

PO BOX 133  
Glen Waverley  
Victoria, 3150

26 July 2024

**To the Project Manager,**

**RE: Transport and Infrastructure Net Zero Consultation Roadmap**

Please refer to this letter and the attachments in support of ARTSA-Institute's official response to *'Transport and Infrastructure Net Zero Consultation Roadmap'*.

The Australian Road Transport Suppliers Association: ARTSA-I has individual members who work in or supply to the Australian road freight sector.

ARTSA-I seeks to make a useful contribution utilising our collective technical expertise to deliver education, training, projects, community engagement and data sharing. Part of this contribution includes this response to the *'Transport and Infrastructure Net Zero Consultation Roadmap'*.

A summary of key points for consideration is given below:

- **We assess that the road vehicle transport sector is not on track to meet 2030 targets.** 2030 should be the most immediate focus and calculations on what is possible with current technology made public, then possible solutions tabled and discussed. These solutions will likely be interim and may involve inclusion of High Productivity Freight Vehicles (HPFV's) and the 30% emissions reduction they can provide in comparison with non HPFV vehicles in the Heavy Vehicle Freight Sector.
- **A 30% emissions reduction target could be considered and additionally presented in terms of percentage of CO2 emissions per tonne per km rather than a total figure compared with 2005 emissions numbers.** Given that the freight task will grow year-on-year, our industry must focus on unit efficiency which should be assessed on a tonne-kilometre basis. This may be a more reasonable measure for realistically meeting ambitious 2030 targets and would still show some progress made through more efficient and greater capacity vehicles, and other improvements.

- **Industry should be openly consulted regarding how CO2 emissions will be calculated the current and future calculators planned for use.** Methodology will have a large impact on how emissions are calculated given that there is no precise way to measure actual emissions. A VECTO calculator equivalent should be considered locally as soon as possible to help industry participate in incremental vehicle design improvements. In Europe, this tool has been available to the public since 2019. Australia has fallen behind.
- **The USA EPS Smartway scheme is proven to reduce in-service emissions by participating fleets.** A version ne adopted in Australia. A version was trailed in Victoria by the Victorian Transport Association but discontinued because of the scale of the commitment that was required. Government needs to do this. This scheme could demonstrate and prove smarter ways to improve vehicle fuel efficiency and save fleet operators money. Reduction of emissions from existing in-service vehicles is imperative if this industry is to come close to its targets. The median age of prime mover trucks is about 14 years, and rigid trucks about 20 years. They are used on Australian roads for 25 years or more. The in-service fleet must not be ignored because the shift to zero emissions vehicles is mainly useful to meet the 2050 targets.
- **A six-point plan to reduce emissions** in the near term was proposed by Dr Peter Hart recently in a Prime Mover magazine article. This submission builds upon that work. These points include promoting fuel efficiency, ensuring trailers run full, fixing the electric trailer problem, incentivising electric-drive trailer use, normalising High Productivity Freight Vehicles and Introducing a Master Driver Accreditation program. We would like feedback on these 6 areas and whether there is planned a calculator which will acknowledge where they are used and the improvements to emissions made. Two ARTSA-I Article of relevance are in the Appendix.
- **Low Carbon Liquid Fuel (LCLF) for Heavy Vehicles is the only interim method provided in the road map** for consultation for abating heavy vehicle emissions soon. Given that the same road map acknowledges that current feedstocks can only make 60% of the SAF required in Australia, we fail to see how any LCLF will be available for Heavy Vehicles. We understand globally that SAF will use LCLF as priority as there are no other clear pathways for aviation to abate at this time. We have alternative suggestions that are in this submission.
- **What role can be trailer play in reducing CO2 emissions?** Trailers can carry the battery for the motor truck. The trailer can also have an electric drive axle. If an Australian interface standard could be developed, then a 'hybrid'

electric articulated vehicle could be made from a diesel truck and an electrically driven trailer. With an industry-standard interface the electrically driven trailers could be swapped on different prime-mover models. The electric drive could be retrofitted to trailers. Installing a battery for the truck on the trailer could assist in resolving the problem of a heavier payload over the prime mover steer axles for longer haul heavy vehicles as well as extending range. Furthermore, batteries on trailers could complement the power system when the trailers are parked. Technical standards and regulatory reform are needed to allow electrically driven trailers to be used on public roads.

- **ARTSA-I supports reforms to optimise the road-rail interface to increase rail use for long haul km on main routes.** We acknowledge the roadmaps numbers for carbon per tonne travelled - rail is a real opportunity for some routes. Trucks would still interface in the most efficient way either end. Road trailers are already routinely carried by rail on Perth-Melbourne-Brisbane routes. The commercial vehicle industry should be engaged in road-rail interface developments. Rail can do some heavy lifting, but it also needs to lift its game!
- **Societal and community behaviour change is barely on the radar** – We note that other than bike paths and increased use of electric cars, there is little ‘energy’ invested into educating our community and positively reinforcing behaviour change that could lower emissions, given that western society make up for 70% of global emissions. A reduction in consumerism, increase in carpooling, incentivising individuals to lower their own footprints, improvement in efficiency leading to less travel and transport required is a major opportunity with little to no cost. We suggest fleets, suppliers and operators are motivated to submit on how they have reduced emissions through behaviour, monitoring or optimisation technology and operational change in exchange for financial or other incentives. These initiatives could then be shared and rolled out in other areas of the community to decrease emissions.

The challenge is substantial, and change is needed now! There is potential for individual articulated vehicles to reduce fuel usage and therefore emissions by 20 - 30 %. This would be a ‘win-win’ for community, government and industry.

**ARTSA-I would like the opportunity to discuss the above points more directly with decision makers.**

Thank you for taking the time to consider our feedback and consulting with the wider transport industry. We know the path ahead is challenging; but are also excited for the many opportunities which lie ahead for both industry, technical professionals, and the wider industry.

Yours Sincerely,

The Australian Road Transport Suppliers Association (ARTSA-I)



ARTSA-I Chair  
Dr. Peter Hart



ARTSA-I Vice Chair  
Rachel Michaud CP Eng | NER

## ARTSA Submission – Roadmap and Action Plan

### (i) Introduction

The Australian Road Transport Suppliers Association: ARTSA-I has individual members who work in or supply to the Australian heavy road freight sector. ARTSA-I seeks to make a useful contribution to technical knowledge, training, and leadership in our industry. ARTSA-I has a 13 years' history of publishing relevant technical articles. More than 130 articles can be found at: <https://www.artsa.com.au/articles/>.

Some articles are relevant to the issues related to greenhouse gas emissions from road trucks in Australia.

Australia has the following greenhouse gas reduction targets:

- Australia has committed to achieve net zero CO<sub>2</sub> emissions by 2050.
- Australia has committed to reduce greenhouse gas emissions (across all economic sectors) by 43% below 2005 levels by 2030.
- Each state has also set interim emissions reduction targets for new vehicles by 2030: NSW: 50%; Victoria: 50%; Queensland: 30%; South Australia: at least 50%; Western Australia: 80% below 2020 levels; ACT: 65-75% (on 1990 levels); Tasmania: achieved net zero greenhouse gas emissions in 2015.

The 2030 targets are to be achieved in only 6 years! The heavy road transport sector is not on track to meet the 2030 targets. No specific new vehicle emission reduction targets exist for Australia. Some marginal reductions will be achieved by new motor trucks due to the applications of new technologies. However, new technologies cannot be applied to the great majority of the truck motor fleet, which is in-service. Some new thinking is needed for the vast majority of the fleet if substantial reductions are to be achieved.

Substantial voluntary greenhouse gas reduction would benefit the road freight transport sector by helping to reduce operating costs and make it less vulnerability to government policy changes that are likely to force substantial reductions anyway. It is always better to plan for change than to complain about it when it hits!

Australia has a successful truck and trailer manufacturing sector. ARTSA-I has a long-term project to analyse the national truck and trailer data base (NEVDIS). Please see: <https://www.artsa.com.au/data/>. Heavy road vehicles have a gross weight rating > 4.5t. 'Heavy-duty road vehicles' have a gross weight rating > 12t. ARTSA-Data reports that there are about 900,000 heavy-duty road vehicles, including trailers, registered in Australia. The number of heavy-duty rigid trucks registered in Australia is about 220,000. There are about 128,000 heavy-duty prime movers registered in Australia. About half of these are multi-

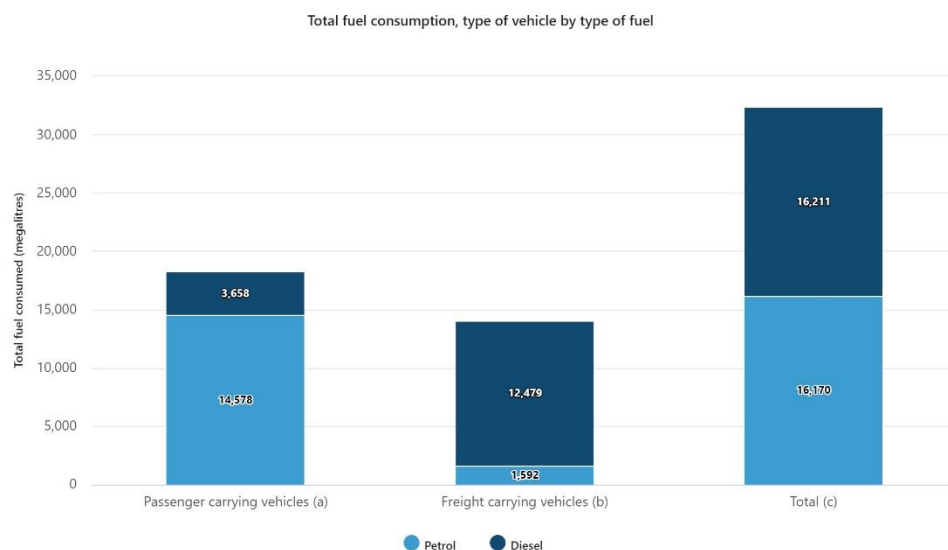
combination prime movers. That is, they are registered to pull two or more trailers. So, the total number of heavy-duty motor trucks is about 350,000. Virtually all use diesel fuel.

There are about 315,000 heavy duty trailers in Australia; so, trailers outnumber prime-movers by 2.5:1. This ratio is almost certainly the world record! This begs the question whether trailers can somehow be used to reduce greenhouse emissions.

ARTSA Data reports that the median age of a heavy-duty prime mover in Australia is about 14 years. Long-distance road trucks tend to be reassigned to intra-state or local work after about 10 years but can have a useful life of 25 years. About 77% of the diesel fuel used in road transport is used by trucks delivering freight (see Figure 1). Therefore, any plan to reduce greenhouse emissions should include practical plans to reduce emissions by in-service trucks and trailers.

The focus of this submission is on heavy duty road trucks and their combinations because:

- They carry the great majority of road freight, often over long distances.
- They consume a disproportionate quantity of the diesel fuel used by road vehicles.
- They have the greatest fuel consumption per unit.
- Greenhouse gas reduction for these types of vehicles could deliver substantial cost savings.
- Operators of these vehicles routinely monitor fuel use.
- Australia has a significant heavy-duty vehicle manufacturing industry, so local innovation is possible.



Source: Australian Bureau of Statistics, Survey of Motor Vehicle Use, Australia 12 Months ended 30 June 2020

**Figure 1 Relative diesel fuel use in Australia.**

## **(ii) High Productivity Vehicles in Australia**

Australia has achieved world-leading status with high productivity freight vehicles on many main roads. In 1993 The Age newspaper in Melbourne 'railed' against the introduction of B-double trucks into Victoria. About 25 years later Victoria introduced a 'high-productivity freight network' that has allowed multi-combination vehicles with length up to 30m and weighing up to 90t to use selected roads. A-double type road trains now run in the Monash Freeway through the centre of Melbourne! There was no publicity about this in The Age newspaper when this significant policy change occurred. A similar story could be told in the other jurisdictions, although the turn-around is not as great as in Victoria. The lesson is that well managed regulatory reform can promote innovation, improve productivity and reduce greenhouse gas emissions per tonne-kilometre.

Australia has developed regulatory paths to manage the safe introduction of high productivity vehicles. The development of the Performance Based Standards (PBS) scheme by the National Transport Commission and its later management by the National Heavy Vehicle Regulator has made a significant contribution. The Intelligent Assess Project and the geo-fencing standards set by the Australian Transport Certification Agency can also be cited. Australia can claim to being the world-leader with the safe introduction of high productivity heavy vehicles. This has made a significant contribution to greenhouse emissions reductions.

Regulatory reform in Australia has also promoted a significant heavy-duty truck and trailer manufacturing industry. About 90% of the 315,000 registered heavy-duty trailers were made in Australia. About 25% of the heavy-duty prime movers were made in Australia and about 40% of multi-combination prime-movers were made in Australia. Regulatory reform underpins this substantial industry, because vehicles with suitable dimensions and features to be high-productivity vehicles are not readily available overseas and need to be made locally. The Australian road-freight sector had achieved significant greenhouse gas reductions per tonne-kilometre because by adoption of high productivity vehicles. Regulatory reform can lead to a win-win for community and industry.

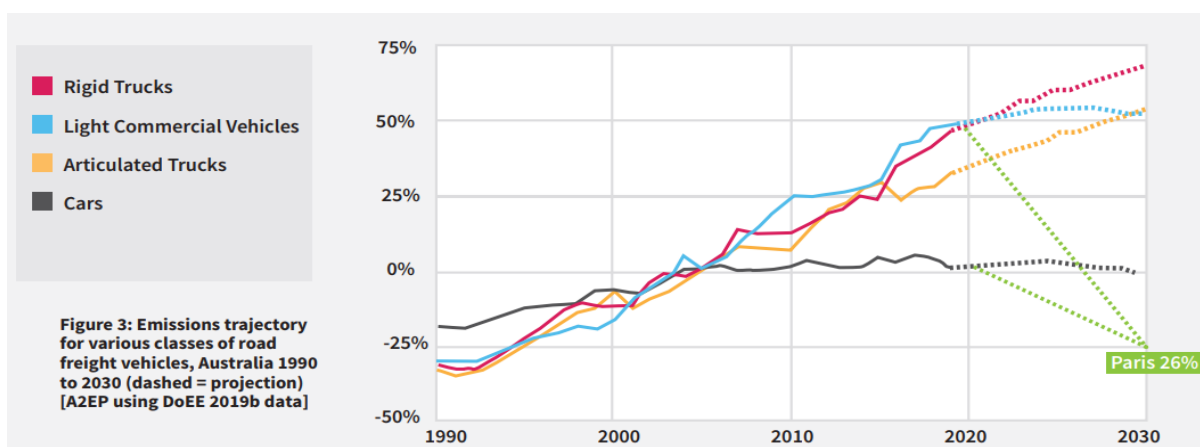
### **Actions:**

- Normalise use of proven high-productivity vehicle types on Federally funded highways.
- Remove regulatory roadblocks to the use of novel heavy vehicle types.

### (iii) Projected Greenhouse Gas Emissions from Australian Trucks

The road freight transport sector uses about 85% of Australia’s diesel fuel. This is because diesel is the most perfect fuel for trucks, except for its greenhouse gas emissions! According to the 2020 Survey of Motor Vehicle Use, Articulated trucks travel an average of 78,300 kilometres annually and account for 22.4% of the tonne-kilometre road freight task. They make up about 4% of vehicles on the road. The average (diesel) fuel consumption by articulated trucks is 53.1 litres/100 kilometres. Clearly articulated trucks should be a priority group for greenhouse gas emissions reductions. It is notable that for an assumed net diesel-fuel cost of \$2/litre, the fuel cost for Australian rigid and articulated trucks would be about \$15B. If a 10% fuel economy reduction could be achieved, the saving would be a significant \$1.5B

The predicted greenhouse gas emission trajectories of four classifications of road vehicles are shown in Figure 2. The projections show growth in fuel usage for articulated trucks and rigid trucks over the next six years. As the median age of the heavy vehicle motor fleet continues to increase, there is no prospect that alternative fuel technologies becoming available for new motor trucks will make any significant difference to the total use of diesel fuel by heavy vehicles in the next six years. Therefore, changing the trajectories in Figure 2 requires us to focus on how to reduce fuel usage by in-service heavy vehicles.



**Figure 2 Actual and projected growth in transport emissions 1990-2030, indexed against 2005.** Source: Australian Energy Alliance – A roadmap to accelerate energy productivity in freight transport by 2030.

Efforts to reduce greenhouse gas emissions from trucks should focus on in-service articulated vehicles because they are the greatest per unit emitters. New thinking is required urgently if the above trajectories are to change. Articulated trucks carry the most freight, travel the longest distances, have the highest fuel usage per truck type yet make up the smallest proportion of motor



truck vehicles. The effort to improve fuel economy in the road freight transport sector should specifically target articulated road freight vehicles because they use the most diesel fuel and there are fewer of them compared to rigid freight trucks. Articulated vehicles, by definition, pull trailers.

Actions:

- Publish road vehicle sector emissions on a tonne-kilometre bases so that productivity improvements can be identified.

#### **(iv) Greenhouse Reduction Developments for New Vehicles**

In April 2024, Members of the European Parliament adopted new measure to strengthen CO<sub>2</sub> emission reduction targets for new heavy-duty vehicles. Carbon Dioxide emissions from new large trucks (including vocational vehicles, such as garbage trucks, tippers or concrete mixers) and buses will have to be reduced by:

- 45% for the period 2030-2034;
- 65% for 2035-2039; and
- 90% as of 2040 (base year for all EU targets is 1990).

New urban buses will need to reduce their emissions by 90% and become zero-emission vehicles by 2035.

Emissions reduction targets are also set for new trailers (7.5%) and new semi-trailers (10%), starting from 2030. To achieve these targets, for vehicles that (usually) do not have engines, aerodynamic and tyre friction losses need to be reduced. On motor vehicles, the reductions will mainly be achieved by introduction of electric and hybrid drives. Averaging over the manufacturer's fleet of new vehicles will be applied.

The EU has developed a VECTO tool that suppliers can use to assess the significance of efficiency improvements. Whilst the tool is useful in Australia, its use cannot be mandated here because only about 25% of Australia's heavy duty trucks are made in Europe.

For new vehicles, the Australian New Vehicle Efficiency Standard Bill (NVES) was released on the 27th March 2024 to:

- Reduce carbon dioxide (CO<sub>2</sub>) emissions from new cars, sport utility vehicles, utes and vans, and stimulate the provision of low and zero emissions vehicles into the Australian market.

Note that there is no 'tonne-kilometer greenhouse gas emissions target' being applied to in-service vehicles. There is no in-service vehicle greenhouse reduction plan.

Given the definitive steps taken in Europe and the recent release of the NVES, it is likely that the Australian Government has further targets and instructions to come which will directly impact the Road Transport Industry. However, the Federal Government does not regulate the in-service vehicle sector. If the state government reduction targets stated above are to be met, state and territory government reduction plans will be needed for the road transport sector and mapping and consultation is currently underway.

One stressor felt in the Australian Industry is that cost and productivity will be significantly inhibited if we cannot adapt to these targets in a practical way. Early calculations done by the Truck Industry Council already demonstrated that even if manufacturers moved to 100% new Electric Trucks by 2030, it would still barely put a dint in the numbers due to an aging fleet of vehicles. Not to mention the challenges which still exist for battery life and long-haul applications. Hence the need for in-service reduction measures.

This aside, what can we learn from our European colleagues to better arm ourselves to tackle the emissions challenge on local soil? Well, there is clearly no silver bullet to solve this problem. At the moment, the approach from the European Union seems to be two-fold.

1. Move to electric, fuel cell or other zero emissions vehicles as soon as possible and assume technology catches up as well as the infrastructure required.
2. Calculate and record every CO<sub>2</sub> saving possible for both Trucks and Trailer by using VECTO - Vehicle Energy Consumption calculation Tool.

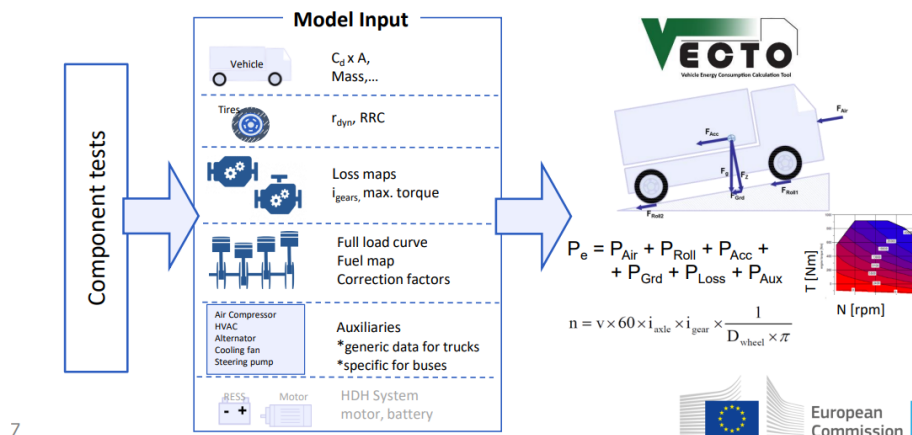
On point 1 regarding zero emissions trucks: The European union is directing manufacturers to move their production from ICE (Internal Combustion Engine) vehicles to BEV (Battery Electric Vehicles), fuel cell or other zero emissions options. There appears to be very little appetite for Bio Fuels for a couple of key reasons. Firstly if energy is placed into bio fuels, then this will dilute the critical funding and infrastructure required for electric and fuel cell vehicles. It is acknowledged that these vehicles are initially more expensive to build, so its important to create a level playing field for manufacturers and operators. The bulk move by Europe to zero emissions vehicles will no doubt assist with the economics of the change required locally in Australia. It is likely that prices will stabilise as manufacturing and technology improve.

Secondly, the aviation and shipping industry have no easy solutions to reduce CO<sub>2</sub> emissions and it is thought that they will consume most of the product required to produce biofuels, hence this is not a viable option for trucks long term.

On point 2 regarding VECTO. This is the new simulation tool developed by the European Commission and is used for determining both CO<sub>2</sub> emissions and

fuel consumption from Heavy Duty Vehicle with a gross weight above 3500kg. Application of this tool is now mandatory for new trucks in certain categories since January 2019, and trailers are included also. Suppliers are required to provide evidence-based information that is added to this calculator periodically. For example, electric axles are still being considered by the European Commission and have not yet been added to VECTO at this time, but will be in future.

## Overview “VECTO method”



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**Figure 3 Illustration of the European VECTO calculation process**

### Actions:

- Require Australian new heavy-vehicle diesel vehicle suppliers to publish vocational fuel economy performance levels. Fuel economy improvements should be published even if improvements are not mandated, so that industry can assess progress.

### (v) The USA EPA Smartway Scheme

The USA EPA introduced its Smartway fuel efficiency scheme more than 20 years ago. Without doubt it is the world leading scheme to assist in-service operators to reduce greenhouse gas emissions and to improve road-freight business efficiency. Smartway accredited operators now have a significant advantage in the USA marketplace (see Figure 4). The USA EPA claims that Smartway has reduced diesel fuel consumption in by road-freight trucks by multiple billions of litres. The claimed cumulating saving in the USA is \$US26B - <https://www.epa.gov/smartway>

The importance and relevance of the USA Smartway scheme is known to some Australian industry associations. About 16 years the Victorian EPA did a feasibility study into developing an Australian Smartway Scheme that was to be called ‘Ecostation’ (see Figure 5). Whilst the benefits could be quantified, the

scale of effort required to make the scheme work was beyond the capacity of the VTA and the scheme did not proceed.

ARTSA-I contends that an Australian Smartway scheme is urgently needed and that it should be introduced by the National Heavy Vehicle Regulator as an additional element of the Heavy Vehicle Accreditation Scheme. The purpose would be to:

- Provide guidance and benchmarks for in-service road truck operators about how to reduce emissions.
- Help the industry to reduce costs.
- Quantify fuel efficiency performance by participating fleets using particular enhancements.
- Recognize excellence by operators in fuel efficiency performance and make this known to logistics customers.
- Make use of international developments such as VECTO so that enhancements can be proven, benchmarked and understood in Australia.
- Provide a pathway for governments to incentivise high performing fleets.

This project has great potential to reduce long-haul articulated vehicle emissions of participating fleets by 10%. It could be a win-win for the community and the road freight industry. It needs government action to manage the task. It should be a national scheme.

**Actions:**

- Introduce a fuel efficiency module into NHVAS. The Federal Government should incentive the National Heavy Vehicle Regulator to do this work.
- Publicly rank operator performance using the USA EPA metrics and 'Smartway IP', or similar.
- Rank operators and adopt a publicly known rating list.
- Encourage state and federal governments to provide benefits for fleets with a high ranking in NHVAS Efficiency Module.
- Encourage logistics users to use fleets with a high ranking.



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- **Measurable results:** Track the metrics that matter most to your bottom line. By benchmarking and monitoring your performance, you see how you compare to your peers, as well as how your efforts affect results on a year-to-year basis. SmartWay provides reports that make it easy to show improvements.
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- **Continuous improvement:** Your annual participation in SmartWay provides business intelligence that helps pinpoint real achievements and uncover opportunities to get better.
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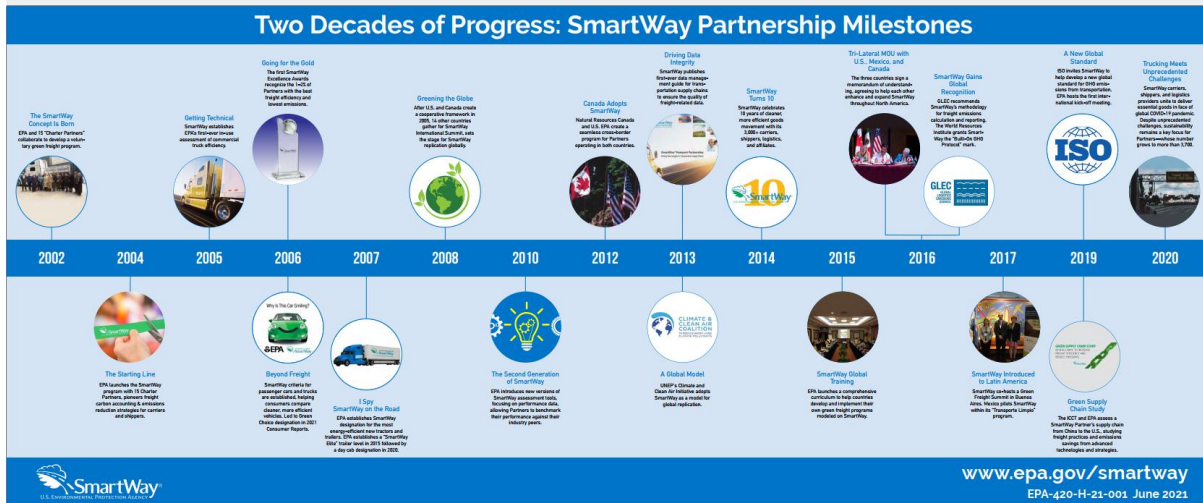


Figure 4 USA Smartway Scheme Features.

# Truck operators to trial EcoStation in Victoria

November 1, 2009

us translate article ▾



Local truck operators will soon be able to measure their environmental impact and reduce their operating costs, with an innovative new program to be launched in September by the Victorian Transport Association (VTA) in Australia, based on a similar program in the United States. The EcoStation program mimics the successful SmartWay program run by the U.S. Environmental Protection Agency (EPA), with the objective of helping local truck companies reduce their fuel consumption and help the environment. Under the U.S. program, participating freight companies are able to use the SmartWay brand to promote their environmental performance when negotiating for business. The objectives of the pilot program are to trial the SmartWay process locally and to identify the tools and resources needed to help companies reduce their fuel consumption and emissions. Our initial challenge in this is to find out how to measure a company's fuel efficiency in a meaningful way, said VTA Chief Executive Phil Level. (September 5, 2009)

**Figure 5** *Victorian trial of EcoStation, 2009.*

## **(vi) A Six Point Plan to Reduce Greenhouse Gas Emissions from In-Service Heavy Duty Trucks**

ARTSA-I has developed a six-point plan to promote substantial reductions in greenhouse gas emissions by the in-service road freight sector:

- 1. Promote Fuel Efficiency** - Introduce a new National HV Accreditation Scheme (NHVAS) module called Fuel Efficiency. This module should be based upon the 'operator module' in the USA EPA's Smartway scheme, which is described in Figure 2. Operators can achieve a ranking from Level 5 to Level 1 (best) based upon proven tonne-kilometre fuel economy, and low gaseous emission performance. The purposes would be to - promote good practice by Australian operators that reduces costs, provide a reliable ranking that will advantage operators in the marketplace and identify to the community tangible action by the road transport sector to reduce emissions. Government policies could also favour achievers in the NHVAS Fuel Efficiency Module. It is beyond industry associations to establish an Australian 'Smartway', although

they could help and the best place for it, in my opinion, is within the NHVAS. Participants could reduce fuel usage by 10%.

- 2. Ensure Trailers Run Full** – A national freight scheduling marketplace is needed that facilitates freight sharing between operators to help fill trailers both ways. Whilst freight marketplaces currently exist, none are focused on increasing utilization of freight vehicles. There are no public statistics I know of that estimate vehicle freight space utilization. Such information could come from the NHVAS Fuel Efficiency module mentioned previously. A freight scheduling marketplace could be a useful partner program to the NHVAS Fuel Efficiency module (item 1). Increasing utilization could reduce the number of trucks by a couple of percent.
- 3. Fix the Electric Trailer Problem** - Federal and State/Territory governments should urgently sort out how to allow electric drive axles to be legally used on heavy trailers. Under current rules, trailers cannot have driven axles. A new ADR (design rule) will probably be needed, and a new registration category will also be needed. An electric drive axle and battery on each semi-trailer could produce a 'hybrid' semi-trailer combination that could improve the fuel economy of the prime-mover by 25-30%, by reducing low-range gear use. Drive axle kits could be retrofitted. The control system could utilize existing CAN bus braking signals. Batteries could be charged by retardation-energy, solar panel installations at depots (and on trailers), battery swaps at half-way sites and at electric chargers. Further, an electric trailer could improve safety by providing more balanced tractive effort and non-brake retardation.
- 4. Incentivise Electric-Drive Trailer Use** - Governments should incentivise the Australian trailer industry to develop electric trailer options. Australia has a substantial trailer manufacturing industry and has more heavy trailers per prime mover than any other country. We are well placed to develop electric trailer technology locally and become world leaders. Incentives will probably also be needed for operators to uptake electric trailers because of additional weight and cost.
- 5. Normalise High Productivity Vehicle Use** – The Performance Based Standards Scheme (PBS) has spurred the uptake of high-productivity freight vehicles. It has given confidence to road agencies and transport



ministers that new high-productivity configurations can be safely used. In the first stage, a path for approval of 4-, 5- & 6-axle tipping dog trailers was created, leading eventually to normalisation. In the current stage a path for approval of A-doubles and super B-doubles to operate on Level 2B routes has been achieved, as has a path for 20m super semi-trailers on Level 1 routes. The next stage should be normalisation of these vehicle types in regulations, meaning they can travel under notice if the vehicle complies with a specification in the notice.

- 6. Introduce a Master Driver Accreditation** – There should be a master driver accreditation to provide a career path for truck drivers, and to promote and recognise excellent driving performance over several years of driving experience. The truck driver can make a 5 - 10% improvement in fuel economy in individual cases. Fuel-efficient driving performance should be one element of this accreditation. Such an accreditation should be developed by an industry association that is focused on individual membership in the road transport sector. Some government assistance is needed to make it happen. Additional benefits are safer drivers and a career development path of professional drivers.

#### **(vii) The Electric Trailer Proposal**

The technology exists to install an electric drive axle onto a heavy trailer. There is adequate space on most semi-trailers to install a battery pack into a protected location, and with potential to swap the battery easily. The electric axle, its controller and the battery could be retrofitted.

A battery could also be carried for use by an electrically-driven truck. A technical standard is needed to guide Australian development of electric trailer requirements. In particular, Australia should develop a control specification so that the electric axle can be controlled via a CAN BUS signal that can be accessed at the Trailer Electronically Controlled brake valve that it already installed on most heavy trailers. In this way the trailer electric drive could be controlled via a 'Australian standard' CAN signal coming from the truck. No cooperation would be needed from the OEM manufacturer. A CAN adaptor unit might be needed on the truck and a safety circuit would also probably be installed. However, only minor modifications would be needed to the truck to provide the control signal.

The purpose of the electric drive axle on the trailer is to provide up to 20% of the tractive effort needed for that trailer. Thereby the tractive effort required from the



motor truck is reduced and the fuel economy of the truck will be increased. A hybrid semi-trailer could be created.

The trailer could provide ‘peak torque’ so that a smaller truck diesel engine would be needed. Furthermore, fewer gear changes on the truck will result. Each gear change degrades fuel economy.

The trailer control system would also provide regenerative braking, which not only scavenges energy but provides retardation in a safe way. Most heavy-duty trucks have a retarder or an engine brake. All this non-brake retardation is applied via the rear drive axles on the truck. A jack-knife risk arises. It is safer to spread the non-brake retardation between truck and trailer. So, there could be a safety benefit.

The electric battery on the trailer could form a useful storage unit to supply the power grid when the trailer is parked up.

Because most heavy trailers are made in Australia, a significant new Australian industry could be developed using support from the Future Made-In-Australia Program. Furthermore, electric drives could be retrofitted so the existing in-service fleet could be reached.

So, what is stopping this development? Regulations!

- The technology exists now to install electric axles onto trailers.
- Regulatory reform is needed because a trailer cannot legally have a drive axle in Australia.
- An Australian Standard or a new design rule is needed so that the control interface between the truck and trailer is specified.
- An uniform set of rules is needed so that trailers with electric axles can be swapped between trucks.
- The additional weight of the electric drive axle is not a difficulty on most trailers because they do not operate near to full weight.
- Incentive funding will be needed to get the operator community to cover the additional costs.
- The technology needs to be proven with demonstration projects.

Actions:

- A road registration category for trailers with electric drive axles should be established.

- Technical standards for Australian electrically-driven trailers should be developed by industry under government supervision.
- Government should mandate application of the trailer standards for both new and in-service trailers.
- Government should fund some demonstration projects with electric drive trailers made by existing Australian manufacturers.

The significant Australian trailer industry could develop world-leading technology that is potentially exportable, particularly into the USA. Development of an Australian ‘electric-trailer’ industry is consistent with the goals of the Future Made in Australia policy.

## **Appendices**

July 2024, May 2024, Feb 2022, Feb 2016



## Clean v Green + Paris

this significant development could reduce operating costs and put pressure on government to liberalise mass and volume limits, so there should be an upside for operators.

Let's consider Guy's main message: Clean is not necessarily Green, as the relevant gases are different. In line with that, emission

rules only regulate clean gas emissions (mainly particulates and NOx), while green rules are needed to regulate green gas emissions (mainly CO<sub>2</sub>).

The US has already introduced such a Green Rule, called GHG 14. It applies fuel economy improvement rates for heavy-duty vocational trucks and prime movers

**A**RTSA recently heard from Guy Macklan about the difference between 'clean' and 'green' engines. Recently retired from the role of Engineering Manager at Penske Power Systems (formerly MTU Detroit Diesel), Guy's knowledge and experience are second to none.

Chart 1 shows the progress made in cleaning up diesel engine emissions in the US during the 20 years between 1990 and 2010. The US EPA limits for particulates PM – microscopic carbon particles – are now 1/60th of the 1990 limits. The Nitrous Oxide (NOx) limits are now 1/30th of the 1990 limits. The US has no plans to introduce tighter 'clean' standards. The US is now focusing on fuel economy – that is, reduction in greenhouse gas emissions.

The US EPA limits are relevant in Australia because they are an acceptable standard to satisfy the current Australian emission rule ADR 80/03, as are European and Japanese limits. ADR 80/03 accepts US EPA 2007, Euro V and JIS 2005+ standards.

Yet, the Australian government is now actively considering introducing ADR 80/04, which would require Euro VI, US EPA 2010 or JIS 2009+ limits. This next step would add further technical complexity to trucks without any benefits to the operator community, just as the last step (ADR 80/03) did.

The political winds are shifting. The Paris agreement regarding greenhouse gas reduction should change our thinking and drive change in our industry. Fortunately,

Chart 1: USA EPA diesel emissions limits 1990-2010, courtesy of Guy Macklan

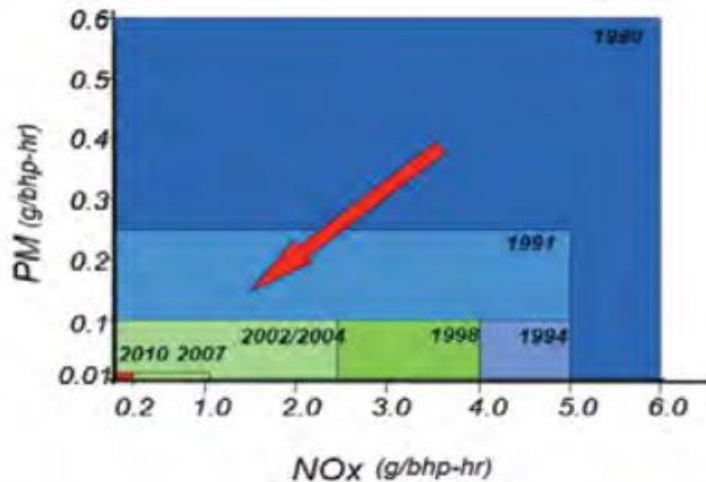


Chart 2: Overview of the GHG14 Rule, courtesy of Guy Macklan



starting from 2014 and proceeding to more stringent improvement rates in the 2018 model year. The significant development will require reductions in engine CO<sub>2</sub> emissions (grams/ton-mile), fuel economy of vehicles (gallons/ton-mile) and leakage from air conditioning systems. Individual certification is required for chassis, engine and air conditioning systems. The rule allows averaging by truck and trailer manufacturers of fuel efficiency improvements over the range of vehicles they produce each year – it does not apply to vehicle owners or to individual vehicles. Owners can still select options even though they may be detrimental to fuel efficiency. The vehicle manufacturers must implement continuous improvement of average fuel efficiency.

Chart 2, an overview of the GHG14 Rule, shows that substantial improvements of about 20 per cent in fuel economy measured on a ton-mile basis are required. This will spur weight reduction; the development and application of low rolling resistance tyres; truck and trailer aerodynamic enhancements; lower speed limiter settings; hybrid motor-generators on the tailshaft that can both propel and regenerate; as well as engine developments including turbocharger improvements, variable-speed water pumps, lubrication improvements and updated engine electronics.

The last item, updated engine electronics is also relevant to the current scandal concerning VW's diesel emission certification. There is a clear trade-off between Clean v Green that influences engine set-points and power, pollution emissions and fuel economy.

Europe has been considering a fuel economy rule for heavy vehicles for a number of years, but it is proving too hard to reach an agreement. It is possible that US manufacturers will get a market lead from the Green Rule introduction, just as

they did when the Californian black smoke limits forced the use of electronic control of the fuel injection system.

Enlightened regulation can bring benefits to all players. Climate change is a serious problem that we are obligated to respond to. Australian heavy trucks release 19.5 million tonnes of CO<sub>2</sub> annually. The average fuel economy is ~ 57 l/100km. Diesel fuel will remain the pre-eminent fuel source for the next decade.

The Australian industry should aim to

reduce total diesel fuel usage by five per cent p.a. despite the rising freight task, which is growing at around three per cent p.a. So what should our industry do? The key is that operators must benefit significantly from fuel-efficiency developments. Guy's main point is that Clean is not Green. It is time to focus on Green.

Peter Hart  
Chairman, Australian Road Transport Suppliers' Association (ARTSA)

## MY ACTION POINTS

1. Introduce voluntary accreditation module based on the US Smartway scheme that requires participants ('the Accreditation Group') to share knowledge, fuel economy, performance experience and benchmark fuel economy. Publish annual benchmark data to provide reference levels and create a performance ranking.
2. Lower registration charges for vehicles less than six years old based upon compliance-plate date.
3. Liberalise rules for high-productivity vehicles. Allow 30m B-doubles and B-triples on all double lane roads.
4. Train every driver about economic driving. Industry associations should develop a video that teaches drivers about economy-driving techniques. Require all heavy drivers to see the video and answer a short test paper.
5. Demonstrate efficient technologies and set up an industry fund to pay for demonstration projects to promote fuel-efficiency improvements using Australian-made equipment. Fund to be open to proposals from Accreditation Group members.
6. Introduce regulations that promote fuel efficiency, identify fuel wastage hotspots and have government and industry co-operate to reduce time wastage at these locations. This could involve introducing truck priority lanes for the Accreditation Group.
7. Abandon the introduction of ADR 80/04 so that vehicle manufacturers have some flexibility to optimise fuel economy engine set-points.
8. Mandate fuel-efficient truck operational conditions. This might result in speed limiters being set to 95 km/h.
9. Apply advanced planning techniques to promote fuel-efficient logistics. Introduce a national freight forwarding market scheme that allows operators to tender for loads without special arrangements.
10. Have the Transport Certification Agency (TCA) assess the potential for advanced route planning to reduce fuel usage around metropolitan areas. Implement demonstration projects.

