicle fleet emissions;
- Facilitate the delivery of optimised fuels for each emission control category, which will minimize vehicle equipment complexities and help reduce customer costs (purchase and operation); and,
- Increase customer satisfaction by maintaining vehicle performance for a longer period of time.

The WWFC contains both minimum specifications of necessary fuel quality parameters and a summary of the impact of the various fuel parameters on vehicle operation. In the "Technical Background" section there is an excellent overview of the research conducted on the effects of octane and sulphur and includes the following statements on octane and sulphur;

> *"Increasing the minimum octane rating available in the marketplace has the potential to help vehicles significantly improve fuel economy and, consequently, reduce vehicle CO2 emissions."* (Page 17)

and

> *"Sulphur removal requires prolonged rich operating conditions…"* (Page 19)

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[42] Miller, Joshua D., Facanha, Cristiano, The International Council on Clean Transportation (ICCT), the State of Clean Transport Policy: A 2014 synthesis of vehicle and fuel policy development, 2014.
[43] ACEA, Auto Alliance, EMA and JAMA, World Wide Fuel Charter, September 2013, 5th Edition, www.acea.be [accessed 9 October 2010]

Relevant to the consideration of a relevant octane rating and level of sulphur for Australia, the WWFC outlines the required parameters for various fuel categories. The ones of specific relevance to Australia considering the current emission standards (i.e. ADR 79/04 or Euro 5) and proposed emission (ADR 79/05 or Euro 6) and fuel consumption standards are (Page 1):

> **Category 4:**
>
> Markets with advanced requirements for emission control, for example, markets requiring US Tier 2, US Tier 3 (pending), US 2007 / 2010 Heavy Duty On-Highway, US Non-Road Tier 4, California LEV II, EURO 4/IV, EURO 5/V, EURO 6/VI, JP 2009 or equivalent emission standards. Category 4 fuels enable sophisticated NOx and particulate matter after-treatment technologies.
>
> **Category 5:**
>
> Markets with highly advanced requirements for emission control and fuel efficiency, for example, those markets that require US 2017 light duty fuel economy, US heavy duty fuel economy, California LEV III or equivalent emission

The maximum sulphur level for both Category 4 and Category 5 gasoline is 10 ppm and Category 5 gasoline specifies a minimum of 95 RON (refer pages 6 and 7).

C5. Australian Fuel Quality Standards:

The current Australian market fuel quality standards are lower than the WWFC recommendations. The Australian fuel quality standards, set under the authority of the Commonwealth Fuel Quality Standards Act and consequential Fuel Standard determinations, specify the following grades of petrol (gasoline);

- Unleaded petrol (ULP) - 91 RON (min) and 150 ppm sulphur (max)
- Premium unleaded petrol (PULP) – 95 RON (min) and 50 ppm sulphur (max).

C6. Department of Environment*:*

In addition to the research contributing to the WWFC, FCAI are also aware of and supports the findings of a yet to be released report prepared for the Australian Commonwealth Department of the Environment in 2013 which reviewed existing standards and research on the impacts of sulphur levels in petrol and reached similar conclusions to the WWFC extracts above, i.e.;

- Fuel standards work in partnership with vehicle emission standards to reduce emissions.
- Exhaust emissions will be higher with existing Australia market fuels (150 ppm or 50 ppm sulphur) than if low sulphur (10 ppm) petrol is introduced.

- Reducing sulphur levels (to 10 ppm) would allow use of some specific technologies and also reduce fuel consumption through the reduction of frequency of catalyst regeneration.

This report also acknowledges the potential for degraded performance, operability and durability of some vehicle technologies due to low quality market fuel. As a result of the potential for technical problems associated with the vehicle's operation, the FCAI is concerned that the resultant degraded vehicle performance, operation or component durability could lead to owner dissatisfaction and subsequent reputational brand damage if the vehicle does not operate as expected. To protect against such damage, some brands may instead choose to restrict from Australia the introduction of new technologies that require higher fuel standards.

C7. Climate Change Authority:

The Climate Change Authority (CCA) acknowledged that vehicle pollutant emission standards 'affect aggregate light vehicle emissions and costs.' [44] However, the CCA did not consider that fuel quality was a factor and accordingly the CCA's analysis undertaken when developing their cost/benefit analysis of mandatory CO_2 targets did not consider the implications of in-service fuel and subsequent in-field vehicle performance.

The CCA paper uses certification results to develop their benefit analysis. The certification fuel is 95 RON 10 ppm sulphur petrol. If this fuel is not available in the market, it cannot be guaranteed that the same result will be delivered in service, especially if a vehicle owner is likely to use ULP which, in Australia, is currently regulated to be 91 RON 150ppm (max) sulphur.

The FCAI questions whether the full benefit as calculated will be delivered and considers that this cost/benefit analysis cannot form the basis for any regulatory analysis without additional testing to confirm in-service operation on market fuel will deliver the same result. Otherwise, to deliver the estimated benefits, the market fuel would have to be consistent with the certification fuel (i.e. 10 ppm sulphur, 95RON) to fully deliver a continued reduction in CO_2 emissions.

C8. FCAI Position:

The FCAI has been consistent in its call for concomitant market fuel. This was highlighted in the FCAI's submission to the 2010 Regulatory Impact Statement (RIS) considering the introduction of Euro 5/6 emission standards. The regulation for Euro 5/6 (i.e. UN R83) specifies 95 RON 10 ppm sulphur petrol as the test fuel and the benefits estimated in the 2010 RIS for the introduction of Euro 5 and Euro 6 used the results of the regulation certification laboratory testing.

[44] Australian Government Climate Change Authority (CCA), Light Vehicle Emission Standards for Australia: Research Report, June 2014