



Flinders University
Australian Industrial
Transformation
Institute

Submission to Senate Select Committee on Electric Vehicles



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The significance of environmental issues like climate change and air pollution is widely understood and accepted in Australia, as is the importance of adaptation initiatives designed to build pro-environmental behaviours amongst citizens.¹ Pollution from transport and energy industries are major issues of public awareness. The Bureau of Infrastructure, Transport and Regional Economics² estimate that the cost of traffic congestion for Australia by 2030 could reach as high as \$37 billion per annum. In addition, transport and energy are the two largest producers of greenhouse gas (GHG) emissions and air pollution in Australia.³

The widespread uptake of Electric Vehicles (EV) in Australia has significant potential for positive impacts that contribute to sustainable transformation across all areas of the economy, society and environment, raising awareness and changing behaviours amongst members of society. There are substantial benefits of EVs for environmental impact, and benefits for consumer health and safety in the uptake of EVs. There are also safety and traffic efficiency benefits to be found in the growing prevalence of Autonomous Vehicles (AVs), for which the economic opportunity is set to grow from US\$800 billion to US\$7⁴ trillion as uptake becomes mainstream with technological innovation and change.

A question remaining to be answered in Australia is what is required for these environmentally, socially and economically beneficial technologies to be made ubiquitous within the transport industry? The R&D interlinkages between EV and renewable industries will fuel the growth of new renewable technology solutions to address the accepted consequences of climate change. However, industry transformation will in part require substantial market demand, and that in turn will require consumer behavioural change. It must be the goal of policymakers to decide how the economic decisions of industry and behavioural changes within society can be realised together in transformative ways that create market opportunities for EV and AV-driven industrial transformation. We have much to learn from in this respect, particularly the uptake of household solar in Australia, which has been driven by a combination of factors including financial incentives, community awareness raising and the evolution of the technology, particularly battery storage.

1.1 Electric vehicle discovery as a learning experience

Collaborative international research conducted by French academics and Australia's national transport research organisation, ARRB, gathered data from experiments to suggest that daily use of EVs amongst a group of drivers resulted in these drivers adapting environmental attitudes into behavioural practices. These practices represented a point at which the uptake and use of EVs became a normal experience and helped to make drivers increasingly conscious of their own environmental impact. The flow-on effect of this is seen in changes to consumer preferences that fuel the growth of markets for environmental sustainable products and services across a far wider range of industries and sectors. However, crucially, this research has noted through the experience of drivers that a 'learning phase' is essential to successful behavioural change processes.⁵ Drivers must be immersed in the experience of driving an EV to feel confident in the knowledge that a range of factors – such as the 'quietness' of EVs and the need to plan lifestyles

¹ Leviston, Greenhill, and Walker (2015). *Australian attitudes to climate change: 2010-2014*. Canberra: CSIRO

² Bureau of Infrastructure Transport and Regional Economics (2015). *Traffic and congestion cost trends for Australian capital cities*. Canberra.

³ Department of the Environment and Energy (2018). Australian Greenhouse Gas Emissions Information System. *National Greenhouse Gas Inventory – Kyoto Protocol classifications*. Canberra.

⁴ Intel (2017)

⁵ Labeye, E., Hugot, M., Brusque, C., & Regan, M. A. (2016). The electric vehicle: A new driving experience involving specific skills and rules. *Transportation Research Part F: Traffic Psychology and Behaviour*, 37, pp. 27-40

around the much shorter range of EVs compared to ICEs – defines the parameters of their attitude and behavioural changes. These may seem like negative implications, but the notion that consumers can be exposed to EVs in ways that lead to positive attitude and behavioural changes is supported by evidence. However, despite providing clear evidence that exposure to EVs turns environmental attitudes into behaviours and norms, such studies are so far limited by small sizes of drivers involved, which exposes only select participants to the numerous benefits of EVs, rather than society more broadly. This challenge is magnified by the availability of autonomous driving capabilities in vehicles, requiring exposure to a new range of transportation opportunities.

1.2 Electric vehicle discovery centres

A way to meet the challenge of scaling up behavioural change specific to uptake, knowledge and use of Electric Vehicles and autonomous vehicles is the concept of a ‘vehicle discovery centre’. An evidence base for the relevance and effectiveness of this concept already exists overseas, from which can be drawn examples of facilities that have embarked upon a mission to inform the wider public about EVs and immerse them in the experience of driving them, in an atmosphere that is not sales oriented or pressured. The ‘Plug’n Drive’ Electric Vehicle Discovery Centre is an information service in Toronto, Canada that is focused on providing an experiential learning environment for EVs. Visitors to Plug’n Drive are able to discover the history of electric transportation since its beginnings in the early 19th century, learn from interactive vehicle displays, discover the environmental and economic benefits of EVs, learn about EV charging, test-drive current EV models, and have general questions answered by industry experts.⁶ The Go Forth Electric Showcase in Portland, USA brings together communities, car companies, industry partners, utilities and entrepreneurs in support of sustainable business and economic growth. It brings partners together in demonstration projects involving new technologies to catalyse an expansion of mobility options, and it advocates for smart laws and policies that strengthen the social benefit of EV-related innovations. To translate these pursuits to the public, visitors can test-drive EVs and learn about their role in realising a sustainable future.⁷

The EV Experience Centre in Milton Keynes, England is the UK’s first shopping centre-based multi-brand showroom. It aims to help residents understand the benefits of EVs. Despite the Experience Centre’s commercial focus, which differs from the Plug’n Drive centre’s educational and experience focus, it is based alongside the UK’s premier Catapult⁸ site for Transport Systems, which focuses heavily on R&D and innovation in EV technologies with a mission to promote ‘intelligent mobility’ to collaborations amongst industry, universities and government. The Experience Centre’s proximity to the Transport Systems Catapult is an advantage, where the latest progress in R&D processes is quickly translatable into public knowledge through the interaction of visitors with EV products and the latest industry innovations.

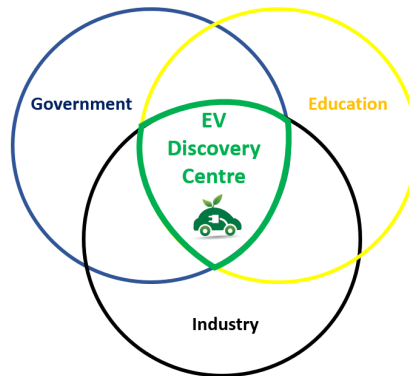
Overall, these experience and discovery centres demonstrate the value, benefit and general process of building connections between the public’s awareness of environment and sustainability issues with industry and the public’s willingness and intention to produce and use EVs, respectively. It is clear that this process of demonstration requires a number of actions that involve government, industry and research institutions in a triple helix collaboration that nurtures the growth of EV knowledge through experience and discovery centres, see below.

⁶ Plug’n Drive (2018), Plug’n Drive - Electric Cars. Retrieved from <https://www.plugndrive.ca/>

⁷ Forth Mobility (2017). GO FORTH Electric Showcase. Retrieved from <https://forthmobility.org/showcase>

⁸ The Catapult initiative supports dedicated environments for collaborative R&D between industry and research, aiming to narrow the gap between R&D and commercialisation in specific industries of the UK’s competitive advantage.

Electric Vehicle Collaboration Model



1.3 Establishing an electric vehicle experience/discovery centre in Australia

At present, no comparable EV discovery and experience centre has been established in Australia. However, lessons from international experience are indicative of the benefits of EV experience centres that aim to educate, immerse a range of social actors in the EV technologies and applications to be taken up widely within industry and broader society. A concept that offers a comparable experience in Australia is that of a 'Future Mobility Centre' (FMC). This is a concept proposing to promote an integrated focal point for the general public, students, consumers, corporations, governments and educational institutions to become involved in learning about environmental and economic benefits of EVs and AVs. Such a discovery centre has the potential to offer an immersive, experiential learning environment that showcases the benefits of smart, connected EV and AV transport solutions and their pivotal role in reducing GHG emissions and creating new economic opportunities in Australia.

There is potential for an Australian FMC to deliver important benefits to the Australian public, researchers, policy makers, industries and business. The Plug'n Drive and the Experience Centre are primarily public-private partnerships that provide information and market exposure to consumers. The establishment of a FMC in Australia represents an opportunity to deliver a world-first form of experiential EV centre, whereby its key tenets focus on providing opportunities for all levels of government, not for profits, commercial and private sectors to access an independent experiential learning centre in a non-sales environment which delivers a broad educational program and a physically engaging environment. Similar international concepts provide evidence that learning and experience opportunities work, and an Australian FMC suggests that these examples can be improved upon and deliver world leadership on EV and AV technology and uptake. This would be achieved by education on a range of subjects:

- EV charging infrastructure;
- Solar power generation via solar photovoltaic;
- Solar thermal energy;
- Battery storage;
- The link between renewable energy and sustainable transport;
- Vehicle/home energy developments; and
- Smart Cities.

An FMC would also evaluate user-experience and systematically collect feedback to inform EV design and deployment. This data can be the foundation for a Future Mobility research program capable of informing policy and practice in Australia.

1.3.1 Establishing a Future Mobility Centre

The FMC would provide visitors with the information, education and experience they need to make informed decisions for their future transport and energy needs. This is an educational experience that would be designed to provide broad access to the abovementioned educational areas, offering a range of learning, educational and training opportunities to visitors from high school students, to industry associations, to international political delegations. The main outcome of this design would be to accelerate the uptake of EVs and renewable energy in Australia for the purpose of reducing GHG emissions. These stakeholders would be brought together through grant funding from the federal government to establish the first FMC in what would become a national network of centres in each state and territory.

Importantly FMCs will help generate an evidence base on those strategies and practices that help foster the uptake and diffusion of EVs in Australia. A research program would be designed in collaboration with industry and government.

The Tonsley Innovation District in Adelaide South Australia is an ideal location for a FMC. Tonsley was the former site of the Mitsubishi Motors Australia Limited vehicle assembly plant. It has been transformed into one of Australia's leading innovation districts involving co-location of companies, start-ups, NGOs and government organisations, Flinders University and Tonsley TAFE. Tonsley has received numerous sustainability and architectural awards. It is a thriving innovation ecosystem designed strategically to encourage engagement and collaboration between entrepreneurs, enterprises, researchers and students. It is also a major residential housing development site, connecting the wider community with the latest technological innovations. Tonsley is also home to one of Australia's first purpose built living laboratories – the Global Centre for Modern Ageing. This is an ideal environment to expose the community to EV and autonomous vehicle technologies and build globally competitive EV supply chain and R&D initiatives by utilising the cutting-edge features of Tonsley. The 'hard' infrastructure of Tonsley's adaptive re-use has been designed to nurture a cluster-based innovation ecosystem for renewable and sustainable technologies. Its 'soft' infrastructure has created an environment of shared spaces and produced a range of social focal points to cultivate collaborative opportunities between the 1,000+ full-time employees now based on the site.

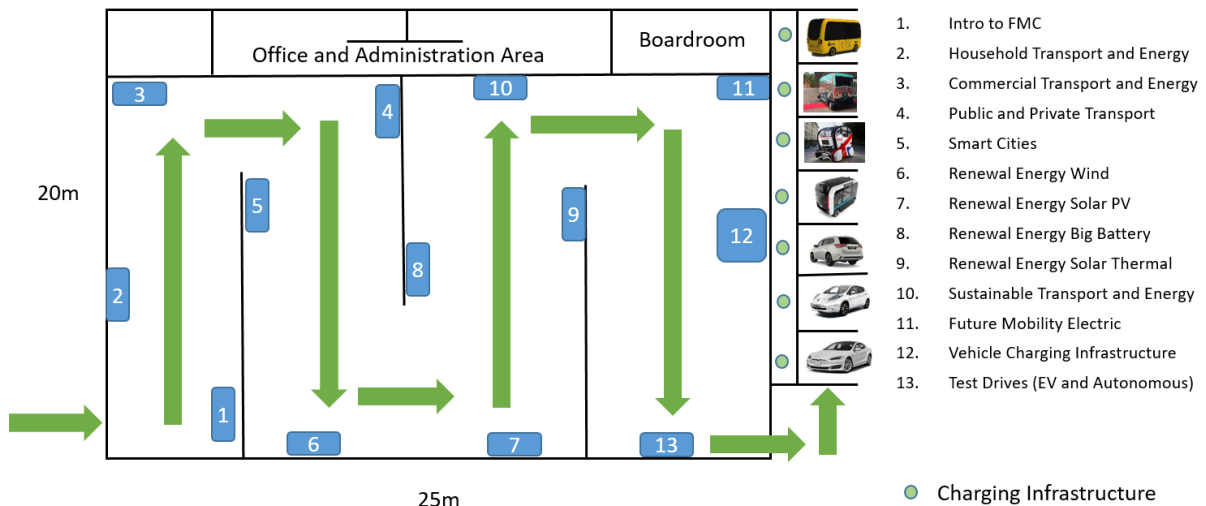
Tonsley also provides ideal conditions for learning and research on sustainable and renewable technologies in which tenants at Tonsley specialise. The Flinders University campus located on site currently has approximately 200 final year engineering and computer science students and each is required to undertake a research project. The Flinders at Tonsley complex includes the Australian Industrial Transformation Institute which is undertaking research on industries and jobs of the future with a particular focus on advanced manufacturing in partnership with the Innovative Manufacturing CRC and the South Australian Government. One manifestation of this has been the establishment of the Tonsley Manufacturing Innovation Hub focusing on advanced manufacturing technologies in combination with high performance workplaces systems. Flinders University in partnership with the State Government are currently using Tonsley as a test site for autonomous vehicles.

Tonsley is home to leading companies with a strong interest in energy technologies and advanced manufacturing including Zen Energy, Siemens, Tesla and SAGE Automation. These companies are joined by numerous technology start-ups supported by Flinders University.

In summary, Tonsley is the ideal site for establishment of an FMC to help drive the uptake diffusion of EV and autonomous vehicles and support the development of the EV and autonomous vehicle industry in Australia. A conceptual model of the FMC is presented below, providing an opportunity for the community to be better informed and experience future mobility options including EVs and AVs. A range of EVs and or AVs would be based at Tonsley including:

- Flinders University FLEX shuttle
 - 100% electric Autonomous shuttle
- Aurrigo Pod
 - 100% electric Autonomous Pod
- Mitsubishi Outlander PHEV
 - Tonsley current head office of Mitsubishi Motors
- Tesla
 - Tonsley is the base for mycar green operations

“FMC” – Concept



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