



Submission from: Clean Air Society of Australia and New Zealand Inc. (CASANZ)

To: Department of Infrastructure and Regional Development

Subject: Consultation on proposed vehicle emission and fuel quality measures

The Clean Air Society of Australia and New Zealand (CASANZ) is a non-governmental, non-profit organization formed in the 1960s to bring together people with an interest in clean air and the study of air pollution. Its interests have since grown to include broader environmental management affairs, including Special Interest Groups focussing on Transport Emissions and Greenhouse Gas issues. The Society has approximately 600 members in Australia, New Zealand and other countries. This submission from CASANZ is based on the responses from members reflecting their views on the various issues identified in the consultation documents.

SUMMARY

CASANZ summarises the following key points in our submission:

- CASANZ supports further measures to improve fuel quality and reduce emissions of greenhouse gases and air pollutants from transport.
 - “Improving the efficiency of new light vehicles”, Option 4, and consider model blending.
 - “Vehicle emissions standards for cleaner air”, Option 6, and consider model blending.
 - “Better fuel for cleaner air – discussion paper”, 10 ppm petrol sulphur standard, and inclusion of fuel volatility
- Vehicle emission standards in Australia are (and have been) substantially lagging behind international best practice and the proposed fuel efficiency and vehicle emission standards are regarded as being long overdue, and are regarded as a minimum effort to reduce vehicle emissions. To ensure better air quality and greenhouse gas emission outcomes, CASANZ recommends complete harmonisation with international vehicle emission standards, and associated fuel quality standards, with minimum further time delays.
- There is an urgent need to coordinate and enable accurate monitoring of in-service vehicle emissions to monitor trends in vehicle emissions and assess policy impacts.
- The proposed vehicle emission and fuel quality standards are regarded as a partial solution from a health and greenhouse gas emissions perspective, and further action is required. For instance, emissions from the on-road fleet are not addressed by the proposed measures, as standards apply only to new vehicles. Solely relying on new vehicle emission/fuel standards is not sufficient to effectively manage the air quality impacts of on-road vehicles. Measures to reduce current (and near-future) on-road emissions should be seriously considered and evaluated as soon as possible.
- The way forward is unclear. Although the “Vehicle Emission Discussion Paper” (February 2016) discussed a wide range of measures to reduce vehicle emissions, the Australian Government does not provide a clear roadmap for a holistic approach, i.e. to what extent and how these measures will be considered, and possibly implemented. We look forward to strong leadership on this important matter from the Federal government once submissions on the RIS have been considered. It is recommended that the Australian Government creates a national working group with subject area experts to create a mechanism by which to effectively discuss and guide a holistic approach to vehicle emission reduction.

GENERAL COMMENTS

- **VEDP** – The *Ministerial Forum on Vehicle Emissions* started with a “Vehicle Emission Discussion Paper” (VEDP, February 2016), which discussed a wide range of initiatives and measures to reduce motor vehicle emissions. In response to this discussion paper CASANZ raised a number of key issues, and recommended that stakeholders like CASANZ are given the opportunity to be involved in the subsequent steps of the process. The Society members were generally very supportive of the objectives stated in the VEDP.
- The “Consultation on Proposed Vehicle Emission and Fuel Quality Measures” has now continued with a limited subset of the measures that were discussed in the “Vehicle Emission Discussion Paper” (February 2016):
 - Improving fuel quality standards (discussion paper)
 - Fuel efficiency/CO₂ emission standards, light-duty vehicles only (draft RIS)
 - Air pollution emission standards, light-duty and heavy-duty vehicles (draft RIS)
- **Road transport, exposure and health effects** – Road transport is a major source of air pollution and greenhouse gas emissions. Overseas studies have concluded that road transport is the largest contributor to adverse health effects of ambient air pollution. This is in part due to the close proximity of vehicles to the population; motor vehicle emissions are released close to ground level and, typically, in close proximity to where people live and work. As a consequence, the actual contribution of motor vehicle emissions to population exposure (and thus health effects) is substantially greater in general than equivalent emission levels from e.g. industrial sources. Industrial emissions are typically emitted through elevated vents and stacks, and are generally located some distance from populated areas. This means that industrial emissions are often dispersed significantly before they reach the population. As a consequence, relatively minor levels of motor vehicle emissions can still lead to significant exposure to pollutants and associated health impacts. This was illustrated by a comprehensive study conducted in the US¹, which concluded that road transport contributes 7% to total PM_{2.5} emissions, but is the largest contributor to population health impacts (the number of premature deaths per year). Moreover, as population growth continues to concentrate around the major capital cities, higher density living along the major roads network has increased; encouraged by state planning authorities. An increasing number of residents are therefore being exposed to the vehicle emitted air pollutants along major roadways.
- **Control of vehicle emissions in Australia** – As is common practice around the world, increasingly strict vehicle emission and fuel quality standards have been adopted in Australia over time. These have progressively reduced average vehicle emissions of regulated air pollutants per vehicle kilometre travelled (VKT). The trend is different for (unregulated) greenhouse gas emissions, where, for instance, the strong and continued growth in SUV sales increases average CO₂ emissions per VKT. Road use has also continued to grow steadily over the years, leading to more congestion, which adversely affects emissions. This has, at least partly, offset gains in vehicle emissions per VKT.

¹ Caiazzo, F., Ashok, A., Waitz, I.A., Yim, S.H.L., Barrett, S.H.R., Air pollution and early deaths in the United States. Part I: Quantifying the impact of major sectors in 2005, *Atmospheric Environment*, 79, 198-208, 2013.

- **Vehicle emission standards in Australia are lagging behind** – Adoption of international vehicle emission standards (air pollutants) in Australia has historically been lagging behind the European Union, varying from 2-7 years. In regard to CO₂ and/or fuel efficiency standards, it is worth noting that there has already been a consultation period of almost 10 years, where these standards have been discussed without tangible action, i.e.
 - The “Vehicle Fuel Efficiency Public Discussion Paper” in 2008 to encourage the uptake of more fuel efficient low carbon vehicles, and
 - the “Light Vehicle CO₂ Emissions Standards Discussion Paper” in 2011 aimed at achieving a significant reduction in greenhouse gas emissions from the transport sector.

As a consequence, both the proposed fuel efficiency and vehicle emission standards are regarded as being long overdue. The majority of motor vehicles engine design and emission performance are now either of European, Asian or USA origin. Continued globalisation of manufacture and delivery times to Australia of new vehicles from these countries of generally a few months, strongly supports common vehicle emission standards, regardless of where manufacture occurs and vehicles are sold, as the health effects of exhaust emissions are expected to be the same.

Unfortunately, a significant delay is again created with the proposed measures:

- ⇒ Euro 6, adopted in Europe in 2014, proposed for Australia 2019-2020, i.e. 5 years delay
- ⇒ Euro VI, adopted in Europe in 2013, proposed for Australia 2019-2020, i.e. 6 years delay
- ⇒ CO₂ LDV, adopted in Europe in 2009 (first goal in 2012), proposed for Australia 2020-2025, i.e. 11-14 years delay

This delay is not a trivial issue as vehicles remain in the on-road fleet for many years. As a consequence, the choice of implementation year is important; it will impact significantly on total cumulative emission reductions. Postponing the implementation of stricter standards will allow vehicles to emit higher levels of air pollution and greenhouse gases over their useful life. The importance of this point is demonstrated with, for instance, research into a diesel filter retrofit program in California: particulate emissions of diesel vehicles were reduced by almost 70% in a short four-year period, showing the impact of emission control technology and the potential for effective emission reduction.² To ensure better air quality and greenhouse gas emission outcomes, CASANZ recommends complete harmonisation with international vehicle emission standards, and associated fuel quality standards, with minimum further time delays.

- **Minimising exposure to air pollution from road transport** – Historically air quality (concentration) standards have been set at levels that balance various factors, including economics, health, social and technological factors, using traditional cost-benefit analysis. Several air pollutants do not have a safe threshold concentration below which adverse health effects do not occur. This means that ambient air quality standards for these pollutants cannot be set at universally protective levels. Adverse health impacts will still occur at and below these ambient concentration standards. As a consequence, minimisation of population exposure should be a driving force behind the “Ministerial Forum on Vehicle Emissions”. In view of this, the proposed and traditional emission reduction methods such as fuel quality and vehicle emission standards will contribute to reduced reduced population exposure to vehicle emissions, but they are only be regarded as a partial solution from a health and greenhouse gas emissions perspective.
- **Emissions from the on-road fleet are not addressed** – Although new fuel quality standards may affect emissions from the current on-road fleet to a limited extent, the proposed vehicle emission standards apply to new vehicles only. Given the slow fleet-turnover, the benefits from stricter emission standards will only start to have a significant effect several years into the future. There is, therefore, an urgent need to supplement the proposed regulatory standards for new vehicles with other measures to effectively address current and near-future emissions from the on-road fleet.

² Millstein, D.E., Harley, R.A., 2010. Effects of retrofitting emission control systems on in-use heavy diesel vehicles, Environmental Science and Technology, 44 (13), 5042-5048.

- Effective measures to reduce current on-road emissions should be considered** – There is currently a lack of a coordinated and effective effort in Australia to reduce on-road vehicle emissions. The current on-road fleet includes a large portion of older vehicles with relatively high emission levels, as 1) they complied with less stringent emission standards at the time of manufacture, and 2) are impacted by deterioration, and sometimes failure, of engine and emission control technology. One particular and important issue is that a small portion of the on-road fleet are ‘excessive emitters’ with emissions up to 50 times higher or more than new or properly functioning vehicle.^{3,4} A recent tunnel study in Brisbane confirmed that some vehicles exhibit (very) high emission levels and have a disproportionate impact on total vehicle emissions.⁵ Retrofit programs have been used around the world to immediately reduce on-road vehicle emissions.^{6,7,8,9} These programs acknowledge that solely relying on new vehicle emission standards is not sufficient to effectively manage the air quality impacts of on-road vehicles. As a consequence, programs to address on-road emissions and, for instance, fix or replace high/excessive emitting vehicles are urgently needed and will create immediate emission benefits; in contrast to the measures now considered in the *Ministerial Forum on Vehicle Emissions*.
- Influence market behaviour** – CASANZ believes that an approach where the various parties (car manufacturers, fuel suppliers, consumers) are (to some extent) held responsible for their emissions, is a sensible way forward (“polluter pays principle”). For instance, combination with other measures such as stamp duty charges, changes to vehicle registration fee structure, rebates, fleet purchasing frameworks and improving consumer awareness could help “internalise” the issue of air pollution and climate change for the general public and influence buying behaviour, which in turn changes market demand and indirectly affects car manufacturers.
- Urgent need to coordinate and enable accurate monitoring of in-service vehicle emissions** – Comprehensive in-service vehicle emissions testing programs (so-called ‘NISE studies’) have been conducted in the past in Australia, but only until 2009. As a consequence, there is an urgent need to measure current ‘real-world’ emissions from Australian vehicles (both CO₂ and air pollutants). This current lack of Australian in-service vehicle emission measurements is particularly relevant as 1) there is an increasing gap between legislative emissions measured as part of the vehicle emission standards and actual real-world emissions of new vehicles, 2) emission benefits of new vehicle emission standards can be less than expected and should therefore be monitored¹⁰, and 3) emissions of in-service vehicles are substantially higher than those of new vehicles due to ‘natural’ engine and emission control deterioration, and in some cases defects, poor maintenance or even tampering. It is essential to measure trends in vehicle emissions and associated impacts on air quality to evaluate the effectiveness of policy measures, and to identify any unexpected results in a timely fashion. There are different ways to quantify trends in vehicle emissions, and they include repeated measurements over time using tunnel studies, long-term air quality monitoring at strategic kerbside locations, on-board emissions testing (PEMS) and remote sensing.

³ Sjödin, Å, Andréasson, K., Wallin, M., Lenner, M., Wilhelmsson, H., “Identification of high-emitting catalyst cars on the road by means of remote sensing”, *Int. J. of Vehicle Design*, 18 (3/4), 326-339, 1997.

⁴ Bishop, G.A., Schuchmann, B.G., Stedman, D.H., Lawson, D.R., “Multispecies remote sensing measurements of vehicle emissions on Sherman Way in Van Nuys, California”, *Journal of the Air & Waste Management Association*, 62 (10), 1127-1133, 2012.

⁵ Smit, R., Kingston, P., Wainwright, D., Tooker, R., 2017. A tunnel study to validate motor vehicle emission prediction software in Australia, *Atmospheric Environment*, 151, 188-199.

⁶ Van Poppel, M., Lenaers, G., 2005. Real life evaluation of the emission reduction potential of a city bus retrofitted with a continuous regenerating trap, *Atmospheric Environment*, 39, 2451–2457.

⁷ Chong, U., Yim, S.H.L., Barrett, S.R.H., Boies, A.M., 2014. Air quality and climate impacts of alternative bus technologies in Greater London, *Environmental Science and Technology*, 48 (8), 4613-4622.

⁸ MECA, 2014. Retrofitting Emission Controls for Diesel Powered Vehicles, Manufacturers of Emission Controls Association (MECA), Arlington, USA, November 2014.

⁹ McCoy, B.J., Tanman, A., 2014. Emissions performance and in-use durability of retrofit after-treatment technologies, *SAE International Journal of Engines*, 7 (4), 1637-1649.

¹⁰ For instance, research in Europe shows that Euro 5 and Euro 6 diesel cars have similar or worse emission performance (NO_x) than Euro 4 cars. There are also potential issues with increasingly complex after-treatment devices in new vehicles, such as diesel particulate filters, where advanced emission control technology can fail (e.g. overheated during regeneration, filter cracking) resulting in pre-Euro standard emission levels.

- **Model blending** – The robustness of RIS results, an important issue, can be further tested by using other available and established methods for vehicle emission estimation such as COPERT Australia¹¹ and NSW AEI¹². In fact, using multiple models in a process called model blending is considered an appropriate approach for complex issues such as simulation of vehicle emissions in Australia. Model blending acknowledges that no single model provides the absolute truth, but that individual model biases and eccentricities can be (partly) cancelled out by blending their outputs, delivering more robust and reliable results. Model blending should be considered in the Draft RIS.
- **Insufficient consultation and time-frames** – Given the complexity it is essential to ensure proper methods are used to assess and quantify the emission impacts and costs of the various options. CASANZ feels that insufficient opportunity for consultation has been provided so far, including for instance involvement of national experts, and that timelines imposed on stakeholder submissions are too tight to allow for a proper and in-depth assessment process. Although the methods applied in the RISs appear generally sound, there is a lack of detail to enable proper assessment of modelling and validity of assumptions used.
- **The way forward is unclear** – The Vehicle Emission Discussion Paper presented and discussed a wide range of vehicle emission reduction measures, and even more measures could be considered that have been used around the world. They include, but are not limited to, retrofit programs, improved traffic management (e.g. signal coordination, ‘green waves’, on-ramp metering), anti-idling measures, low emission zones, traffic re-routing, and so forth. It is unclear, to what extent and how these necessary and additional measures will be considered further in Australia. The Australian Government does not provide a clear roadmap for a holistic approach, i.e. to what extent and how these measures will be considered, and possibly implemented. We look forward to strong leadership on this important matter from the Federal government once submissions on the RIS have been considered. It is recommended that the Australian Government creates a national working group with subject area experts to create a mechanism by which to effectively discuss and guide a holistic approach to vehicle emission reduction. CASANZ can recommend subject matter experts for this working group. CASANZ is well placed to provide expert comment and advice on emissions, air quality and climate change policy and science, by both direct participation and by referral, through its wide network of recognised experts in this area.
- **New Zealand is affected by Australian policy decisions** – New Zealand is affected by Australian policy decisions – Australia effectively sets vehicle standards for New Zealand as well. The Australian/New Zealand market is treated as one by vehicle manufacturers. Any delays in adoption of Euro 6/VI and CO₂ emission standards, will create a similar delay in New Zealand. We welcome further engagement from the Australian government with CASANZ which represents both New Zealand and Australian professionals. This also allows New Zealand members to have input into a process that will ultimately help to improve air quality in New Zealand and contribute to the reduction of greenhouse gas emissions from New Zealand.

¹¹ <http://emisia.com/products/copert-australia>

¹² <http://www.epa.nsw.gov.au/air/airinventory.htm>

SPECIFIC COMMENTS

“Better fuel for cleaner air – discussion paper”

The quality of fuel is closely linked with international vehicle emission standards for technological reasons, so it is important that emission and fuel quality standards are adopted simultaneously, preferably without modification.

Adopting different standards such as a 30 ppm petrol sulphur standard, rather than 10 ppm used overseas, will have an adverse effect on vehicle emissions. For instance sulphur content is critical for effective operation of catalyst technology, where higher sulphur levels will, for instance, cause reduced control of particulate matter and toxic hydrocarbon emissions.

It is noted that a 10 ppm sulphur standard is already in place for diesel fuel, so a 30 ppm sulphur standard for petrol would prolong the current inconsistency between Australian petrol and diesel sulphur standards.

Modification of international standards (e.g. sulphur content) will also create a unique situation in Australia with potentially unintended consequences. For instance, overseas research is often used in the absence of Australian vehicle emission measurements to estimate vehicle emissions and impacts of different policy and emission mitigation measures. Deviation from international practice could make the use of international research data inappropriate and no longer representative for Australian conditions. This will further increase the need for comprehensive and ongoing emission test programs in Australia, with associated resource implications.

An important issue is that fuel volatility is not included or discussed in the discussion paper, yet it is an essential fuel parameter from an emissions perspective. Fuel volatility standards currently used across the jurisdictions vary and are less stringent than overseas standards (e.g. EU). As a consequence, the inclusion of this parameter in nationally harmonised fuel quality standards is beneficial and likely a cost-effective measure to reduce vehicle emissions, and should therefore be considered.

“Improving the efficiency of new light vehicles”

CASANZ supports “*Option 4: Legislated fuel efficiency standard. Australian Government legislates to introduce a fleet average efficiency target for manufacturers to meet*”, to:

- ensure ongoing improvements in air quality and reduce population exposure to air pollution,
- ensure fuel efficiency improvements in line with international best practice,
- maintain commitments to international trade agreements,
- maintain international competitiveness,
- prevent Australia from becoming the worst performer from a greenhouse gas emissions perspective,
- prevent Australia from becoming a destination for outdated and inferior technology.

Table 1 lists a reduction of 252 to 184 g CO₂/km for the LDV fleet in the period 2002-2015. The National MVEI¹³ reports a much higher ‘real-world’ value of 251 g/km for 2010 (212 g/km in Table 1), showing the discrepancy between legislative cycles and real-world CO₂ emission rates. CASANZ recommends to clearly include real-world emissions information in the RIS, as this will affect and relate back (both in a relative and absolute sense) to the international commitment of the Australian Government to reduce greenhouse gas emissions by 26-28 percent.

¹³ University of Queensland, Australian Motor Vehicle Emission Inventory for the National Pollutant Inventory (NPI), prepared by Robin Smit, available at <http://www.npi.gov.au/resource/australian-motor-vehicle-emission-inventory-national-pollutant-inventory-npi>, 2 August 2014.

“Vehicle emissions standards for cleaner air”

CASANZ supports “*Option 6: Mandatory standards for light and heavy vehicles. Mandate both Euro 6 for light vehicles and Euro VI for heavy vehicles under the Motor Vehicle Standards Act 1989*”, to:

- ensure ongoing improvements in air quality and reduce population exposure to air pollution,
- maintain commitments to international trade agreements,
- maintain international competitiveness,
- prevent Australia from becoming a destination for outdated and inferior technology.

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