



Submission from the Centre for Air pollution, energy and health Research (CAR)

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Contributors:

Dr Farhad Salimi, University of Sydney (farhad.salimi@sydney.edu.au)

Ana Porta Cubas, University of Sydney (ana.porta@sydney.edu.au)

A/Prof Geoff Morgan, University of Sydney (geoffrey.morgan@sydney.edu.au)

Prof Guy Marks, University of NSW (g.marks@unsw.edu.au)

Thank you for the opportunity to comment on the Select Committee on Electric Vehicles' Terms of Reference. The Centre for Air pollution, energy and health Research (CAR) brings together researchers at the forefront of their respective fields to research the impacts of air pollution and new forms of energy on health. We are thus well placed to comment on the likely health impacts of electric vehicles on our populations, which aligns with the first of the Committee's Terms of Reference: (a) the potential economic, environmental and social benefits of widespread electric vehicle uptake in Australia.

Summary

The human health impacts of electric vehicles need to be analysed within the wider context of the changing mobility and transport landscape of Australia. Transportation and the use of transport infrastructure exposes people to a range of health risk factors including: air pollution, noise pollution, traffic accidents, physical activity and social interaction. The introduction of electric vehicles has the potential to substantially change current population exposures to ground level air pollution, noise pollution and greenhouse gas emission and may bring its own problems or maintain a range of current problems. For example, it may increase motor vehicle dependence and associated sedentary lifestyles which in turn have detrimental health, economic and social outcomes through increased health costs and decreased quality of life. Additionally, the use of electric vehicles does not eliminate the substantial motor vehicle related air pollution due to non-exhaust emissions from brake and tyre wear and road dust. The health impacts of increased uptake of electric vehicles on each of the aforementioned exposures is complex and needs to be examined in their entirety along the complete life cycle of electric vehicles. This assessment should also include an analysis of the potential health benefits of improved public transport, the increased use of sustainable (non fossil fuel) energy generation and improved urban design.

Effects on air quality

Conventional vehicles with internal combustion engines are a major source of ground level air pollutants such as carbon dioxide (CO₂), nitrogen oxides (NO_x), and particulate matter (PM). Air pollution has severe adverse effects on health that can lead to premature mortality

431 Glebe Point Road
Glebe NSW 2037 Australia

E car@sydney.edu.au
W www.car-cre.org.au

[1]. The replacement of conventional vehicles with electric vehicles may result in a range of environmental, health, and climate benefits due to possible reductions in ground level pollutants as well as greenhouse gas emissions.

The original source of energy generation to drive electric vehicles is an important consideration to determining overall pollutant and emission levels. Due to differences in proximity of emissions to people between motor vehicles and power stations the replacement of combustion engine vehicles with electric vehicles could have a net benefit in terms of the health effects due to reduced PM exposure. Electric vehicles charged using electricity produced by fossil fuel-based (coal and gas) power stations would result in substantial generation of ground level air pollution as well as greenhouse gas emissions. Around ninety per cent of electricity in Australia is generated from fossil fuels, with 75 per cent from coal and 16 per cent from natural gas [2]. A recent study in Sydney found that around 10 per cent of population exposure and a similar proportion of mortality burden due to particulate matter pollution less than 2.5 micrometres in diameter (PM_{2.5}) was due to power station emissions [3]. Thus, while the widespread uptake of electric vehicles is likely to reduce emissions from the vehicles themselves, this reduction may be negated unless the electricity to charge the electric vehicles is generated from sustainable (non fossil fuel) sources.

While electric vehicles produce no exhaust emissions, a substantial component of non-exhaust related emissions still remain while using electric vehicles. These come from brake and tyre wear as well as road dust. A recent study in Sydney found that on-road vehicles and off-road vehicles are responsible for 17 and 10 per cent respectively of the population exposure and the mortality burden due to PM_{2.5} [3]. Of the 17 per cent of PM_{2.5} exposure due to on-road vehicles, 5 per cent was due to non-exhaust emissions such as tyre and brake wear as well as road dust [3]. It is likely that similar results would be found in other major cities in Australia. In addition, electric vehicles are on average around 25 per cent heavier than their conventional counterparts which leads to higher non-exhaust emission [4]. One study found that PM_{2.5} emissions were only 1-3 per cent lower for electric vehicles as the extra weight of electric vehicles lead to more non-exhaust PM emissions [4].

Other environmental and health concerns

Electric vehicles run on lithium-ion batteries and there are environmental concerns related to lithium mining and recycling of these batteries. The batteries used in electric vehicles carry a risk of producing toxic gases in case of a malfunction or damage which pose health concerns [5]. Moreover, core ingredients used in battery production such as cobalt and lithium are finite, and their extraction can have adverse environmental impacts including water pollution and depletion.



Motor vehicle dependence and sedentary lifestyles

While electric vehicles are likely to have some health benefits they do not address a broad range of health and economic concerns related to motor vehicle dependence and sedentary lifestyles including inadequate physical activity, traffic congestion, requirements for more roads, parking areas. These important health and economic issues will not be addressed by simply maintaining our current dependence on private motor vehicle transport, even if these are electric vehicles.

Instead, there are substantial environmental, health, and economic benefits associated with investing in active transportation (e.g. walking and cycling). The societal benefits of a modest increase in the proportion of people who are physically active could be large. For instance, it has been estimated that a five percent increase in the proportion of people doing 30 minutes of moderate physical activity per day could save around 600 premature deaths per year in Australia which would consequently lead to substantial savings to the health system [6].

A study conducted in London and New Delhi found that a combination of active travel and lower emission vehicles would give the largest health benefits. The study concluded that a combination of implementing low-emission vehicle technologies with a substantial increase in active transportation offers the best outcome in terms of climate change mitigation and public health [7].

Conclusions

Electric vehicles are increasingly attracting attention as a potential alternative to conventional vehicles due to their reduced emissions. However, this is only a part of the broader impacts of the changing energy and transport landscape of Australia. In terms of health, through a transition to electric vehicles, there may be potential benefits of reduced overall exposure to emissions from combustion as well as noise pollution. However, there are many other elements to consider in any transition to electric vehicles and these can be analysed through a life cycle lens. For example, the air quality and climate benefits of electric vehicles are highly dependent on the energy mix which is used to produce electricity for their operation. Additionally, the continued dependence on motorised personal vehicles perpetuated by this shift is likely to have ongoing effects on human health.

Holistic environmental, urban planning and transport policy along with comprehensive health impacts assessments are required to ensure the transition to electric vehicles results in improved mobility and improved population health through the reduction of environmental hazards and facilitation of active transport.

About CAR

The Centre for Air pollution, energy and health Research (CAR) is a Centre of Research Excellence funded by the National Health and Medical Research Council. CAR brings together

431 Glebe Point Road
Glebe NSW 2037 Australia

E car@sydney.edu.au
W www.car-cre.org.au



over 30 researchers at the forefront of their fields to investigate how air pollution and new forms of energy affect our health. Our vision for a healthier community is the driving force behind our research.

CAR supports teams of researchers in the fields of epidemiology, exposure assessment, toxicology, chemistry, biostatistics and clinical respiratory medicine to pursue collaborative projects and to develop their capacity. We are based in seven of Australia's leading universities and research institutions.

References

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