



LEGISLATIVE ASSEMBLY

Committee on Transport and Infrastructure

Emission free modes of public transport

Questions for the Australasian Railway Association

1. What do you consider to be the major challenges in decreasing emissions output in the passenger rail sector?

- Most of the passenger rail sector in Australia operates on electrified networks, which means that the primary challenge (and opportunity) is to decarbonise through transition to renewable energy sources and offsets.
 - New South Wales has moved to net zero emissions from electricity consumption across the Sydney Trains network through an offset program.
 - Melbourne's metro and tram network will move to 100 per cent renewable by 2025
 - Canberra Light Rail aims to source 100 per cent of electricity from renewable sources through design initiatives such as solar panels on the roof of light rail depot, solar powered lights, and regenerative braking technology. Any residual emissions will be offset to create a carbon neutral project.
- Beyond renewable energy offsets for electrified networks, there is also consideration of integrating battery and potentially hydrogen technology into both passenger and freight locomotives. This may be more applicable for regional networks, where electrification is not as cost effective.
- Decarbonised rolling stock (and associated infrastructure) through electrification, reducing traction and auxiliary energy use, and new technology, would represent a step change to reducing Australia's transport carbon emissions. While there are already zero emissions transport options in the market the challenge is range, particularly on regional routes. Identifying appropriate fuel production, maintenance and depot requirements needs to be part of implementing new technologies.
- One of the major challenges in this space is the supporting mechanisms of standards, safety protocols and regulations are yet to be developed.
- The other significant challenge is the interoperability of new and old technologies/assets, particularly when new systems are retrofitted into ageing rollingstock. In addition, fuel cell or battery replacements may be costly over the lifetime of the asset (up to 40 years potentially) due to regular replacement needs.
- Coordinated investment and planning into research and trials is needed to determine the most appropriate use of energy for the various network requirements (including length and gradient of track, number of stops, energy storage as part of network design; refuelling/recharging requirements; interoperability for various types of powered rollingstock).
- The investment into new energy infrastructure is likely to be substantial. As such zero emissions transport needs to be appropriately valued by the client and customers , otherwise policy settings will need to support or incentivise commercial decisions.

- In the first instance, energy needs to be appropriately costed by transport agencies. The general trend is to buy offsets as opposed to adopting green technologies.

2. Can you outline some of the key findings or recommendations from the recent *Journey to net-zero* report that could be implemented by the NSW Government?

- The *Journey to Net Zero* report outlines a total of 46 recommendations under five overarching key areas. Some of the recommendations require action from governments, others require actions from industry, and many require industry and government to collaborate. The report identifies the relevant stakeholder groups against each action, which will be a useful guide for the NSW Government in considering its public transport policies.
- Of particular note are the recommendations related to placemaking, which is the first step in developing a sustainable transport network.
 - Effective placemaking can limit people's need to travel to work, school or to access services, and encourage active transport such as walking or cycling.
 - It can also promote mode shift from private vehicle use to more sustainable public transport modes (such as rail), reducing transport emissions in the process.
 - Placemaking has the potential not just to promote public and active transport use, but to consider how to integrate appropriate supporting infrastructure to maximise the use of emissions free public transport options as they become available.
- The NSW Government should also give consideration to the recommendations regarding the importance of having the right policies and incentives in place to support investment in innovation and technology for renewable energy, sustainable materials and manufacturing.

3. Does the rail industry use sources of renewable energy or take other steps to offset the emissions caused by electricity generation?

- As mentioned previously, Sydney Trains was the first Australian passenger rail operator to move to net zero emissions through a dedicated offset program, with Melbourne's metro trains and trams aiming to be completely offset by renewable energy by 2025, and Canberra Metro's light rail system will be powered by renewable energy.
- In the US and Europe, trials of hydrogen passenger trains are underway, and trials for hydrogen trams in Korea are commencing in 2023.
- The implementation of hydrogen passenger trains commenced in Germany in 2018, as well as hydrogen fuel cell powered rail track maintenance machines in operation.
- The US are currently reviewing hydrogen fuel cell design standards for adoption in the rail sector.
- In Australia, it may be necessary to start small with dedicated, discrete trial corridors and building from there if successful, and potentially introducing hydrogen fuel cell track maintenance machines before passenger trains.
- However, there are parts of the rail network that cannot be easily electrified, or where alternative approaches may be more suitable, and a continued focus on new technologies to support a move to emissions free public transport is needed.
- When considering hydrogen trains, it is important to also consider the need for a ready supply of hydrogen, preferably green hydrogen, in Australia
- It is understood Wollongong has been identified as a hydrogen hub and may help address this need.
- Interim measures such as low emission diesel fuel of hydrogen vegetable oil (HVO) fuels may also be considered. In the case of HVOs are imported, and costs in Australia are

significant higher than overseas. There may therefore be a case for incentivizing the adoption of low emissions fuels or transitional technology to support the journey to net-zero.

4. Can improved efficiency in services, such as through timetabling or improved signalling, reduce the emissions produced by passenger rail networks?

- Decarbonisation of rollingstock can be achieved using different approaches.
- A transition to new and more efficient refrigerants for HVACs systems and the introduction of intelligent controls for these systems, together with better insulation of the vehicle, would maintain performance reliability and comfort for passengers, yet be more environmentally responsive.
- The potential now offered by intelligent digital data systems to improve driving modes, whether computer assisted or not, would mean braking and acceleration could be minimised, saving on traction energy. Computerised assistance also reduces braking needs.
- Even the simplest considerations, like straightening a track can support increased energy efficient transport movements.
- The *Journey to Net Zero* report also notes the importance of optimising the existing transport system as one of the more immediate solutions to reducing emissions.
 - The report notes the example of optimising rolling stock operations can be as simple as improving the way they are driven, which can reduce their energy consumption, related emissions and costs.
 - Driver Advisory Systems (DAS) inform the driver of the optimal travel speed to arrive on time, while also using the least amount of energy. 'Connected' systems (CDAS) extend this capability by enabling communications with a central control system that monitors train performance and can update train schedules in real-time.
 - An award-winning C-DAS technology developed in Australia is Trapeze Group's TTG Energymiser, which to date has been installed on more than 8,000 train and driver applications across 80,000 km of track in 10 nations and four continents, and consistently delivers 10-12 per cent reductions in energy consumption when deployed on rail networks. The technology can be implemented on any train including diesel, electric, high-speed, freight and heavy haul, and works by reinforcing good driving behaviour, providing drivers with information to make accurate and consistent driving decisions. It does not direct drivers on what to do – it simply provides advice based on track characteristics and the timetable.
- In Australia, implementing these types of systems presents a challenge. Traditional procurement models for rolling stock and train control systems do not provide a whole of system approach. This new technology for monitoring and control spans the systems that integrate rolling stock and the train control itself. It is timely for the states to review this current approach to realise the savings available, both financially and in terms of carbon emissions.

5. Are any other Australian jurisdictions planning to convert diesel-powered trains to hybrid or electric?

- There are a number of current international providers of emission free rollingstock,
- TfNSW and Queensland Rail have shown interest in undertaking a demonstration version of hydrogen technology.

- Queensland Rail is undertaking a trial to replace a local tourist diesel train to a battery operated train.
- Back-up batteries are currently used in some light rail networks instances where backup is needed.
- Wabtec, among other companies, are working in the freight sector to undertake trials in converting diesel powered trains to hybrid battery.
- An integrated approach to public sector energy needs to be considered to maximise infrastructure investment. In planning for emissions free public transport, the use of emissions free vehicles for maintenance and other supporting activities should also be considered

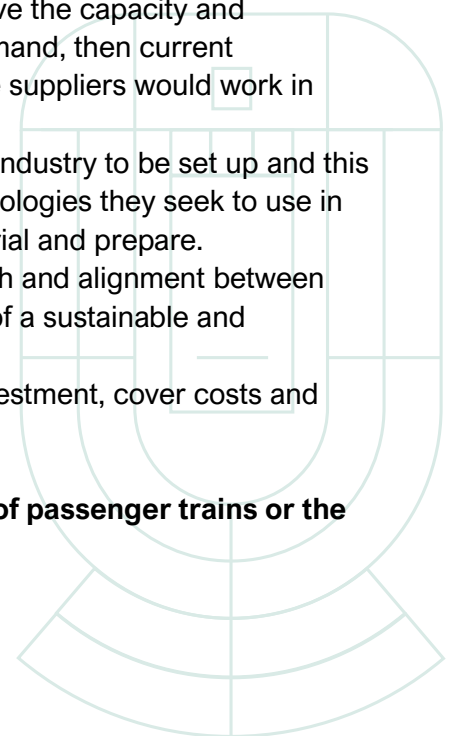
a. Noting that Alstom have supplied hydrogen-powered passenger trains for regional routes in Germany, can hydrogen play a role in improving the efficiency of NSW's rail network?

- It is the ARA's understanding that Transport for NSW undertook a feasibility study process to explore the potential to introduce hydrogen trains in the NSW regional network earlier this year.

6. What are the benefits of manufacturing trains in Australia?

- Manufacturing trains locally in Australia provides a multitude of benefits, for the economy, the community, and the governments procuring the train assets.
- Local manufacturing provides a significant economic boost, through creation of local jobs as well as investment in local suppliers and facilities.
- It arguably allows for a high degree of quality control and design specifications that ensure the rollingstock are constructed and tested for Australia's rail conditions.
- It provides an opportunity to establish locally based ongoing maintenance and supply facilities to ensure the rollingstock remains fully operational and can be repaired quickly and returned to service.
- It should also be noted that rollingstock builders in Australia have the capacity and capability to deliver emissions-free rollingstock. If there is a demand, then current manufacturing facilities in Australian can be adapted, and these suppliers would work in partnership with these technology providers.
- But there needs to be a consistent demand pipeline for a local industry to be set up and this requires governments and purchasers to determine what technologies they seek to use in what circumstances, and to partner with industry to research, trial and prepare.
- However, the most critical factor is ensuring a national approach and alignment between jurisdictions as this is the only way to justify the establishment of a sustainable and prosperous local train manufacturing market.
- A sustainable pipeline of procurement is required to enable investment, cover costs and ensure the sustainability of the local manufacturing industry.

7. Are NSW-based manufacturers engaged in the production of passenger trains or the components and systems required to build them?



a. Are there any regulatory or administrative barriers that are slowing the development of rail manufacturing in NSW?

- The ARA's Towards a National Local Content [Policy](#) report released in September 2022 highlights the significant challenges for Australian rail manufacturers, due to state-based rail procurement's varying investment and procurement processes as well as planning and policy development. The ARA encourages an approach that does not limit the effectiveness of the rail manufacturing supply chain in Australia by supporting NSW based manufacturers at the expense of other Australian based manufacturers, or encourage the establishment of facilities by suppliers which could lead to duplication and limit manufacturing efficiencies. A national approach is an imperative to justify establishing a local market.

b. Are there particular regions in NSW that could be developed as hubs for local rail manufacturing, such as those with appropriately skilled workforces or access to necessary infrastructure?

- There is existing local capability (skills and facilities) in NSW and across all Australian states. The ARA's [Rail Supply Chain Report](#) released in 2021 highlights the location of rail suppliers across Australian jurisdictions. A 100% local build is not possible, but rather a maximum of 70% local content. However, there needs to be consistent demand pipeline for a local industry to be set up.
- Jurisdictions need to be clear on what technologies they are seeking to invest in and provide clear signals and information for the market to gear up and respond.
- It is important this aligns with other states for opportunities to be capitalised by local manufacturers. It is important that capability is not duplicated in each state, as this reduces opportunities of investment and viability.
- It's expected to take three years to manufacture hydrogen passenger trains.

c. What could the NSW Government contribute to the development of locally-built passenger trains?

- Clear targets and commitments by Government are required. The ARA encourages NSW to partner with other jurisdictions and rail suppliers to collaborate on research, trials and planning for the roll out of emissions free transport.
- This opportunity could bring about sector-wide collaboration and policies with a plan that anchors the role of rail in decarbonisation.
- Many other countries around the world working on commercialising emissions free trains and trams and locos are engaging in a partnership between government, industry and academic institutions, with dedicated public research funding.

8. Is there much co-operation between the Commonwealth and states or territories on emissions reduction in the rail sector, or in the local manufacture of passenger trains?

- While there hasn't been a great deal of specific coordination between the Commonwealth and jurisdictions on emissions reductions in the rail sector or local manufacture of passenger trains, there is certainly an opportunity to do so.

- This may be most appropriately pursued through the Infrastructure and Transport Ministers Meeting (ITMM), which includes the relevant Ministers from each jurisdiction and Chaired by the Commonwealth Minister for Infrastructure, Transport, Regional Development and Local Government.
- This forum also oversees the National Rail Action Plan, which is progress through the National Transport Commission. The plan currently has three key focus areas (Interoperability, Skills and Labour, and Harmonisation of standards). There may be opportunity to expand the focus to cover procurement (including local manufacture of trains) and potentially emissions reduction.

a. What steps can be taken to drive a national approach to improving the rail network, including by reducing emissions?

- To support a thriving local rail industry, you need to have a sustainable pipeline and coordination across jurisdictions.
- It is important that federal and state governments support this coordination (rather than duplicate or compete), to enable rail suppliers and the broader industry to innovate and grow.
- The development of new rollingstock provides an opportunity for harmonisation across Australia. National (or preferably international) standards and requirements should be adopted where possible to maximise investment, opportunities and the local market for local rail manufacturers.
- Harmonised rail procurement across jurisdictions is vital. The adoption of these new technologies would provide the opportunity to deliver a standardised national approach.
- Local rail manufacturers need commercialisation and trial opportunities with clients, and governments need to lead this engagement. Procurement is the only tangible mechanism to signal to the market on where investment needs to be made and what needs to be delivered.

