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Truck Industry Council Response to:

**Review of Emissions Standards (Euro VI) for Heavy Vehicles –
Discussion Paper, issued October 25, 2012**

Submitted by email to adr80review@infrastructure.gov.au

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Background

The Truck Industry Council (TIC) is the peak industry body representing manufacturers and distributors of heavy commercial vehicles (that is, with Gross Vehicle Mass above 3,500 kg) in Australia. TIC has assisted the Department of Infrastructure and Transport (DoIT) over the past 11 years when formulating vehicle emissions rules for the Australian market, in particular regarding contents and timing for ADR80/00, ADR80/02 and ADR80/03.

DoIT's Vehicle Emissions and Environment Team is responsible for drafting and administering Australian Design Rules (ADRs) for Motor Vehicles that relate to environmental standards. Since 1 January 2011, all heavy vehicles (with a Gross Vehicle Mass above 3,500 kg) are required to comply with ADR 80/03, which prescribes compliance with EURO V and equivalent standards. In October 2012, the Department released a Discussion Paper to explore the issues relating to, and seeking industry comments for, the possible adoption of EURO VI and equivalent standards for the same class of vehicles.

The Discussion Paper is the first stage of the public consultation process leading to a possible new ADR. It will be followed by a Regulation Impact Statement, and potentially to a new ADR, which is likely to be designated ADR80/04.

The Discussion Paper raised specific questions that DoIT wishes to address before drafting any RIS on the same subject. This document provides the TIC response to these questions raised and some general comments in conclusion.

Introductory Comment

TIC members recognise that while there is a strong heavy truck manufacturing sector in Australia (with around 50% of heavy duty truck segment new sales being manufactured locally), most new vehicle technologies, and virtually all driveline, diesel engine and exhaust system design and development occurs overseas. As such, our nation is a "technology taker", and does not have the local new vehicle sales volumes to justify major local variations from engine and emissions control systems developed overseas. On the other hand, the unique Australian operating conditions relating to average speeds, ambient temperatures, loads and long distance operations demand that cooling systems and related design aspects of heavy vehicles must be adapted before they are introduced to market.

Consequent to this situation, TIC has collaborated with the Department to ensure that changes in emissions standards are introduced to Australia according to a schedule that is neither "too soon" nor "too late". The introduction of a new vehicle emissions standard in Europe, the USA or Japan is now usually "phased in" across various classes of vehicle, with new technologies often requiring 2-3 years of in-service experience before they are reliable and met with a high level of customer acceptance in their home market. Subsequent to the home market experience, Australian vehicle variants then require testing and development under local conditions. Accordingly, the Australian introduction of a new standard less than 3 years after the home market introduction is likely to be "too soon" for our own market. It is also possible that a local standard can

be introduced “too late” for our market, possibly restricting the availability of the latest safety and efficiency features that are only developed on the latest designs. This is especially relevant if new emissions control technologies are developed to comply with the latest standards, and they require redesign of chassis space, engine bay and other factors to comply.

Separate to the local market conditions described above, we also must consider that the Commonwealth Government’s focus has turned strongly towards the reduction of Carbon Dioxide (CO₂) emissions, through measures including the “Carbon Tax”. Should the current government’s policy of applying a Carbon Tax component to the Road User Charge for heavy vehicles be applied as proposed from 1 July 2014, it is expected that truck operators will seek to reduce fuel consumption even more than they do now. The introduction of tougher exhaust emissions standards 2-3 years after the carbon tax takes effect is expected to result in increased fuel consumption for some heavy truck engines. Evidence from Europe suggests that EURO VI diesel engines typically use more fuel than their EURO V counterparts. By contrast, the situation in the USA is such that fuel economy mandates being phased in from 2014 will result in more fuel-efficient engines becoming available from the USA by the time a new ADR is introduced.

In conclusion, TIC supports the gradual improvement in local emissions standards, due primarily to our need to adopt the best available technology from home markets such as Europe, the United States and Japan. However, TIC is sensitive to the difficulties that DoIT may have in being able to justify the required benefit: cost ratio in a forthcoming RIS. Indeed, given the improvements made already in reaching EURO V levels, any tougher standards will provide diminishing returns on the significant investments required. Arguably, a program that can remove pre-1996 trucks from our inner cities will provide far more benefit; TIC has previously highlighted that just one pre-1996 truck produces as much PM as sixty new trucks. The evidence provided of air quality improvements in Australian capital cities, and the projections of improvements (even without changes to the new vehicle ADR) may not readily lead to a resounding conclusion that a new emission ADR should be urgently pursued. Indeed, the recent 2nd Minor Amendment to ADR80/03 will allow latest technology engines to be introduced voluntarily without a mandate, and perhaps allow the introductory timing for ADR80/04 to be delayed until well after EURO VI and their equivalent standards are fully implemented in their home markets.

Discussion Paper Questions: Page 8

1. Would you support the determination of a new ADR 80/04 based on the Euro VI emission standards?

TIC Response: *The TIC supports the timely* introduction of a new ADR 80/04 but believes that several concurrent considerations must be raised:*

- **Higher Mass Limit** allowances to compensate for the increased mass of the technologies involved. TIC members advise that EURO VI and US EPA 2010 engine + exhaust system masses have increased by **up to 450 kg** compared to their predecessors, in the HD segment. Without accompanied legal mass limit increases, ADR80/04 vehicles would therefore provide a disincentive to customers from a payload and productivity perspective. There is a precedent in that ADR80/02 compliant vehicles with ADR84 FUP devices were permitted 500 kg additional steer axle mass limits.
 - **Medium Duty & Heavy Duty trucks with axle masses at the current legal limit.** For ADR80/04, TIC seeks at least an **additional 400 kg across the legal GVM** limit of the vehicle, not necessarily just on the steer axle, as quite a portion of the additional mass is attributed to the exhaust after-treatment technologies. Examples:
 - 1) a 2-axle rigid truck has a 15,500 kg legal limit (GML), which could be increased to 15,900 kg.
 - 2) a 3-axle 6x4 configuration truck has a 23,500 kg legal limit (on HML) which could be increased to 23,900 kg
 - 3) a 4-axle 8x4 configuration truck has a 28,000 kg legal limit (on HML) which could be increased to 28,400 kg.
 - **Light Duty trucks at license limits.** The legal mass limit for a car driver's license is currently 4,500 kg GVM. Trucks with separate bodies at or below this GVM rating have a marginal payload, and with additional emissions control equipment weighing perhaps 250-300 kg, the legal payload is further reduced. However, the physical size and driving characteristics of many light trucks up to 6,500 kg GVM and higher is no different to those rated at or below 4,500 kg. New Zealand recently (2012) increased the GVM limit for car license operations to 6,000 kg. The car license limit in the United Kingdom has been 7,500 kg for many years. TIC suggests an increased GVM rating of 6,000 kg (on a car license) could apply to light trucks complying with ADR80/04, thus removing a clear disincentive to purchasing these trucks when they are new. A payload benefit would apply rather than a deficit.
- **Overall Width Limit** considerations. The emissions control equipment (including chassis-mounted SCR catalysts and Diesel Particulate Filters) developed for EURO VI is fitted to vehicles with a width limit of 2,550 mm, while that developed in the USA for US EPA 2010+ is fitted to vehicles with a width limit of 102 inches, or 2,590 mm. Given that Australia is a technology taker, consideration must be given to allowing ADR80/04 trucks to have various components wider than the current 2,500 mm limit. TIC therefore proposes that exhaust emissions equipment (including AdBlue/DEF tanks, SCR catalysts and DPF systems) and fuel tank components should be

included in the existing list of items exempt from the current width limit, to a maximum of 2,550 mm.

- **Equivalency of Standards.** Careful consideration of the details of each standard is needed when assessing and comparing Alternative Standards with EURO VI requirements. While much good work was done in this area during the development of ADR80/03 Amendment 2, the various standards appear to be changing on an annual basis at present, and Australia must consider what are reasonable and achievable standards for ADR80/04 (especially in the area of On-Board Diagnostics and Driver Inducements, in light of the lack of “on-the-ground” resources to enforce in-service standards). TIC recommends that the starting level for equivalency between standards should be **EURO VI Part C, US EPA 2010 (2012 Model Year) and Japan Post-NLT09**. Please note that the US EPA 2014 model year engines (meeting fuel economy requirements) are potentially a higher level of cost again, over the 2012 Model Year specification.
- **Benefit : Cost ratio.** As stated in the introductory comments, TIC is sensitive to the Department’s task of showing a reasonable Benefit : Cost ratio in the forthcoming RIS, particularly in the context of Australian cities. Other factors such as the World Health Organisation’s recent declaration of diesel exhaust fumes as a known carcinogen may need to be used. Further, a concurrent program which encourages users of pre-ADR (that is earlier than 1996) trucks to update to more modern and clean vehicles may have far greater benefit.
- **Real-world improvements in emissions between EURO V and EURO VI.** Consideration must be given to the fact that trucks which already use Diesel Particulate Filters (DPFs) are already at levels well below the PM limits for EURO V. That is, a DPF effectively eliminates more than 99% of PM emissions. Therefore, while the LIMIT levels reduce by 66% between the two standards, the “real-world” PM emissions for engines that already use a DPF do not change at all, even though NOx limits reduce. This would have a significant impact on Benefit : Cost ratio calculations.
- **Air Quality vs. Fuel Consumption benefits.** European truck engines that comply with EURO VI typically use more fuel (and AdBlue reagent in their SCR system) than their EURO V equivalent. European regulations which mandate fuel consumption improvements in heavy vehicles appear to be around 4-5 years away, while the US fuel economy / Greenhouse Gas Rule begins to apply from 2014. Accordingly, the introduction of ADR80/04 before the fuel economy mandates take effect in Europe could prove to be a disincentive to truck buyers, and possibly skew the market towards US EPA-compliant engines. TIC supports a “level playing field” for all truck suppliers, regardless of origin, and therefore does not support a new ADR which may favour trucks and engines from one region.

2. What implementation timelines* would you consider to be reasonable?

TIC Response:

The proposed timelines of 1 January 2016 for new models and 1 January 2017 for existing models are the earliest that could be achievable from an engineering

development and product planning perspective, and match dates previously advised in separate correspondence to DoIT, subject to finalization and publication of the new ADR before 1 Jan 2014. However, recent information suggests that there is a reasonable case for delaying the mandatory introduction dates for ADR80/04.

- **Timing for EURO VI in the EU.** *A presentation from an overseas speaker at TIC's Truck Emissions Seminar in October 2012 revealed that EURO VI for heavy vehicles would be introduced in phases from 2013, but not completed until 2017. This timetable is expanded upon later in this response in Table 1. Accordingly, it would be unwise to introduce ADR80/04, based on EURO VI, when EURO VI has not been fully implemented in its home markets. A 2-3 year period subsequent to the European timetable would allow testing and development time using reliable and durable technologies for Australia.*
- **Fuel Economy / GHG Rules in Overseas Markets.** *With the expected introduction of fuel economy standards, TIC expects that EURO VI-compliant engines will be developed further from 2017 and beyond. Similarly, the Fuel Economy / GHG Rule in the USA (from 2014) and mandatory fuel economy targets in Japan (from 2015) will result in a renewed focus and development efforts on fuel efficiency. A delay in ADR80/04 by 2-3 years from the Discussion Paper's proposal would serve to allow for a more "level playing field", and the adoption of mature technologies to Australia. In the mean time, the overall emissions of the new truck fleet will improve, as the existing ADR80/03 Amendment 2 will allow the voluntary introduction of cleaner engines with improved fuel economy to suit market demands.*

Due to these factors described above, TIC believes that a case can be made to delay introduction of ADR 80/04 until the heavy vehicle fuel economy rules in all markets, especially in the EU, have been established. Therefore, an introductory timing delay for mandatory compliance with ADR80/04 by three years to 1 Jan 2019 (New Models) and 1 Jan 2020 (All Models) can be justified. This delay is offset by the fact that several truck suppliers will choose to introduce J-NLT09 and US EPA 2014MY (or later) engines voluntarily in Australia before these dates because of their fuel economy benefits. Further, EURO VI engines that have been developed further for improved fuel economy should be available by this timing, therefore removing a potential disincentive to operators.

3. Do you agree that the adoption of more stringent emission standards for new heavy vehicles could contribute to improvements air quality in Australia?

TIC Response: *Yes, in principle. However, the gains may be relatively minor and difficult to justify in the RIS. As previously mentioned, engines which already use a DPF will not achieve reductions in PM, as their PM levels already comfortably exceeds the EURO V limit level. Much improved gains in urban air quality would be achieved if a complementary program which encourages owners of pre-1996 vehicles to upgrade their trucks was adopted.*

- Do you have any additional information or studies that the Department could consider in assessing the health and environmental benefits of implementing the possible new ADR 80/04?

TIC Response: Any information TIC has is provided elsewhere in this response, or has been supplied to DoIT previously. TIC will continue to share any relevant information with the Department.

Discussion Paper Question, Page 23 (Section 9):

- Do you have any additional information or studies that the Department could consider in assessing the costs associated with implementing the proposed new ADR 80/04?

TIC Response:

Regarding timing, a TIC member has provided Table 1 which advises the “phased in” approach to NOx sensing and associated OBD / Inducements for EURO VI legislation. TIC Notes that the final phase is not mandatory until 31 Dec 2016.

TIC further considers that it would be impossible for the Australian market to adopt a similar “phased” approach, as the annual changes could not be tested adequately and changed for the relatively small local sales volumes; local manufacturers & distributors do not have sufficient resources to repeat the necessary work annually. TIC’s strong preference is to adopt the “mature” EURO VI (i.e. Type C) specification, and thus avoiding the interim Type A and B versions. Further, it is Type C OBD that is likely to be closer to the Inducements that the US EPA have required from the 2012MY onwards.

The elements that are phased in on the EU & R49 versions are OBD related - there is an increase in stringency for NOx & PM OBD thresholds as well as NOx control monitoring (aka anti-tampering) shown in Table 1. This phase-in is in recognition that the technology to support the final levels may not be commercially available until those dates. The expectation is that the PM threshold will drive soot sensors in the tailpipe and the lower NOx OTL would require more capable NOx sensors, similarly the urea quality and flow sensing capability was expected to need to be increased to support the more stringent NOx control monitoring.

Level	Letter	Implementation dates		NOx control level	NOx OTL (mg/kWhr)	PM OTL (mg/kWhr)	IUPR
		New vehicles	All vehicles				
Initial	A	31 December 2012	31 December 2013	Quality: 0.9g/kWhr Consumption: 50%	1500	Performance monitoring	No mandatory limit
IUPR survey	N/A	2 surveys complete by 1st July 2015		Quality: 0.9g/kWhr Consumption: 50%	1500	Performance monitoring	Demonstration only, no mandatory limit
Interim	B	1 September 2014	1 September 2015	Quality: 0.9g/kWhr Consumption: 50%	1500	25	No mandatory limit
Final	C	31 December 2015	31 December 2016	Quality: 0.46g/kWhr Consumption: 20%	1200	25	Minimum ratio 0.1

Table 1: EURO VI Phased approach to NOx and PM monitoring Inducements.

TIC considers the introduction of ADR 80/04 will have the following effects:

- **Technology required.** TIC members advise that, with very few exceptions, compliance with EURO VI (Type C), US EPA 2010 (2012MY) or J-PNLT09 will require the adoption of almost all of the commonly available emissions control technologies available to date. That is, a combination of Exhaust Gas Recirculation (EGR), Selective Catalytic Reduction (SCR) using a consumable reagent known as AdBlue or DEF, Diesel Particulate Filters (typically containing a ceramic filter), and upgraded electronic monitoring and controls will be required. For the current ADR 80/03, most trucks use either EGR+DPF or SCR technology, so the cost for each manufacturer and even each engine within a manufacturer's range will vary. In most cases, a DPF or an SCR system will be added to the existing technology used for ADR80/03. These are both relatively expensive additions, and add significant mass and complexity.
- **Purchase Costs** – The purchase price of the truck will increase due to the cost of the design and development for the new systems, the cost of the additional equipment itself, and the cost of testing and compliance required. The advice from Europe, Japanese and US suppliers is that this cost will be between A\$6,000 to A\$12,000 per truck, with variations according to:
 - **Vehicle size.** The small-medium trucks (e.g. with GVM rating in the range 3,501 kg to 16,000 kg) will have slightly lower material costs, due to being fitted with smaller capacity DPF and SCR systems. However, it is important to note that the development, technology, electronics and installation costs are very similar regardless of vehicle size.
 - **Cooling system requirements.** Depending on the technology currently used, some cooling systems may need to be upgraded significantly, while others may require minor modifications.
 - **Efficiencies due to redesigning components.** At least one European truck manufacturer is known to have developed a single after-treatment device that incorporates DPF and SCR technologies in the one “box”, with some resultant cost and space savings.
 - **The type of technology to be added.** In general terms, the addition of an SCR system is more costly than the addition of a DPF system, however the level of integration of these components will vary considerably between manufacturers.
 - **Product Support, Training and User Education.** The introduction of new technologies has a cost in these areas which is quite significant in Australia, due to the geographic distances and relatively low volumes involved. Sales staff, maintenance staff and customer workshop staff all need to be trained and educated in the operation and maintenance of the new after-treatment systems.
- **Maintenance Costs** – All manufacturers and suppliers are advising that there will be an increase in maintenance costs. These cost increases are associated with the additional heat created as a result of EGR systems and use of DPFs.

All generally contribute to a reduction in the service intervals and therefore increases the overall service costs. Those manufacturers introducing EGR+DPF technology will add set service intervals for DPF maintenance. Those introducing SCR technology will introduce maintenance intervals for the SCR system. These increased and added service intervals will be set for the life of the vehicle. It is not technically feasible that such intervals will change over time, and so these additional service requirements will be fixed costs for the life of the vehicle.

Discussion Paper Questions, Page 25, Section 10:

6. Do you consider the proposed alternative standards to be sufficiently equivalent in stringency to Euro VI?

***TIC Response:** TIC believes that the proposed alternative US (EPA 2010 Limits with 2012MY or later Inducements) and Japanese standards (P-NLT09) are sufficiently equivalent to Euro VI standards when fully implemented to Type C, and that they should be accepted alternatives. TIC wishes to clarify that while the limit levels in the US EPA regulations do not change from 2010, many other items do, primarily around “anti-tampering”. TIC considers that US EPA 2012MY compliance (and beyond) is an acceptable equivalency to EURO VI Type C for the purposes of the new ADR. TIC is aware that the anticipated difficulty in finalizing these equivalencies will be in the details surrounding “OBD” and/or “Inducement” requirements, however is willing and able to work with the Department to come to an agreement that works for Australian conditions.*

7. Do you consider the proposed alternative standards discussed above should be accepted in ADR 80/04?

***TIC Response:** The TIC strongly considers that these alternative standards should be accepted in ADR 80/04 in a similar manner to the alternative standards that have been negotiated for inclusion into ADR 80/03 Amendment 2.*

8. If the proposed alternative standards were not accepted, do you consider that this would significantly affect the ability of truck and/or bus manufacturers to supply vehicles to Australia? What would be the impact on compliance costs?

***TIC Response:** The TIC believes that if these alternative standards were not accepted, then there would be a significant negative effect on the importers, and operators, of both US and Japanese supplied engines and vehicles. It is noted that around 80% of trucks sold new in 2012 were EURO V compliant, including many of those that used technology of US or Japanese origin. However, this was a choice made by the engine manufacturers for the Australian market when making critical decisions based on the availability of engines for each market segment and horsepower rating. By contrast, less than 50% of truck engines sold new when ADR80/02 was required were certified to the EURO IV standard.*

It is possible that several current heavy vehicle engine series that are EURO V compliant will be changed to US EPA compliance over the next few years, partly due to the maturity of SCR technology, and the focus (by government and industry) on

improved fuel consumption in the US market. When ADR80/04 is introduced, the more advanced timing in the USA and Japan for fuel economy improvements may lead to manufacturers deciding upon engines complying with US EPA or Japanese standards for commercial reasons.

In summary, if alternative standards to EURO VI were not permitted, this would not only preclude some manufacturers from continuing their existing offering in some market segments, but would be counter-productive to Australia's greenhouse abatement targets.

Discussion Paper Questions, Page 26, Section 10

9. Should the Euro VI provisions requiring manufacturers to report engine fuel consumption and CO₂ emissions be adopted in ADR 80/04?

TIC Response: *A strong and emphatic "No". The TIC considers that Australia has many and varied vehicle configurations and operational environments, such that any requirement for test bench fuel consumption information would not relate to real world figures. For example, the maximum and average speeds, ambient temperatures, vehicle loadings and distances travelled vary considerably to those encountered by comparable vehicles in the EU. The TIC is opposed to the public declaration of this information, as it would be misleading to the end customers.*

10. Would there be merit in making this information publicly available?

TIC Response: *Again, a strong "No". TIC sees little relevance in this information as the design, configuration and operational environment of each type of truck varies and these variations have a major effect on the real life economy for the vehicle. Most trucks in Australia are sold as a cab-chassis unit, which is then adapted with unique body and equipment. Fuel consumption results for otherwise identical cab-chassis units (with identical engine, transmission, axles and tyres) can vary in the real world 60% or more, making test bench data meaningless. Hence the engine consumption figures would not relate to the real world experiences and would be of little or no benefit to end-users. To the contrary, it would be confusing to the end users.*

11. If these provisions were adopted and the information was made publicly available, do you consider that it would be necessary for all new heavy vehicles to meet Euro VI requirements to provide a common basis for comparison?

TIC Response: *TIC and its members cannot accept this type of information being publicly available for heavy commercial vehicles. TIC believes that if such data was made publically available, all suppliers would be forced to test to the Euro VI standards which would add considerable costs to these engines and as stated above would provide no real benefit. Yet, the resulting data would not be relevant to any customers for comparative purposes. It would also detract from the "level playing field" that the alternative standards seek to provide.*