Australian Electric Vehicle Association Inc.
ABN 27 629 533 129
PO Box 5285
Clayton, VIC 3168
Email: secretary@aeva.asn.au

Established 1973

February 28th 2017

To Vehicle Emissions Working Group
Department of Infrastructure and Regional Development
GPO Box 594
CANBERRA ACT 2601

vemissions@infrastructure.gov.au

Re: Submission on the draft Regulation Impact Statement for introducing fuel efficiency standards for light vehicles; and on the draft Regulation Impact Statement on strengthening noxious emissions standards for light and heavy vehicles

On behalf of the National Executive of the Australian Electric Vehicle Association Incorporated, please accept the following submission.

The AEVA is a not-for-profit, membership-based association dedicated to educating, advocating and promoting the use of electricity for private and public transport. Established in 1973, the AEVA has provided a forum for those interested in electric vehicle (EV) technology, and assists in the dissemination of information on the benefits of electric transport. It also supports informed policy concerning the uptake, supporting infrastructure and safety standards of EVs.

The RIS document notes that vehicle emissions, predominantly carbon dioxide (CO_2), has increased despite a general improvement in average fuel efficiency. A massive reduction in greenhouse gas emissions is required to avoid the worst effects of a warmer atmosphere, and cutting the 57 million tons of CO_2-e emissions from the light vehicle sector would contribute to this reduction. With liquid fossil fuels representing the majority of these emissions, **the AEVA believes Australia should be a leader in the region, and commit to a target of 100% of all new light vehicles sold in the country to be plug-in electrics, by 2025**. We believe this is an achievable, affordable, and necessary goal.

The RIS document already notes that the cost of CO_2 emission abatement under a fuel efficiency standard is negative; that is, it saves money. The AEVA has calculated that the greater the proportion of ultra-low and zero emission vehicles (primarily electric powered vehicles) the greater the benefits to the populous and the economy. We also note that EVs could now be a cost neutral alternative to internal combustion engines (ICE) and when externalities are considered the benefits are extended further still. **Prioritising and facilitating electric vehicle adoption should be part of this review**. In order to gain full understanding of these economic benefits, a holistic view of the sectors that would benefit from increased electrification, including synergies with the energy sector must be

undertaken. It must be pointed out that even when charged with coal-fired electricity, EVs still emit less CO_2 per kilometre travelled than an equivalent vehicle powered by petrol or diesel. As more zero-emission generators are added to the mix, the figures only improve for EVs.

Zero emissions also means a multiplier effect on the health benefits of reducing noxious emissions and avoids the "diesel paradox", where increased fuel efficiency resulted in a decrease in air quality, eliminating any benefit. The AEVA urges the Government to seriously consider this submission and when crafting legislation to avoid incentivising vehicle oversizing and diesel options which have potential to reduce the benefits outlined. Especially as the current medical consensus is that there is no safe level for the particulate emissions created by diesel engines.

Cost Savings

Electric vehicles are considerably more efficient than internal combustion engine (ICE) vehicles. Electric drive efficiency can be as high as 95% and petrol as low as 25%. Even highly efficient diesel engines achieve only 35% thermal efficiency.

In the RIS document, the estimated fuel cost savings to the economy are between $10.8 and $27.5 billion (2020-2025). If measures to promote EV uptake are endorsed, an additional fuel saving of $300-$600 million per year can be demonstrated. If the proposed fuel quality standards are adopted, this figure would rise to between $465 and $700 million per year for every million EVs added to the passenger fleet. Electric vehicles produce no harmful emissions at point of use, while every additional million electric passenger vehicles will potentially reduce CO_2 emissions by a further 2.7 million tonnes each year. Future health costs will be reduced by $5 to 9 million per year owing to the improvement in air quality in our cities. In effect, this is 6 % of the vehicle fleet producing 10 times the benefit in emissions reduction and health outcomes.
Electricity as a fuel replaces imported petroleum, this money injected into the local economy could support 8,000 or more new jobs for every million electric cars substituted into the fleet. Moreover, second life use of batteries can considerably reduce the cost of storage for renewable generation and electricity grid support. Re-use of batteries from just 1 million cars could save up to $5 billion in capital costs, and provide between 2,000-3,000 MW of grid support, reducing the discounted cost of household solar generation with storage to $0.21 per kWh, with a breakeven cost of $0.155 /kWh. Battery electric cars can be demand-managed to best utilise grid resources and generating capacity, and therefore absorb intermittent supply from renewable; helping to lower the supply cost of electricity.

Cost Justification

As noted in the ABMARC analysis, there is a retail price premium for EVs estimated to be between $9 k and $19k for vehicles on sale at present. The price differential decreases markedly at the premium end of the market; to this end, German auto giant BMW have stated they will offer electric hybrids at the same premium as diesel.

The ABMARC report applied a 2020 premium of $19 k reducing to $10 k by 2025, which the AEVA believes is a considerable overestimation. Given reasonable production volumes (currently estimated to be close to 750,000 plug-in vehicles per annum) we have determined the current price premium for pure EVs should be little more than the cost of the battery pack and it must not be forgotten that lithium battery prices have plummeted in the last decade.

Battery costs per kWh for EVs currently sit at about AUD$347, and is forecast to approach AUD$208 /kWh within the next two years. Several studies into the development of lithium battery manufacturing indicate these predictions may turn out to be conservative, with Tesla expecting to push the price below AUD$200 per kWh assembled.

A compact 5-seater EV has a 22 kWh battery, which represents about $7,640 of the total purchase price at current prices. A battery of this size allows for a driving range of about 120 km. This is sufficient for 98% of urban/suburban trips, considering the average Australian vehicle travels under 40 km a day. Despite this premium paid by the consumer, the savings on fuel and service costs over the life of the battery comfortably cover its cost. After seven years, or 100,000 km, the EV would have saved over $7400 in wholesale fuel costs. Given the expected increase in costs on premium unleaded fuel, the payback period is likely closer to 5 years. Moreover, the used battery may be sold for 20% of its starting value in a home energy storage application, recovering about $1530 to the consumer and contributing to a reduction in additional generating capacity. Transitioning to an EV fleet to achieve zero passenger vehicle emissions compares particularly favourably against the diesel option, which has a cost of $4200 to $5200 for emissions reductions of a mere 28-38%. By way of comparison, petrol options for 2020 emissions targets are $2997; about 25%). In addition, the ABMARC report notes that ICE technical improvements will plateau by 2025 whereas **electric power is already the lowest fuel cost, least emissions choice**. The AEVA urges the Government to bravely grasp the future and speed Australia's transition to the best technology available.

These estimates are based on a retail price of petrol which includes taxes and levies; a significant source of national revenue equating to $12 billion annually. An overall reduction in fuel use will clearly reduce this revenue, which is understood to be re-invested into transport infrastructure. **Therefore the AEVA suggests that the levy on petroleum products remain in place as a disincentive to drive inefficient ICE vehicles, while the gradual phasing in of a per-kilometre charge for vehicles manufactured after 2018 will compensate for lost revenue due to fuel savings**. Currently, the average passenger vehicle driver will pay about $600 per year, or 4.24 cents per km travelled in fuel excise. Retaining the fuel excise will serve as a disincentive to continue driving inefficient ICE vehicles, and incentivise the purchase of zero emission vehicles. It also establishes a robust model for revenue collection after the passenger and light commercial vehicle fleet has moved to full electric. The rate may be modified to meet targets and prompt behaviour change over time. Multipliers based on vehicle mass may be included to account for wear and tear of roads. The implementation and compliance in this area can be managed using existing technology.

The latest model electric cars have battery packs between 40 kWh and 100 kWh, with most expected to be around 40 to 50 kWh. Based on $347/kWh, these batteries represent between $13 k and $18 k of the total vehicle price. When the target price of $208/kWh is achieved in late 2018, this drops to an effective premium of just over $8k making it a viable consumer and economic alternative to ICE vehicles.

AEVA's Response to Specific Questions in the RIS

1. **What parameter (CO_2 emissions or fuel consumption) should be used for an Australian fuel efficiency standard and why?**

The AEVA believes both measures should be incorporated into the standard. Fuel efficiency is pertinent to ICE vehicles, while low and zero emission vehicles may still be responsible for CO_2 emissions depending on the generation source. Opportunities still exist to drive innovation in efficiency and reducing greenhouse gas emissions, and manufacturers already have low-emission ICE vehicles due to be released in the next 5 years. Improvements in efficiency and emissions should continue to be implemented, even as ICE technology is inevitably superseded.

2. **How should a vehicle's efficiency for the purposes of an Australian fuel efficiency standard be assessed and why?**

The adoption of the Euro standards would be prudent. These are world-leading ambitious targets while the compliance costs for Australia will be lower.

3. **How should a sales weighted average target be applied in Australia and why?**

Sales weighted averages allow for more flexibility in meeting targets which in turn provides more consumer choice. Manufacturers and dealerships will be motivated to offer a variety of lower emission vehicles, and it would be up to the individual businesses to plan their response.

4. **If an attribute based standard is adopted, which attribute should be adopted in Australia and why?**

Emission regulations based on vehicle footprint will favour manufactures who build physically larger vehicles which make their way to the Australian market. While mass and footprint are roughly proportional, reducing the physical size of our road-going fleet is preferred.

5. **How should a fuel efficiency standard be applied to each light vehicle category and why?**

Passenger cars and sports utility vehicles (SUVs) should be combined into one category – passenger vehicles. As the majority of SUV vehicles sold in Australia are used for family or commuting tasks normally carried out by smaller passenger cars they should be grouped together. Having a separate category for SUVs and light commercial vehicles (LCVs) allows for compliance mitigation by limiting model choice, which also leads to decreased consumer choice. From a road safety perspective, utility and resource allocation perspective, handing concessions to larger, heavier vehicles where a smaller, cheaper and more efficient vehicle could have sufficed, should be avoided wherever possible. Additionally, giving concessions reduces the incentive for manufacturers to innovate in efficiency. Combining cars and SUVs would also reduce the administrative burden.

6. **If SUVs are subject to a different target to passenger cars, how should SUVs be defined, and why**?

The AEVA believes only petrol or diesel SUVs or four wheel drive vehicles which meet very strict special use requirements should be included in exemptions, or grouped with the LCV standard, for example emergency vehicles, ADF vehicles and heavy plant equipment.

7. **How should targets for a fuel efficiency standard be phased in and why?**

Vehicle emission standards should be set immediately, and efforts to achieve them should be started as soon as feasible. The AEVA believes the goal should be to reduce new passenger vehicle emissions to zero by 2025. A July 2018 start would allow for the clearance of stock already in supply chain, making way for better performing vehicles. Also, since emissions standards are already in place overseas, there should be no development lead times at the point of manufacture. Vehicle manufacturers already have low inventory supply chains, so six months is easily enough lead time for manufacturing of new compliant vehicles. Benefits to Australian economy are clear and tangible and should be realised sooner rather than later

8. **If annual targets are adopted, what targets should apply in each year for each segment and why?**

Annual targets will help ensure compliance objectives are being met. The AEVA believes setting an ambitious target of zero emissions on new vehicles by 2025 will help drive research and development into alternatives to internal combustion, increase EV inventory in Australia and push new EV prices down.

9. **If a percentage phase in is adopted, what percentage should apply in each year and each segment, and why?**

The AEVA encourages the following measures – maintain the fuel excise as is, while introducing a revenue framework for per-kilometre-based road use fees. By 2020, we should aim for 20% of all new passenger vehicle sales in Australia to be plug-in vehicles (PHEVs or pure EVs). A direct subsidy of about $4000 to purchase a zero emission vehicle may be introduced off the back of national account savings from imported fuels, continued collection of revenues from the fossil fuel excise, and in light of the battery premium already paid by early adopters. By 2025 all new passenger vehicles sold in Australia should be plug-in vehicles.

10. **What flexibility arrangements should be allowed under an Australian fuel efficiency standard and why?**

European standards allow flexibility in compliance models, while also allowing for more make and model choice. For example, a non-complying manufacturer could pool their imports by bringing in a Hybrid/EV from another market. US standards allow specific manufacturers to avoid improvements, although an argument for adopting a mix such as banking debits while new models are pending is an option.

11. What, if any, credits should an Australian fuel efficiency standard adopt to further encourage the supply of more efficient vehicles, and why?

Credits for ultra-low and zero emission vehicles would incentivise manufacturers to supply these vehicles already available elsewhere in the world to the Australian market. Overseas experience shows this benefits the consumer in terms of choice and price, particularly in the deregulated import environment enjoyed in New Zealand. These subsidies should be restricted to electric and electric assist vehicles only, and set at a level designed to achieve the target penetration rate of 100% plug-in vehicles by 2025. Electric vehicles represent nearly 40% of all new vehicle sales in Norway. The country has also committed to ensuring all new vehicles are EVs by 2025. It has achieved this through numerous incentive schemes, including traffic concessions, rebates and direct subsidies.

12. Which entities should be required to comply with a fuel efficiency standard, and why?

The AEVA believes the manufacturer should bear responsibility for compliance, with feedback from dealership networks to guide their implementation of emissions and efficiency standards.

13. What concessional arrangements should be offered to low volume suppliers under an Australian fuel efficiency standard and why?

By definition, low volume exceptions will have little effect on overall efficiency or emissions. Therefore any exemptions should be allowed up to a pre-determined volume limit. Also for special purpose / unique use vehicles where a complying alternative with similar specifications does not exist, this should also be considered for emergency services and ADF. High performance and other non-standard road vehicles, to which this concession would most likely apply, would need to be limited to special purpose or unique vehicles, and not a high emitting competitor to a complying model. If not, it would need to be included under flexibility arrangements. All models sold in Australia should be required to enter required details on the register.

14. What penalties should be applied to entities that failed to comply with a fuel efficiency standard and why?

The non-complying entity should pay into a trust or managed account the imputed cost to the economy for every non-complying vehicle on a monthly basis. Any profits from this investment would accrue to the Government. If after two years the entity has not paid back this 'debt' by exceeding the standards, then one year's payments are forfeited. The AEVA suggests for the period of non-compliance an equal sum could be paid to not-for-profit organisations like the AEVA or the Alternative Technology Association for the purpose of promoting the benefits of zero emission vehicles.

The AEVA thanks the Department of Infrastructure and Regional Development for the opportunity to comment, and we hope the recommendations listed here are endorsed.

Edward Booth
President

Dr Chris Jones
Secretary

Co-authors: Daryl Budgeon and Chris Jones