

Submission to the Senate Select Committee on Electric Vehicles

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67 Payneham Road
College Park SA 5069
P 0422 974 857
E admin@dea.org.au
W www.dea.org.au

Healthy planet, **healthy people.**

DEA Scientific Committee

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Prof Stephen Leeder AO
Prof Lidia Morawska
Prof Hugh Possingham
Dr Rosemary Stanton OAM

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"Electricity is the thing. There are no whirring and grinding gears with their numerous levers to confuse. There is not that almost terrifying uncertain throb and whirr of the powerful combustion engine. There is no water-circulating system to get out of order-no dangerous and evil smelling gasoline and no noise." Edison to Ford c1895

Doctors for the Environment Australia (DEA) is an independent self-funded non-government organisation of medical doctors and students in all Australian States and Territories. Our members work across all specialties in community, hospital and private practice. We work to prevent and address the health risks-local, national, and global-caused by damage to our natural environment. We are a public health voice in the sphere of environmental health with a primary focus on the health harms from pollution, environmental degradation, and climate change.

DEA welcomes the opportunity to submit to the Senate Select Committee on Electric Vehicles.

Glossary

AEMO - Australian Energy Market Operator
BEV - Battery Electric Vehicle
BNEF - Bloomberg New Energy Finance
GHG - Greenhouse gas
EV - Electric Vehicle
HEV - Hybrid Electric Vehicle
ICEV - Internal Combustion Engine Vehicle
NEM - National Electricity Market
OPEC - Organization of the Petroleum Exporting Countries
PHEV - Plug-in Hybrid Electric Vehicle
SUV - Sports Utility Vehicle
WHO - World Health Organization

Recommendations

- That this enquiry form part of a wider enquiry into transport policy in Australia, with consideration of greenhouse gas emissions and air quality and the role of public transport, road and rail freight, urban design, and active transport in walking and cycling.
- That Australia urgently addresses the health issue of air pollution from vehicle exhaust.
- That Australia, in accordance with the Paris Agreement, addresses the increasing contribution of vehicular traffic to Australia's rising greenhouse gas emissions.
- That the contribution of EVs, HEVs and PHEVs, to reducing greenhouse gases and improving air quality be recognised in policy and legislation.
- That Australia, as a matter of urgency, updates its vehicle emission standards to Euro6/VI or equivalent, and its fuel quality standards to the best in the OECD, adopting Fuel Policy option B as per the Better Fuel for Cleaner Air Discussion Paper.
- That Australia adopt mandatory fuel efficiency standards, with a target average of 105gms CO₂ per kilometre.
- That the impacts of EVs, both positive and negative, on the NEM be considered in formulating energy policy.
- That COAG use incentives across all States and Territories for the adoption of low emission and electric vehicles as in the ACT, US, UK and most of Europe.
- That electrification of Australia's public transport system be supported, in particular with electrification of the bus fleet.

Introduction

DEA respectfully requests that electric vehicles should be considered in the broader context of transport infrastructure, urban planning, and climate policy in Australia, and according to the principle of '*health in all policies*' as recommended by the World Health Organization (WHO)². The social, health and economic gains from integrating health, transport and city planning are:

- Reduced air pollution. Vehicular emissions are responsible for about half of the 3,000 deaths per year in Australia from poor air quality.
- Reduced greenhouse emissions will aid in Australia meeting its Paris Agreement target and mitigating the increasing impacts of climate change.
- More liveable cities promoting exercise with reductions in obesity, diabetes and heart disease. Each additional hour spent in a car per day is associated with a 6% increase in the likelihood of obesity.³

The Ministerial Forum on Vehicle Emissions, established in 2015, is yet to make any determination on vehicle and fuel standards, a delay DEA asserts is unjustified in view of the known health harms from transport pollution and the impact on the health budget. We wish to refer you to DEA's following submissions:

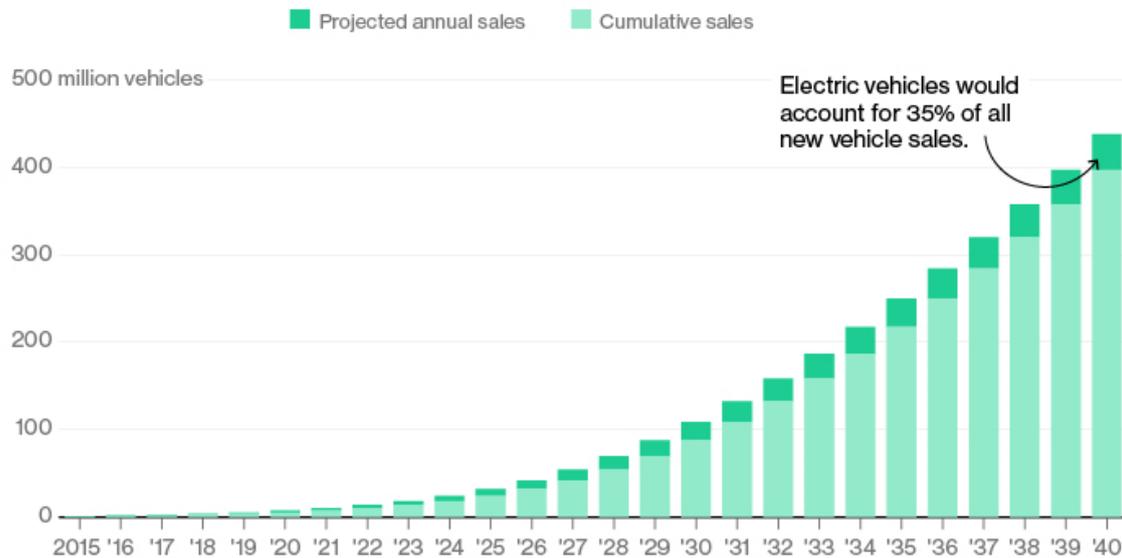
- Submission to the Senate Inquiry into Public Transport⁴
- Better Fuel for Cleaner Air Discussion Paper⁵
- Vehicle Emissions Discussion Paper (Ministerial Forum)⁶

Electric Vehicles

A global disruption in the automotive industry is underway. In 2017 there were more than 1 million new electric cars added to the global stock, a growth rate of 54% compared with 2016.⁷ All major car manufacturers are entering the global market for low emission vehicles. All new cars in Norway after 2025 are likely to be electric. China is ramping up EV production and large-scale production of EV batteries, likely to drive EV prices down further globally⁸. The United Kingdom has now released a package of laws aimed at speeding up the adoption of low emission vehicles, including banning all new petrol and diesel models by 2040, and charging stations to be required in all new homes and offices⁹. British Transport Minister Grayling said the package, known as Road to Zero, would provide "*not just a cleaner and healthier environment, but a UK economy fit for the future and the chance to win a substantial slice of a market estimated to be worth up to £7.6 trillion by 2050*"¹⁰.

The Rise of Electric Cars

By 2022 electric vehicles will cost the same as their internal-combustion counterparts. That's the point of liftoff for sales.



Sources: Data compiled by Bloomberg New Energy Finance, Marklines

Bloomberg

According to Bloomberg New Energy Finance (BNEF) electric cars will make up 28% and electric buses 84% of their respective markets by 2030. Falling battery costs and large-scale production will result in price parity of EVs with ICE vehicles by 2024, without subsidies. The advance of e-buses will be even more rapid with the total cost of e-buses being lower than conventional buses as early as next year.¹¹ The AEMO has recently doubled its forecast for EV uptake in Australia. Within two decades EVs could make up half of Australia's car fleet. For this submission we have focussed on EVs over HEVs and PHEVs. While pure EVs offer the most advantage in terms of tailpipe emissions (zero), HEVs and PHEVs are low emission vehicles and therefore preferable to ICE vehicles. As battery technology and cost improves, and charging infrastructure is rolled out it is likely customers will choose BEVs over HEVs and PHEVs. Some manufacturers are building hydrogen powered cars (e.g. Hyundai). However, most are backing batteries. Hydrogen vehicles also have zero tailpipe emissions.

Electric Vehicles and Health

1. Air Pollution and the internal combustion engine

The Discussion Paper '*Better Fuel for Cleaner Air*', from the Department of Environment and Energy, describes the problem: "*Noxious emissions from motor vehicles are particularly harmful to human health, as the*

general population is exposed to more motor vehicle exhaust emissions than most other sources"¹².

Poor air quality contributes to the leading causes of death in Australia, including heart disease, stroke, dementia, chronic lung disease and lung cancer.^{13, 14} According to the OECD, air pollution is set to become the world's top environmental cause of premature mortality.¹⁵ The WHO reports that 80% of urban residents are exposed to air pollution levels that exceed WHO limits and that one third of deaths from stroke, lung cancer and chronic lung disease, and one quarter of deaths from ischaemic heart disease are related to air pollution¹⁶. Kjellstrom, Neller, and Simpson, in an article in the Medical Journal of Australia in 2002 wrote "*Further reductions (in urban air pollution) may prevent hundreds of cardio-respiratory hospital admissions and deaths each year*"¹⁷. Since then, after some improvement in the following decade, the pollution curve has started heading in the wrong direction, especially since the higher uptake of diesel vehicles in Australia. The health costs from mortality arising from poor air quality were reported in the 2016 *State of the Environment Report* to be of the order of \$11-\$24 billion¹⁸.

Around 1 in 9, or 2.5 million, Australians have asthma¹⁹. Children are particularly vulnerable to asthma induced by air pollution because they have narrower airways, breathe more air per kilo of body weight, and spend more time outdoors. A meta-analysis published in the journal Environmental Research concluded that living or attending school near high traffic density roads increases the incidence and prevalence of childhood asthma and wheeze²⁰. A longitudinal study by the California Air Resources Board followed children in high traffic and low traffic areas for 10 years (the study is still running). They found that children exposed to vehicular pollution over time suffer poor lung development which endures into adulthood²¹.

The Lancet Planetary Health Journal July 2018 reports that the evidence for an increase in the incidence of diabetes mellitus due to fine particulates PM_{2.5} is now strong.²²

Because EVs have zero tailpipe emissions and PHEVs very little, they present an opportunity to dramatically reduce air pollution with immediate positive impacts on health.

2. Greenhouse gas emissions²³

Australia is a continent particularly vulnerable to the effects of climate change which the First Lancet Commission described as the greatest global health threat of the 21st Century. With a high degree of natural variability in climate in terms of temperature and rainfall, climate change amplifies that variability and makes extremes of weather more likely. The Bureau of Meteorology has identified a long term drying pattern for

the southern half of Australia. DEA has submitted elsewhere on the health impacts of climate change, including from droughts, flooding, rising sea levels, spread of vector borne diseases, longer and more extreme bush fire seasons and heat stress in vulnerable populations.^{24, 25, 26} The WHO has estimated that the direct damage costs to health (i.e. excluding costs to agriculture, water and sanitation) will be of the order of US\$2-4 billion/year by 2030²⁷

It is therefore in Australia's self-interest to take an ambitious approach to mitigation of climate change and demonstrate leadership in reducing emissions. It is not reasonable to claim that Australia's contribution to global emissions at 1.3% justifies no action on climate change when Australia grouped with similar sized economies makes up 40% of the total and Australia has the highest per capita emissions among developed countries.²⁸

The very contentious National Energy Guarantee provides for only 26% reduction in emissions within the electricity sector. Other sectors, including agriculture and transport will be required to make deep cuts in emissions if Australia is to meet its modest target of 26%-28% overall. If agriculture is one of the hardest sectors in which to cut emissions, transport could be the easiest, provided some simple policies are enacted.

Greenhouse gases from transport are predicted to increase at a faster rate than those from other energy uses. The Fifth Report of the IPCC projects transport emissions could double by 2050.²⁹ Australia's emissions in 2017 reached a record level, the highest since 1992.

Energy expert Hugh Saddler has pointed to Australia's rising GHG emissions from the transport sector. This increase in petroleum use will make it hard or impossible to achieve Australia's commitment to the Paris Agreement.³⁰ In its 2014 report on Policies for Reducing Light Vehicle Emissions the Climate Change Authority stated:

"In the absence of an incentive to reduce greenhouse gas emissions (either explicitly through a price or implicitly by regulation) the market for greenhouse emissions is 'missing'. As a result, motorists will not take into account the social cost of the emissions they produce when driving and emissions will be too high from the perspective of society as a whole".³¹

The Climate Change Authority has identified mandatory light vehicle emission standards, applied across the fleet as a whole, as the policy of choice for reducing light vehicle emissions. Mandatory standards apply to 70% of light vehicles sold in the world. Absence of such standards has led to the potential dumping of less efficient vehicles onto the Australian market to the detriment of the environment and consumer.³² The

Authority recommended adoption of a fuel efficiency standard of 105gms CO₂ per kilometre which would require dealers to offer low emissions models. The standard would bring Australia into line with countries such as the US and Europe. Mandatory standards, in contrast to voluntary schemes, have been shown to work.³³

Electric vehicle emissions vs ICE emissions

It has been argued that EVs do not reduce emissions but merely shift them to the electricity grid. A study commissioned by the Union of Concerned Scientists in the US found that even when charged from grids powered from a high proportion of coal EVs produce less emissions than petrol or diesel-powered cars. The same study looked at total emissions from cradle to grave of EVs compared with ICE vehicles and concluded that a typical EV produces less than half the global warming emissions of a typical ICE vehicle.³⁴ When charged from a grid with a high proportion of renewable energy, such as California at 30% renewables³⁵, a typical EV has the same emissions as a petrol car with a fuel economy of 2.8 litres/100km.

Electric vehicles complement a grid with a higher proportion of renewable electricity. Variability in supply and demand can be smoothed out, with EV charging occurring during times of low demand, and feeding back into the grid from the batteries when demand is high.³⁶ Distributed generation, community solar, smart meters, and the internet will make this possible. Such a scenario could reduce reliance on gas for peaking power and reduce electricity costs. Dieter Helm, Professor of Energy Policy, University of Oxford in his book *Burn Out, the End Game for Fossil Fuels* writes about the technical change in energy which will require integrating generation, storage, distribution, supply and transport policy.³⁷

A survey by the World Refining Association of oil industry executives found that 70% believe that electric cars will "*substantially impact*" the emissions of CO₂ linked to global warming.³⁸ Vlado Vivoda, Research Fellow at Griffith University has written of Australia's dependence on imported oil and the vulnerability to potential disruptions in supply chains.³⁹ Wide adoption of electric vehicles can reduce this dependency on foreign oil.

Electric Buses

Electrification of Australia's metropolitan and suburban bus fleets would deliver an immediate environmental dividend. Electric buses now account for 17% of China's entire fleet and now all of Shenzhen's buses are electric. Because diesel powered buses consume up to thirty times more

fuel than the average car, replacing them with electric vehicles has a large impact in reducing pollution and CO₂ emissions.⁴⁰ Australia has a nascent electric bus manufacturing industry in South Australia and Victoria and there exists an opportunity there to revive Australia's manufacturing expertise.⁴¹

Cultural attitudes, the free market and regulation

Car ownership is deeply rooted in western culture and, for many, choice of vehicle is driven by factors other than concern for the environment. Two of the most popular models sold in Australia produce over 200gms CO₂/km. Advertising is heavily tilted towards large SUVs, and particularly diesels which are perceived to be more fuel efficient. Diesel emissions, high in oxides of nitrogen (NO_x) and particulates are particularly bad for air quality. We reiterate here that mandatory standards are necessary to shift attitudes to driving. It is not reasonable or equitable that drivers' choice be placed ahead of public health and the environment.

Public transport use is low in Australia, a matter we have raised in previous submissions as a cause for concern.⁴² Improved public facilities and usage will be better for everyone's health, including drivers.

Summary

Electric vehicles should be part of a broad based and health focussed approach to curb Australia's growing greenhouse gas emissions and deteriorating air quality. There is a large body of evidence of the harms of both air pollution and climate change and measures to address both these problems co-exist. DEA urges the Senate to consider electric vehicles as part of a suite of measures addressing air pollution and climate change in the interests of the health of all Australians.

References

¹ https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Electric_Vehicles

² <http://www.who.int/healthpromotion/frameworkforcountryaction/en/>

³ <https://www.ncbi.nlm.nih.gov/pubmed/15261894>

⁴ <https://www.dea.org.au/wp-content/uploads/2017/08/Public-Transport-Submission-02-14.pdf>

⁵ <https://www.dea.org.au/wp-content/uploads/2018/03/Better-fuel-for-cleaner-air-draft-regulation-impact-statement-submission-03-18.pdf>

⁶ https://www.dea.org.au/wp-content/uploads/Vehicle_Emissions_Discussion_Paper_submission_04-16.pdf

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- 7 https://webstore.iea.org/download/direct/1045?fileName=Global_EV_Outlook_2018.pdf
- 8 <https://www.reuters.com/article/us-byd-autos/byd-predicts-ambitious-china-shift-to-electric-cars-by-2030-idUSKCN1BW0BQ>
- 9 <https://cleantechnica.com/2018/07/11/uk-road-to-zero-plan-promises-ultra-low-emissions-vehicles-residential-chargers/>
- 10 <https://www.theguardian.com/environment/2018/jul/09/electric-cars-vehicles-uk-plan-more-charging-points-chris-grayling>
- 11 <https://www.bloomberg.com/professional/blog/e-buses-surge-even-faster-evs-conventional-vehicles-fade/>
- 12 <https://www.dea.org.au/submission-to-the-better-fuel-for-cleaner-air-discussion-paper/>
- 13 [https://www.thelancet.com/journals/lanpub/article/PIIS2468-2667\(16\)30023-8/fulltext](https://www.thelancet.com/journals/lanpub/article/PIIS2468-2667(16)30023-8/fulltext)
- 14 <https://www.smh.com.au/healthcare/living-near-busy-roads-increases-dementia-risk-lancet-study-20170105-gtm8r1.ht>
- 15 <http://www.oecd.org/newsroom/environmentactnoworfacecostlyconsequenceswarnsoecd.htm>
- 16 <http://www.who.int/airpollution/en/>
- 17 <https://www.mja.com.au/journal/2002/177/11/air-pollution-and-its-health-impacts-changing-panorama>
- 18 <https://soe.environment.gov.au/theme/ambient-air-quality/topic/2016/health-impacts-air-pollution>
- 19 <https://www.asthmaaustralia.org.au/national/about-asthma/what-is-asthma/statistics>
- 20 <https://www.sciencedirect.com/science/article/pii/S0013935112001442>
- 21 <https://www.arb.ca.gov/research/chs/chs.htm>
- 22 <https://www.sciencedirect.com/science/article/pii/S2542519618301402>
- 23 <http://www.bom.gov.au/climate/updates/articles/a010-southern-rainfall-decline.shtml>
- 24 <https://www.dea.org.au/abc-4corners-while-politicians-question-the-reality-of-climate-change-farmers-and-businesses-ac>
- 25 <https://www.dea.org.au/theconversation-health-check-how-can-extreme-heat-lead-to-death/>
- 26 <https://www.dea.org.au/bushfires-and-health-in-a-changing-environment-fact-sheet/>
- 27 <http://www.who.int/news-room/fact-sheets/detail/climate-change-and-health>
- 28 <http://climatecollege.unimelb.edu.au/facts4paris-australias-capita-emissions-remain-highest-among-its-key-trading-partners>
- 29 <https://ipcc.ch/PDF/assessment-report/ar5/wg3/ipcc-wg3-ar5-chapter8.pdf>
- 30 <https://reneweconomy.com.au/australias-record-energy-emissions-still-no-plan-reduce-45412/>
- 31 <http://climatechangeauthority.gov.au/reviews/light-vehicle-emissions-standards-australia/policies-reducing-light-vehicle-emissions>
- 32 <https://theconversation.com/could-australia-become-a-dumping-ground-for-high-emission-vehicles-38299>
- 33 <http://www.climatechangeauthority.gov.au/reviews/light-vehicle-emissions-standards-australia>
- 34 https://www.ucsusa.org/clean-vehicles/electric-vehicles/life-cycle-ev-emissions#.W0_ijLqymds
- 35 http://www.energy.ca.gov/renewables/tracking_progress/documents/renewable.pdf
- 36 <https://www.forbes.com/sites/constancedouris/2017/12/11/how-electric-cars-can-make-your-electricity-cheaper-and-more-reliable/#76076b2a6042>
- 37 Dieter Helm. Burn Out: the end game for fossil fuels
- 38 https://www.greencarreports.com/news/1117774_oil-refiners-express-skepticism-worry-over-electric-cars
- 39 <https://theconversation.com/australias-growing-oil-imports-are-an-energy-security-issue-7749>

⁴⁰ <https://www.afr.com/business/transport/electric-buses-are-hurting-big-oil-and-helping-the-warren-buffettbacked-byd-20180424-h0z77j>

⁴¹ <https://www.theherald.com.au/story/5216852/australias-next-stop-green-bus-revolution/>

⁴² <https://www.dea.org.au/wp-content/uploads/2017/08/Public-Transport-Submission-02-14.pdf>