



ARENA Submission to the Parliamentary Inquiry into Automated Mass Transit

Thank you for the invitation to make a contribution to this inquiry. Our submission seeks to provide the committee with project and broader industry insights in relation the Inquiry's Terms of Reference.

About ARENA

ARENA was established to make renewable energy solutions more affordable and to increase the supply of renewable energy in Australia.

ARENA provides financial assistance to support innovation and the commercialisation of renewable energy and enabling technologies by helping to overcome technical and commercial barriers. A key part of ARENA's role is to collect, store and disseminate knowledge gained from the projects and activities it supports for use by the wider industry and Australia's energy market institutions.

ARENA's interest in transport

ARENA established its four investment priorities in May 2017. Of these, two, Improving Energy Productivity and Exporting Renewable Energy are relevant to the Inquiry as they encompass renewable energy alternatives in the transport sector:

- Under the **Improving Energy Productivity** priority, ARENA aims to demonstrate how different technologies and approaches (including electrification and fuel switching to renewable energy sources) can reduce costs for consumers, while increasing the competitiveness and uptake of renewable energy, including in the transport sector.
- The **Exporting Renewable Energy** priority is about creating new, scalable export value chains in renewable energy. In this context, ARENA has been supporting the development and use of hydrogen across the entire value chain, including for transport uses.

The *Australian Renewable Energy Agency Act 2011*, provides that ARENA can direct financial assistance (grants) to research, development, demonstration, commercialisation and deployment of renewable energy technologies and the storage and sharing of information and knowledge about these technologies. Renewable energy technologies include "hybrid", "enabling" or "related" technologies. These can include technologies and approaches such as energy storage, load shifting, electrification, fuel switching and energy efficiency, where these use, enable or support greater deployment of renewable energy.

Relevant ARENA projects

While ARENA has not directly funded mass transport projects, we have supported projects that contribute to an understanding of how renewable energy technologies may be incorporated into mass transport systems in the future.

Chargefox Ultra-rapid EV Charging Network.

ARENA has provided \$6 million of funding to this \$15 million project which will establish Australia's first ultra-fast electric vehicle charging network. Under the project 21 charging sites on interstate highways across the east coast and separately north and south of Perth will be constructed. All the 150kW charging stations will be powered through the purchase of renewable energy. This project is relevant because, although the network will be for private vehicles, it will provide an Australian demonstration of the size of chargers (high kW capacity) that will likely be required for mass transit uses as well as a demonstration of how renewable energy can be used to 'fuel' the vehicles.

Jemena Power to Gas Demonstration

ARENA has provided \$7.5 million of funding to this \$15 million project which will involve the design and construction of a Power to Gas facility which will source renewable electricity and convert it into hydrogen via electrolysis. While the majority of the hydrogen produced will be injected into the gas network, some will be used for electricity generation and in an onsite hydrogen refuelling station. This project is relevant because it will demonstrate the production and use of zero emission hydrogen as a transport fuel in Australia.

More information on these projects, and other ARENA supported projects the Inquiry may find relevant, is available on the ARENA website www.arena.gov.au.

Potential alternative fuels for mass transit

The current use of alternative fuels (electricity or hydrogen produced from renewable energy) for mass transit is limited in Australia and there is significant potential for Australia to learn from the global experience. This includes:

- Hydrogen trains (early proof of concept stage)
 - Hydrogen trains are potentially a zero carbon alternative to diesel powered trains for long distance routes, and do not require the installation of new (and potentially expensive) electricity infrastructure.
 - There are currently two Alstrom-built hydrogen powered trains being trialled and operating in Germany. This demonstration is expected to lead to further deployment in Germany and France.
- Hydrogen buses (demonstration, early deployment stage)
 - Hydrogen buses may be one of the earliest opportunities for hydrogen-powered vehicles, due to the ability to use 'back-to-base' fueling which can support higher utilisations of centralised fueling infrastructure, thereby reducing costs. The refueling times for hydrogen buses are equivalent to conventional fuels, which can improve bus fleet availability during peak times (compared with recharging battery electric buses).

- Hydrogen buses are currently involved in multiple demonstrations and small-scale deployments globally, predominantly in Europe, but also in China.
- Electric buses (deployment stage)
 - Electric buses are currently being deployed in large numbers, especially in China (382,000 in 2017¹) but in a more limited fashion elsewhere. A number of Australian state and territory governments are progressing electric bus trials.

While there are varying levels of technology development and commercial maturity, alternative fuelled mass transit is certainly past the 'concept' stage and is being pursued in various ways internationally. This suggests that Australia can focus on demonstration, trialling and implementation utilising existing early stage or mature commercial solutions.

Contact information

ARENA is happy to support the inquiry by providing further information on relevant projects within our portfolio. Please contact Scott Belmann (scott.belmann@arena.gov.au, 0424 967 898) if we can be of any further assistance.

¹ Bloomberg New Energy Finance (2018) Long Term Electric Vehicle Outlook 2018