Committee on
Transport and Infrastructure

LEGISLATIVE
ASSEMBLY

Emission free modes of public transport

Report 3/57 – November 2022

New South Wales Parliamentary Library cataloguing-in-publication data:

A catalogue record for this
book is available from the
National Library of Australia

ISBN: 978-1-925214-30-7

The motto of the coat of arms for the state of New South Wales is “Orta recens quam pura nites”. It is written in Latin and means “newly risen, how brightly you shine”.

Contents

Membership

Chair	Mr Tim James MP, Member for Willoughby
Deputy Chair	Mr Mark Taylor MP, Member for Seven Hills
Members	Ms Jo Haylen MP, Member for Summer Hill Dr Marjorie O'Neill MP, Member for Coogee The Hon. Melinda Pavey MP, Member for Oxley
Contact details	Legislative Assembly Committee on Transport and Infrastructure Parliament House Macquarie Street SYDNEY NSW 2000
Telephone	(02) 9230-2312
E-mail	transportinfrastructure@parliament.nsw.gov.au
Website	www.parliament.nsw.gov.au/transportandinfrastructure

Chair's foreword

In May 2022, the Committee on Transport and Infrastructure self-referred an inquiry into emission free modes of public transport.

We received 29 submissions from government agencies, transport manufacturers and operators, non-government organisations, unions, academics and members of the public. On 19 August 2022, we held a public hearing and heard evidence from 14 organisations. We also conducted site visits to the facilities of bus and ferry manufacturers in regional and metropolitan NSW. We are particularly grateful to these organisations and discuss the visits in further detail in appendix six.

This report investigates the long-term feasibility of emission free modes of public transport, with a focus on buses, ferries and trains. The Committee wanted to understand the capacity and capabilities of local manufacturers, and the challenges they may encounter when developing and producing emission free vehicles for use on the NSW public transport network. We asked stakeholders about the benefits and the costs of transitioning to emission free modes of public transport, and we were particularly interested to learn about what other jurisdictions, in Australia and overseas, are doing to reduce public transport emissions.

Chapter one focuses on the transition to an electric bus fleet in NSW, and the ways that local manufacturers could be supported by government in achieving this transition. NSW has recently made progress in reducing public transport emissions, including plans to fully replace the diesel bus fleet with zero emission alternatives. However, if local manufacturers are to lead the way in supplying buses to the Transport for NSW (TfNSW) fleet, there are several issues that need to be resolved.

The Committee made recommendations that focus on how TfNSW procures buses from local manufacturers. We recommend that TfNSW review the bus specifications that manufacturers are required to meet, in consultation with local manufacturers. We also recommend that TfNSW develop a procurement model that provides greater long-term certainty to manufacturers and avoids fluctuating levels of demand.

We heard that ensuring adequate labour capacity for zero emission bus manufacturers will be challenging in the years ahead. The Committee recommends that TfNSW work with government education agencies to support the training and education of workers involved in producing and maintaining the electric bus fleet. We also heard upgrades to electrical infrastructure will need to keep pace with the deployment of zero emission buses. We recommend that TfNSW review its strategy for constructing, upgrading and converting bus depots and local electricity infrastructure, with a particular emphasis on establishing a timeline for depot upgrades.

In chapter two, the report explores how emissions can be reduced from ferries operating on the NSW public transport network. Stakeholders outlined various technological and operational challenges involved in electrifying the NSW ferry fleet. This includes the need to develop charging infrastructure and refine timetables.

For these reasons, our recommendations regarding ferry emissions are forward-looking. Electric ferry technology is still in a developmental phase, and other jurisdictions are yet to fully electrify their fleets. We recommend that while technology is improving and construction costs are decreasing, TfNSW use this time to develop effective strategies to support the introduction of emission free or lower emission ferries in the future.

This includes conducting and publishing analyses to identify the most appropriate strategy for transitioning to an emission free ferry fleet. The Committee highlighted that particular consideration should be given to whether procuring fully electric ferries should be prioritised, or whether hybrid ferries can be used as a medium-term solution. Similarly, we recommend that TfNSW conduct analyses that identify what infrastructure upgrades and timetable refinements will be required for operating emission free or lower emission vessels for public ferry transport.

Chapter three examines how emissions from the public train network can be reduced. The Committee would like to acknowledge the Australasian Railway Association's contributions to the inquiry, as the peak body representing rail manufacturers, suppliers and operators in Australia.

For trains operating in metropolitan areas, reducing emissions is partly reliant on the decarbonisation of the electricity grid that powers their operation. We were encouraged to find that TfNSW has made significant progress in offsetting the emissions generated by Sydney Trains, NSW TrainLink and Sydney Metro by purchasing green electricity. For example, Sydney Trains has become the first passenger rail operator in Australia to achieve 100 per cent net zero emissions.

We also heard that greater government support could be provided to local manufacturers engaged in the Australian rail manufacturing supply chain, and that there would be benefits to doing so. The Committee recommends that the NSW Government introduce incentives and support to develop the capacity of NSW-based manufacturers. We also recommend that TfNSW develop a medium-term strategy for potential deployment of hydrogen-powered trains, particularly in relation to longer regional routes where electrified rail corridors may not be practical.

Chapter four explores some broader considerations involved in reducing emissions from public transport, and further actions that could be taken to support transport manufacturers. Stakeholders told us that an immediate measure to reduce overall transport emissions is to increase the number of people that use the public transport network. Residents of Greater Sydney, in particular, frequently use private vehicles with internal combustion engines as their primary mode of transport.

The Committee recommends that the NSW Government targets an increase in the proportion of people using public transport in NSW in the next five to ten years, and works with other government stakeholders to reduce reliance on private vehicles. Consideration should be given to how service quality and access to the public transport network can be improved, and how people can be encouraged to use public transport in preference to private vehicles.

We also heard that supporting NSW-based manufacturers may require greater co-ordination between the NSW Government, Australian Government and other states and territories. This includes pursuing collaborative, rather than competitive, relationships between states and

territories. The Committee recommends that the NSW Government work with the Australian Government and other states and territories to develop a co-ordinated and nationally consistent approach to the local manufacture of emission free modes of public transport.

The Committee is grateful for the submissions we received from stakeholders, and we would like to thank the witnesses who appeared during the public hearing in August 2022. We also acknowledge Express Coach Builders, Birdon, Custom Denning and Nexport for their hospitality and sharing their expertise with us during our site visits in August and September.

I would like to thank my colleagues on the Committee for their valuable contributions throughout the inquiry process. I would also like to thank the Committee secretariat for their professionalism and support throughout the inquiry.

Tim James MP
Chair

Findings and recommendations

Chapter One – Supporting local manufacturers in the transition from diesel to zero emission buses

Introduction

1.1 The electrification of NSW's bus fleet represents a significant opportunity to reduce public transport emissions. However, the transition to an electric fleet ecosystem is complex and costly, and requires careful coordination of several elements.

1.2 Throughout this inquiry, the Committee heard from government, industry and experts about NSW's bus fleet conversion and the unique challenges it brings. This chapter discusses the issues stakeholders raised.

Replacing the diesel fleet

1.3 Transport for NSW (TfNSW) told the Committee that its *Future Energy Strategy* aims to support the sector's transition to net zero emissions by 2050, and to use sustainable sources to secure the energy needs of the NSW public transport network. A central pillar of the *Strategy* is to reduce emissions by transitioning the state's entire diesel-powered bus fleet to zero-emission buses (ZEBs).[1] Battery electric buses and hydrogen fuel cell buses are examples of zero-emission technology.

1.4 There are currently around 120 ZEBs in operation around the state.[2] TfNSW's rollout plan for the state's 8000-bus fleet aims to transition Greater Sydney buses to zero emission alternatives by 2035, outer metropolitan by 2040 and regional NSW by 2047.[3]

1.5 In its 2022-23 Budget, the NSW Government committed $218.9 million over seven years to support electrical upgrades at 11 depots in Greater Sydney, to construct a new depot and to initiate procurement of around 1100 electric buses and charging infrastructure.[4]

1.6 Stakeholders noted the various benefits that will come with the transition to an emissions free fleet, including:

- improved public perception of bus travel
- improved passenger comfort

[1] Submission 25, Transport for NSW, p 3.

[2] Submission 25, p 4.

[3] Transport for NSW, *Zero emission bus transition enters new gear*, media release, 21 June 2022, viewed 21 October 2022.

[4] Submission 25, p 8.

- better health outcomes for the community and reduced health costs associated with pollution
- operational savings
- more job opportunities in the automotive manufacturing industry
- alignment with national and international decarbonisation commitments.[5]

1.7 The Committee heard that although NSW is leading the nation in its conversion of buses to zero emissions, in an international context, we are lagging behind many cities in Europe and Asia.[6]

1.8 Stakeholders told us that there is more work to be done. We heard that the transition presents a number of challenges for operators and manufacturers, particularly the need to improve procurement processes, develop a skilled workforce, and accelerate upgrades to bus depots and electrical infrastructure. These issues are discussed in the following sections.

1.9 The Committee heard that, while hydrogen-powered buses also offer substantial potential for reducing emissions caused by public buses, electrifying the bus fleet represents a more practical goal in the short-term. As a result, this chapter focuses on electric buses.

1.10 In a hydrogen bus, hydrogen tanks feed a fuel cell, eliminating the need for an external charge. Mr Jon Tozer, Business Development Manager, Volgren Australia, told the Committee that hydrogen fuel cell technology 'is probably three to four years behind where the electric is in regard to learnings.' Mr Tozer also noted the global shortage of hydrogen refuellers and high cost of refuelling a hydrogen bus.[7] Transdev submitted that 'the hydrogen industry is relatively underdeveloped in Australia'.[8]

1.11 Notwithstanding these limitations, the Committee recognises the important contribution hydrogen-powered technology could make to a zero emission future in NSW. The potential for hydrogen-powered passenger rail in NSW, for example, and the challenges of developing the necessary hydrogen refining and refuelling infrastructure, are considered in chapter 3 of this report.

[5] Submission 22, Nexport, p 3; Submission 24, BusNSW, p 7; Professor David Levinson, Professor of Transport in the School of Civil Engineering, University of Sydney Net Zero Initiative, Transcript of evidence, 19 August 2022, p 8; Mr Matt Threlkeld, Executive Director, BusNSW, Transcript of evidence, 19 August 2022, p 26.

[6] Professor Levinson, Transcript of evidence, 19 August 2022, p 9; Mr Cameron Rimington, Senior Project Manager, Transport, Climateworks Centre, Transcript of evidence, 19 August 2022, p 10.

[7] Mr Jon Tozer, Business Development Manager, Volgren Australia Pty Ltd, Transcript of evidence, 19 August 2022, p 6.

[8] Submission 28, Transdev Australasia Pty Ltd, p 8.

Supporting local manufacturers through reforms to procurement and industry standards

Recommendation 1

That Transport for NSW review the bus specifications for Procurement Panel 4 within one year of its publication, through sustained and meaningful consultation with local manufacturers.

Recommendation 2

Future panels should develop specifications that support the competitiveness of local manufacturers, while facilitating the rapid transition to a zero emission bus fleet.

1.12 Stakeholders outlined several issues with bus procurement in NSW, which may limit the capability and capacity of local manufacturers to supply buses to the TfNSW fleet.

1.13 In NSW, private bus operators must purchase buses for government-contracted services from a procurement panel (Procurement Panel Three).[9] The panel contains specifications and a list of approved manufacturers for seven bus types (including zero emission buses). Buses listed on this panel have pre-approval from TfNSW. A new panel of specifications (Procurement Panel Four) is due to commence in 2023.[10]

1.14 Industry stakeholders told the Committee that consultation on Procurement Panel Four was limited.[11] However, in his evidence to the Committee, Mr Howard Collins, Chief Operations Officer, Transport for NSW, said, 'We do consult, and we have spoken to a number of people who contribute towards [the procurement panel]'.[12]

1.15 Some stakeholders anticipated that the fire safety standards on Procurement Panel Four will be higher than they are currently, and may result in a more costly product and reduced efficiency.[13] However, TfNSW advised the Committee that it is allowing time for further feedback on whether these requirements will be included in Procurement Panel Four.[14]

1.16 Mr Tozer, Volgren Australia, expressed concern that increasing fire safety standards under Procurement Panel Four could reduce buses' passenger capacity. Fire materials are particularly heavy and every 60 kilograms in material added to the vehicle results in one less passenger.[15]

---

[9] Transport for NSW, TfNSW Bus Procurement Panel, viewed 24 October 2022.

[10] Submission 24, p 9.

[11] Mr Threlkeld, Transcript of evidence, 19 August 2022, p 28.

[12] Mr Collins, Transcript of evidence, 19 August 2022, p 37.

[13] Mr Scott Dunn, Managing Director, Custom Denning, Transcript of evidence, 19 August 2022, p 5; Mr Tozer, Transcript of evidence, 19 August 2022, p 6; Mr Threlkeld, Transcript of evidence, 19 August 2022, p 28.

[14] Mr Collins, Transcript of evidence, 19 August 2022, p 37.

[15] Mr Tozer, Transcript of evidence, 19 August 2022, p 6.

1.17 NSW's standards for buses already exceed those of other states. This includes, for example, technical specifications relating to bus door safety systems and school bus flashing lights.[16] Witnesses from Volgren and Custom Denning told us that specifications such as these can mean that the overall cost of supplying a bus in NSW is higher than elsewhere in Australia.[17]

1.18 Volgren informed the Committee that, although it is actively seeking to increase its local content percentage, the specialised requirements for buses mean it is not always viable for a local manufacturer to produce the component.[18] Custom Denning, which produces the only bus fully designed and built in Australia, also expressed concern at the impact of increased safety specifications. Mr Scott Dunn, Managing Director, Custom Denning, said:

> We have a very high spec in New South Wales—more than any other state… On panel four, the standards are going to be even higher when there's no need to make them higher, which is going to make the product even more expensive, which I don't actually agree with. I think that's a problem, personally…[19]

1.19 BusNSW submitted that any local content targets for bus manufacturing need to be clearly established as part of the next procurement panel. Some suppliers that import buses, chassis and other components are concerned that, although the NSW Government and Opposition have expressed a preference for local content, the precise requirements are unclear. Any 'local content targets' would need to be supported by an auditing regime to ensure a fair and consistent approach.[20]

1.20 The Committee recommends that TfNSW review Procurement Panel Four within one year of its publication, to ensure it is effective in supporting local manufacturing and creating jobs, as well as aiding the transition to a zero emissions fleet. The review should be informed by robust consultation with the local manufacturing sector.

1.21 We also recommend that future procurement panels should develop specifications that support the competitiveness of local manufacturers, while facilitating the rapid transition to a zero emission bus fleet

Consistency and certainty in procurement

Recommendation 3

That Transport for NSW develops a procurement model for zero emission buses that provides manufacturers with greater long-term certainty and enables more consistent levels of demand.

[16] Mr Threlkeld, Transcript of evidence, 19 August 2022, p 28.

[17] Mr Tozer, Transcript of evidence, 19 August 2022, p 5; Mr Dunn, Transcript of evidence, 19 August 2022, p 5.

[18] Answers to supplementary questions, Volgren Australia Pty Ltd, 14 September 2022, p 1.

[19] Mr Dunn, Transcript of evidence, 19 August 2022, p 5.

[20] Submission 24, p 9.

1.22 We also heard from several inquiry participants that ebbs and flows in procurement of buses create uncertainty for manufacturing businesses and their employees.[21]

1.23 In its submission to the inquiry, Custom Denning highlighted that it currently has capacity to manufacture 440 buses per year. For the past two years, the company has built around 60 buses per year, equating to around 14 per cent of current capacity. The number will increase to 160 – or 36 per cent of actual capacity – this year. It is important for industry to have 'consistent demand and long lead times when orders are placed'.[22]

1.24 BusNSW underscored the 'highly variable' nature of bus and coach procurement. The annual number of new bus deliveries in NSW between 2007-2021 has ranged from 250 to 700. This has resulted in cases where manufacturers have had to increase and upskill staff in periods of high demand, only to let them go within a number of years due to a drop in order numbers.[23]

1.25 Mr Tozer, Volgren Australia provided an example of the impacts of this variability in procurement. Volgren's manufacturing facility in Tomago, near Newcastle, was forced to close in 2010 due to a high fluctuation in bus orders from the NSW Government. This variability rendered the facility unsustainable.[24]

1.26 Long-term, consistent demand will also benefit local manufacturing by supporting better skills training. Custom Denning pointed out that more stable demand would help to create high voltage vehicle manufacturing expertise, drive investment in the local supply chain and enable businesses to compete internationally in the electric bus market.[25]

1.27 The production of chassis is an area where there is significant opportunity to grow local jobs and knowledge. Of the 1041 buses documented as sold in Australia in 2021, only 15 had chassis that were built in Australia. This is in contrast to the 611 buses that had their body built wholly in Australia.[26]

1.28 According to Custom Denning, the IP for technology remains with chassis builders. This limits Australia from advancing current learning beyond constructing bus bodies.[27] Volgren also supported any government effort to encourage chassis manufacturers to assemble in Australia, in order to provide jobs and reduce shipping costs.[28]

---

[21] Mr Dunn, Transcript of evidence, 19 August 2022, p 2; Mr Sid Rallapalli, Head of Global Partnerships, Nexport Pty Ltd, Transcript of evidence, 19 August 2022, p 2; Mr Tozer, Transcript of evidence, 19 August 2022, p 2; Mr Threlkeld, Transcript of evidence, 19 August 2022, p 30.

[22] Submission 27, Custom Denning, pp 2, 5.

[23] Submission 24, p 9; Mr Threlkeld, Transcript of evidence, 19 August 2022, p 30.

[24] Mr Tozer, Transcript of evidence, 19 August 2022, p 4.

[25] Answers to supplementary questions, Custom Denning, 20 September 2022, p 2.

[26] Answers to supplementary questions, Volgren Australia Pty Ltd, 14 September 2022, p 1.

[27] Answers to supplementary questions, Custom Denning, 20 September 2022p 2.

[28] Answers to supplementary questions, Volgren Australia Pty Ltd, 14 September 2022, p 1.

1.29 The transition to zero emission buses presents the NSW Government with the opportunity to give longer-term certainty to bus manufacturers, and the industry more broadly, by creating a 'smooth supply pipeline'.[29]

1.30 We recommend that TfNSW strategically plan future bus procurements to allow for greater consistency in demand. This would provide assurance and stability to bus manufacturers, as well as attract more manufacturing to NSW in the long term.

Developing a local workforce for building, operating and maintaining the electric bus fleet

Recommendation 4

That Transport for NSW work with TAFE NSW and the Department of Education to support the development of a skilled workforce for building, operating and maintaining the electric bus fleet. This strategy should consider building this labour capacity in regional NSW in addition to metropolitan areas.

1.31 Labour and skills shortages in the Australian market pose a challenge for bus manufacturers, particularly as they prepare for a rapid transition to ZEBs. Auto electrical skills are in particularly high demand.[30] Mr Yuri Tessari, Chief Commercial Officer, Volgren Australia Pty Ltd, told the Committee:

> ...finding labour in Australia at the moment has proven to be very, very difficult… We have been hiring since November last year for a ramp-up, and the job rotation is massive because it is basically the same people in the country just moving across from company to company. So the skills are here, but we have demand for more skills, and this is where I think if we have to ramp up at a very quick pace, we might struggle with finding the labour on time.[31]

1.32 The Committee also met with regional stakeholders during its site visits, who reported that finding and retaining skilled labourers can be challenging for ZEB manufacturers outside metropolitan areas.

1.33 Bus & Coach International submitted that young auto electricians should be encouraged to specialise in electric vehicle technology through TAFE programs. Given the anticipated need to supply a greater volume of buses, this would enhance their job prospects.[32]

1.34 TAFE NSW is offering a new program of training to prepare the industry for the transition to ZEBs, particularly electric buses. The training comprises three levels. The first is baseline training and consists of four modules. The second level is for maintenance operations staff and involves units on de-powering and re-initialising battery electric vehicles, and servicing and maintaining battery electric

[29] Mr Threlkeld, Transcript of evidence, 19 August 2022, p 30.

[30] Mr Yuri Tessari, Chief Commercial Officer, Volgren Australia Pty Ltd, Transcript of evidence, 19 August 2022, p 7.

[31] Mr Tessari, Transcript of evidence, 19 August 2022, p 7.

[32] Submission 5, Bus & Coach International Pty Ltd, p 3.

vehicles. Further work is being done to develop a third level to train master service technicians for electric vehicles.[33]

1.35 The Committee heard examples of bus manufacturers employing local apprentices and forging partnerships with schools and tertiary education institutions. Custom Denning, which employs between 20 and 30 apprentices each year, hosts monthly visits from local schools to encourage students to consider an apprenticeship.[34] Nexport is also partnering with the University of New South Wales to allow engineering students to learn on the job in their factory. The initiative provides a higher degree of 'job readiness' upon graduating.[35]

1.36 In addition to upskilling the workforce, the Committee notes the importance of ensuring zero emission bus drivers and depot workers receive adequate work health and safety training. In its submission, the Transport Workers' Union of NSW (TWU) identified safety risks to workers employed to maintain electric buses, including:

- electrocution risks when plugging vehicles in, or after they have been involved in a crash
- battery explosion
- chemical leakage from batteries.[36]

1.37 Ms Marija Marsic, Assistant State Secretary, Director of WHS and Education, TWU, told the Committee that certain features of ZEBs are dissimilar to regular diesel buses – for example, tyre size and braking systems – and necessitate different driving behaviours. Specialised instruction would help ensure safety in the vehicles, as well as in the depots.[37]

1.38 The Committee also heard that there is a need for broad collaboration to facilitate 'cross-pollination of skills and technologies'. Mr Sid Rallapalli, Head of Global Partnerships, Nexport, told the Committee that Nexport's partnership with Quickstep, which is helping to build understanding of how carbon-fibre composites can be applied in zero-emission vehicles, is an example of this.[38]

1.39 Ensuring an adequate supply of skilled labour in both regional and metropolitan centres will be critical to the success of transitioning NSW's bus fleet. The Committee acknowledges that there are existing training programs and partnerships between industry and the education sector.

1.40 However, we recommend that TfNSW work with TAFE NSW and the Department of Education to develop further programs that will support the ongoing

[33] Mr Threlkeld, Transcript of evidence, 19 August 2022, p 29; TAFE NSW, Electric Vehicles, viewed 21 October 2022.

[34] Mr Dunn, Transcript of evidence, 19 August 2022, p 6.

[35] Mr Rallapalli, Transcript of evidence, 19 August 2022, pp 6-7.

[36] Submission 20, Transport Workers' Union of NSW, p 2.

[37] Ms Marija Marsic, Assistant State Secretary, Director of WHS and Education, Transport Workers' Union of NSW, Transcript of evidence, 19 August 2022, p 31.

[38] Mr Rallapalli, Transcript of evidence, 19 August 2022, p 7.

development of a skilled workforce that can build, maintain and operate ZEBs. Such programs should aim to build labour capacity in regional NSW, in addition to metropolitan areas, and could leverage existing internship pathways that exist with NSW-based ZEB manufacturers.

Accelerating the development of bus depots and local grid capacity

Recommendation 5

That Transport for NSW review its strategy for constructing new bus depots, converting existing depots to support electric buses, and developing supporting electrical infrastructure. This review should establish a timeline for depot upgrades that sets clear and ambitious targets to ensure that infrastructure improvements keep pace with the roll-out of zero emission buses.

1.41 Stakeholders told the Committee that developing the infrastructure that supports the operation of electric buses is crucial to replacing the diesel bus fleet. We heard that existing bus depots will need to be converted for charging electric buses, and this will place additional demands on local electricity grids.

1.42 The infrastructure upgrades required to convert and power depots, so that they can support electric buses, are extensive and costly.[39]

1.43 Stakeholders expressed concern that grid upgrades are not keeping pace with procurement of ZEBs, which creates a risk of the grid not having sufficient capacity to charge the vehicles.[40] Mr Scott Dunn, Managing Director, Custom Denning, told the Committee that Custom Denning is well-placed to deliver ZEBs, but the challenge is ensuring depots have capacity to take those vehicles. Custom Denning also submitted that 'It would be useful to understand the Government's timeline on both deployment of ZEB's (sic) and depot infrastructure.'[41]

1.44 We heard that TfNSW has undertaken a depot definition design. As part of the design process, the agency engaged with depot operators and suppliers to discuss requirements. TfNSW has identified the first depots to be upgraded, with those works to inform ongoing planning. Its tranche approach recognises constraints on the transmission network.[42]

1.45 Mr Rallapalli observed that charging 300 electric buses in a single depot has the effect of 'creating a mini power station [with]in a city'.[43] The impacts on the grid are significant.

1.46 As part of the transition to a zero emissions fleet, there is opportunity to consider the placement of depot locations and how these can be strategically located to distribute impact on the grid more evenly. As ZEBs are significantly quieter than their diesel counterparts, depots would have less need for sound-reducing

[39] Dr Elliot Fishman, Director, Institute for Sensible Transport, Transcript of evidence, 19 August 2022, p 9; Mr Threlkeld, Transcript of evidence, 19 August 2022, p 26.

[40] Mr Tozer, Transcript of evidence, 19 August 2022, p 2; Submission 27, Custom Denning, p 5.

[41] Mr Dunn, Transcript of evidence, 19 August 2022, p 2; Submission 27, p 5.

[42] Ms Gillian Geraghty, Chief Development Officer, Infrastructure and Place, Transport for NSW, Transcript of evidence, 19 August 2022, pp 34, 35.

[43] Mr Rallapalli, Transcript of evidence, 19 August 2022, p 2.

infrastructure and could be integrated with public spaces. Redistribution of depots would also support better route efficiency.[44]

1.47 Mr Rallapalli suggested that the deployment of ZEBs across the community affords an opportunity to 'really [think] about where are we putting the depots, why are we putting those depots there, what does that mean for the grid and what does that mean for public spaces.'[45]

1.48 We recommend that TfNSW review its strategy for upgrading depots supporting electrical infrastructure to ensure the state is prepared to accommodate a much higher volume of ZEBs, as well as to give certainty to manufacturers and operators.

[44] Mr Rallapalli, Transcript of evidence, 19 August 2022, pp 2, 4.

[45] Mr Rallapalli, Transcript of evidence, 19 August 2022, pp 2, 4.

Chapter Two – Planning for an emission free ferry fleet

Introduction

2.1 This chapter discusses the challenges and opportunities associated with electrifying the NSW public transport ferry fleet. It explores the technological and operational challenges that Transport for NSW (TfNSW) should consider when preparing for the electrification of NSW's ferries, and outlines the ways that NSW-based manufacturers can be supported in delivering new ferry fleets.

2.2 The chapter discusses specific considerations for using electric ferries on the NSW public transport network, whether to introduce hybrid ferries as a short-term solution, and the need for a procurement strategy that provides certainty and stability for local manufacturers.

Resolving the technological challenges of electric ferries will provide numerous benefits

Finding 1

The transition from diesel to emission free ferry fleets presents significant technological and operational challenges for NSW.

2.3 During the inquiry, the Committee heard from stakeholders in the marine industry, including ship and ferry manufacturers, and TfNSW. We also received submissions from manufacturers who are developing emission reducing technologies and vessels, including electric ferries.[46]

2.4 We found that the electrification of public ferry transport involves significant technological challenges, such as developing battery technology and charging infrastructure. However, there would also be numerous benefits to using electric ferries in NSW, once key technologies have reached maturity.

Electric ferry technologies are still in a developmental phase

2.5 Stakeholders told us that battery technology is still in development and 'changing almost daily.'[47] Electric ferries use a lot of energy and need large batteries when operating as part of a mass transit system.[48]

2.6 Introducing electric ferries for public transport would require large charging infrastructure to be installed at wharves. For example, in point-to-point transportation, two charging installations are needed – at the start and end of

[46] Submission 14, Steber International, p 1; Submission 8, Austal, p 1; Submission 16, Harwood Marine, pp 1-2.

[47] Mr Tim Curtis, Capture Manager, Birdon Pty Ltd, Transcript of evidence, 19 August 2022, p 17.

[48] Mr Curtis, Transcript of evidence, 19 August 2022, pp 17-18.

the journey. Ferries need to be recharged 'each time the ferry stops to take on passengers', potentially requiring charging infrastructure at each wharf.[49]

2.7 An electric ferry has large energy requirements. Due to a ferry's size and weight, 'they are power hungry and they require a lot of batteries.' This, in turn, adds more weight.[50] In addition, a ferry must wait to charge its batteries before it can travel again, which presents further challenges for timetabling.[51]

2.8 As a result, batteries age very quickly, as ferries would be recharged many times per day. Mr Andrew Malcolm, Chief Digital Officer and Vice President Strategy and Commercial Development, Austal, observed that an operator's challenge is to see a 'battery as a consumable – it's no longer a fixed asset'.[52]

2.9 Costs represent another challenge associated with electric ferries, as they require a much higher upfront cost than diesel ferries. This includes the additional costs of batteries and charging infrastructure.[53]

2.10 As a result of these factors, stakeholders told us that, at present, electric ferry technology is in its early stages.[54] Electrifying larger and faster vessels is particularly challenging.[55] Ms Terri Benson, Managing Director, Birdon reflected on the developing nature of electric ferries:

> The reality is no-one has fully electrified their fleets, and lots of people are at that point where they're looking at technology, and looking at the curve of technology, and knowing when the right time to invest is.[56]

2.11 Some examples of electric ferries in overseas jurisdictions are provided below.

There are benefits to using electric ferries

2.12 Despite these technological challenges, Austal also outlined the benefits of electric ferries. These include lower carbon emissions and diesel pollution. Electric ferries also have lower noise and vibration, which improves passenger comfort.[57] Electric ferries also bring manufacturing opportunities for Australian and NSW-based ship manufacturers (discussed further below).

---

[49] Mr Andrew Malcolm, Chief Digital Officer and VP Strategy and Commercial Development, Austal, Transcript of evidence, 19 August 2022, p 18.

[50] Mr Curtis, Transcript of evidence, 19 August 2022, p 17; Ms Terri Benson, Managing Director, Birdon Pty Ltd, Transcript of evidence, 19 August 2022, p 20.

[51] Mr Malcolm, Transcript of evidence, 19 August 2022, p 18; Mr Howard Collins, Chief Operations Officer, Greater Sydney, Transport for NSW, Transcript of evidence, 19 August 2022, p 42.

[52] Mr Malcolm, Transcript of evidence, 19 August 2022, p 18.

[53] Mr Malcolm, Transcript of evidence, 19 August 2022, p 19.

[54] Ms Benson, Transcript of evidence, 19 August 2022, p 17; Mr Collins, Transcript of evidence, 19 August 2022, p 42; Submission 8, p 2.

[55] Mr Malcolm, Transcript of evidence, 19 August 2022, p 17.

[56] Ms Benson, Transcript of evidence, 19 August 2022, p 17.

[57] Submission 8, p 2.

2.13 Electric ferries also represent an opportunity for reducing operating costs, with electricity costs estimated at approximately 25-70 per cent less than diesel fuel costs.[58] Mr Malcolm explained these cost saving opportunities:

> …what we're seeing from the analysis we're doing with fully electric vessels is that, even accounting for that cost and the replacement costs of batteries through life, the overall operating cost of the vessel will be significantly lower, based upon current diesel prices, even before the Russia-Ukraine crisis and the impact that has had on diesel and gas prices. The relative movement in electricity price and diesel prices means that there is an operational saving, in addition.[59]

2.14 Mr Malcolm noted that there is a lower maintenance burden on electric ferries. Not only does this reduce operating costs, it improves the availability of ferries to service routes on a more consistent basis.[60]

2.15 Electrically-powered ferries also provide greater certainty in terms of operating costs. A ferry's scheduled timetable allows an operator to predict the energy demand required for each route. This means that an operator can enter into long-term purchase agreements to purchase electricity, including green electricity. This creates greater stability and a reduction in costs when compared to fluctuating diesel prices.[61]

There is an opportunity for NSW to leverage its existing manufacturing capabilities

2.16 The Committee heard that Australia is a world leader in the large fast ferry market, with many of Europe's ferries designed and built in Australia.[62] NSW, in particular, has a strong marine vessel manufacturing sector, and local manufacturers are among the Australian firms that export vessels overseas.[63]

2.17 While emission free ferry technologies are still in a developmental stage, NSW is well positioned to leverage the existing capabilities of local manufacturers in the transition to electric ferry fleets. As technology develops and costs reduce, investment in electric ferries will increase. This is further encouraged by decarbonisation targets and the transition towards clean energy public transport, both in Australia and overseas.[64]

2.18 The Committee also notes that there are a small number of products and trials of electric and hybrid ferries across the globe.

2.19 Norway is currently leading the global market in lower emission and zero-emission vessels, including hybrid diesel-electric ferries.[65] In the United Kingdom,

[58] Submission 8, p 2.

[59] Mr Malcolm, Transcript of evidence, 19 August 2022, p 19.

[60] Mr Malcolm, Transcript of evidence, 19 August 2022, p 19; Submission 8, p 2.

[61] Mr Malcolm, Transcript of evidence, 19 August 2022, p 19.

[62] Mr Malcolm, Transcript of evidence, 19 August 2022, pp 16, 22.

[63] Ms Benson, Transcript of evidence, 19 August 2022, pp 16, 21; Submission 14, p 1; Submission 16, p 4.

[64] Mr Malcolm, Transcript of evidence, 19 August 2022, p 17.

[65] Mr Malcolm, Transcript of evidence, 19 August 2022, p 17; Submission 8, p 2.

hybrid ferries are being introduced on the river Thames, as charging infrastructure for fully electric vessels is not yet available.[66]

2.20 In New Zealand, a high-capacity electric passenger ferry made out of carbon fibre has entered service in Wellington. Locally manufactured electric ferries will also be introduced in Auckland in 2024, reflecting the city's commitment to electrify its ferry fleet by 2040. The new ferries will be 200-seat vessels, with the cost of procuring the first two ferries estimated at NZD $36 million.[67]

2.21 In Australia, TfNSW has worked with Manly Fast Ferry, to trial the first battery-electric passenger ferry service operating from Darling Harbour. The two small ferries are slow in speed and are best suited to short journeys.[68]

2.22 At present, Transdev Sydney Ferries are implementing a range of strategies to reduce emissions, including investing in more efficient ferries and reducing fuel use. Transdev's vessel operations are also certified carbon neutral.[69]

2.23 While the technological challenges involved in developing electric ferries are significant, the Committee is encouraged by the capacity and capabilities of NSW-based manufacturers to supply TfNSW with locally-built electric ferries.

Preparing for the electrification of NSW ferry networks

Recommendation 6

That Transport for NSW conduct and publish analyses to identify the most appropriate strategy for transitioning to an emission free ferry fleet, including consideration of whether to utilise fully electric or hybrid ferries in the medium-term.

Recommendation 7

That Transport for NSW conduct and publish analyses to identify the infrastructure upgrades and timetable refinements that would be required to operate emission free ferry routes (including both riverine and coastal routes).

2.24 Given the technological challenges involved in designing and building electric ferries, and the time that will likely be required for battery technology to mature, TfNSW should plan ahead and consider how best to implement lower emission ferries in NSW. This includes consideration of interim solutions, such as hybrid diesel-electric ferries.

2.25 The Committee recommends that TfNSW conduct and publish analyses that identify the most appropriate strategy to transition to an emission-free ferry fleet, such as deciding on fully electric or hybrid ferries, and to identify the infrastructure upgrades and timetable refinements that would be required for servicing ferry routes using lower emission vessels.

---

[66] Mr Curtis, Transcript of evidence, 19 August 2022, p 17.

[67] Mr Collins, Transcript of evidence, 19 August 2022, p 34; Submission 15, Institute for Sensible Transport, p 13.

[68] Submission 25, Transport for NSW, p 6; Mr Collins, Transcript of evidence, 19 August 2022, p 42.

[69] Submission 25, p 6.

Developing a strategy that is appropriate for NSW ferry routes

2.26 Preparing for the electrification of the NSW public transport ferry fleet requires long term planning and investment, and a strong technical understanding of how to support the operation of electric ferries on NSW ferry routes.

2.27 Witnesses explained the different types of ferry journeys in NSW that must be considered for future electric ferry fleets. These include riverine, harbour and coastal journeys.[70] Mr Howard Collins, Chief Operations Officer, Greater Sydney, TfNSW, explained the different energy requirement for two types of ferry journeys:

> … power utilisation in Sydney, and even in Newcastle, has almost two requirements. There's an inner harbour river journey experience, the F3 [Parramatta River] and the Inner Harbour, and then there's quite a different requirement for almost a semi-seagoing vessel which goes between Circular Quay and Manly…[71]

2.28 NSW's riverine ferries, which make multiple short stops along a journey, are difficult to electrify due to the stop-start requirement and vessel design and weight. Mr Collins told the Committee:

> … as I think the experts in the field who are the manufacturers will tell you, there's no equivalent full electric vessel of high capacity able to do the stop-start almost bus journey-type experience that we have in Sydney.[72]

2.29 However, Ms Benson noted that these short, brief trips allow for greater capacity in the vessel, as high speeds and long journeys are not required. Short trips present a way to find a compromise between 'battery, speed and weight of the vessel.'[73] Managing route distance for electric ferries in NSW is an important consideration when introducing an emission-free fleet in the future.

2.30 Ferry timetables must also be considered when planning NSW's future ferry fleet. This is because a 'ferry's job is to meet a timetable.'[74] Therefore, vessel design, route planning and charging infrastructure must all work to ensure an electric ferry is able to collect and drop-off passengers on time.

Considering hybrid or fully electric ferries

2.31 Looking to the future, we heard evidence that a decision needs to be made on whether to use hybrid vessels or hybrid fleets (a combination of electric and diesel vessels across the fleet) for reducing emissions and transitioning to emission-free ferries.

2.32 Hybrid ferries run on both diesel and electric power. In answers to supplementary questions, Austal described two different types of hybrid vessels. Non-plug-in hybrid vessels have a diesel generator that charges and provides energy to a battery or electric motor. These vessels use more diesel due to

---

[70] Mr Malcolm, Transcript of evidence, 19 August 2022, p 17.

[71] Mr Collins, Transcript of evidence, 19 August 2022, p 42.

[72] Mr Collins, Transcript of evidence, 19 August 2022, p 42.

[73] Ms Benson, Transcript of evidence, 19 August 2022, p 18.

[74] Mr Curtis, Transcript of evidence, 19 August 2022, p 17.

increased weight and the 'added inherent inefficiency of converting energy from mechanical to electric and back again'.[75]

2.33 In contrast, plug-in hybrid vessels contain both a diesel engine and battery system that is charged with electricity from the grid. By drawing more power from batteries, a plug-in hybrid vessel is able to reduce emissions and operating costs.[76]

2.34 Both Birdon and Austal noted that hybrid ferries can operate with zero emissions, at least for parts of a journey.[77] However, the Committee heard differing views on the overall effectiveness of using hybrid vessels for reducing emissions.

2.35 Witnesses from Birdon told the Committee that hybrid ferries are a useful strategy in the transition to electric ferries. This is because they can reduce emissions by at least 30% compared to diesel-powered ferries, and do not rely on onshore charging infrastructure. They are also able to operate on existing routes and timetables.[78]

2.36 Austal told the Committee that although hybrid vessels can have some efficiency gains, overall, they generally use more diesel fuel per voyage:

> Depending on the vessel design and operating profile some efficiency gains are possible, however, generally speaking this is not sufficient to offset the additional weight, especially at higher speeds (>20kts). As a result, even though hybrids can operate in zero emission mode during part of the voyage, the total diesel consumption for the voyage will generally be higher, especially for Non-Plug-in Hybrids.[79]

2.37 Austal's approach is to develop a hybrid fleet, where the ferry network includes fully diesel vessels that are augmented and eventually replaced by fully electric ferries. This involves using diesel ferries on longer routes without charging infrastructure and using full electric ferries on routes where possible, such as with wharves that have lower cost, high-voltage power. Adjusting the ferry timetable and allowing for slower charging will also improve the ageing of batteries.[80]

2.38 Birdon suggested an alternative approach that involves trialling electric vessels while procuring hybrid vessels. In the medium term, hybrid ferries are used to reduce emissions.[81] Mr Tim Curtis, Capture Manager, Birdon, suggested implementing a strategy where certain sections of a ferry route are emission free. For example, travelling in and out of Circular Quay could be when a hybrid engine

---

[75] Answers to supplementary questions, Austal, 16 September 2022, p 2.

[76] Answers to supplementary questions, Austal, 16 September 2022, p 2.

[77] Mr Curtis, Transcript of evidence, 19 August 2022, pp 18-19; Answers to supplementary questions, Austal, 16 September 2022, p 2.

[78] Ms Benson, Transcript of evidence, 19 August 2022, p 20; Answers to supplementary questions, Birdon, 16 September 2022, p 1.

[79] Answers to supplementary questions, Austal, 16 September 2022, p 2.

[80] Mr Malcolm, Transcript of evidence, 19 August 2022, p 20.

[81] Ms Benson, Transcript of evidence, 19 August 2022, p 18.

runs emission free, 'and then [the ferries] run their diesel engines to operate and recharge their batteries.'[82]

2.39 Converting existing ferries to hybrid or electric power may be cost effective in the short-term. TfNSW recently procured 10 River-class ferries from Birdon, which have been designed so that they can later be converted to hybrid or electric power.[83] Birdon estimated that conversion of these ferries would cost approximately $2 million for hybrid power and starting at approximately $2.5 million for electric power, depending on ferry timetables and routes.[84]

2.40 Birdon argued that, while hybrid vessels are used, electric ferries can be gradually introduced as charging infrastructure improves. Ms Benson, Managing Director, Birdon argued that electric ferries should be introduced to help develop the technology:

> … if you wait for the onshore charging to be in place before you think about electric ferries, you lose the opportunity to evolve the technology while you are doing that.[85]

2.41 As part of this approach, Birdon suggested converting one of the new River-class ferries to electric, to test its charging capabilities on shorter journeys and integrate it into the timetable. Over time, more ferries can then be converted to electric as charging infrastructure is implemented across ferry wharves.[86]

2.42 In light of these issues raised by stakeholders in the marine industry, the Committee recommends that TfNSW carefully plan the conversion of the existing fleet to emission free vessels, whether by using hybrid ferries as an interim solution or prioritising fully-electric ferries from the outset. Feasibility or scoping studies should also incorporate route planning and infrastructure development, in order to maximise lower-emission vessels' effectiveness on the NSW public transport network.

Procurement and local manufacturing

Recommendation 8

That Transport for NSW develop a long-term ferry procurement strategy that is based on the findings of Recommendations 6 and 7.

2.43 Witnesses indicated that local manufacturers could play a central role in supplying a fleet of electric vessels in the future. Australian and NSW-based manufacturers are already researching and developing emission-reducing technologies and vessels. This includes electric hybrid vessels, hydrogen-powered vessels, electric passenger ferries and an air lubrication system to reduce hull friction.[87]

---

[82] Mr Curtis, Transcript of evidence, 19 August 2022, pp 18-19.

[83] Mr Curtis, Transcript of evidence, 19 August 2022, p 19; Mr Collins, Transcript of evidence, 19 August 2022, p 42.

[84] Answers to supplementary questions, Birdon, 16 September 2022, p 2.

[85] Ms Benson, Transcript of evidence, 19 August 2022, p 18.

[86] Ms Benson, Transcript of evidence, 19 August 2022, p 18; Mr Curtis, Transcript of evidence, 19 August 2022, p 19.

[87] Submission 14, Steber International, p 1; Submission 8, Austal, p 1; Submission 16, Harwood Marine, pp 1-2.

2.44 They also told the Committee that Australia has a strong marine vessel manufacturing sector. Local manufacturers build different types of vessels for governments, commercial clients and the defence industry, for sale in Australia and for export overseas.[88] For example, Birdon told the Committee that working with the NSW Government has led to further contracts with the Australian and US defence industries, which has increased their capacity as a local manufacturer.[89]

2.45 The Committee heard that NSW needs a clear procurement strategy for ferry replacements – particularly one that indicates to manufacturers how electric ferries will be utilised when in service. A five-to-ten-year timeline for procurement will provide Australian manufacturers with clear investment timeframes, which will allow them to plan ahead and manufacture ferries locally.[90]

2.46 This is important as continuity is a key challenge in the broader Australian ship building industry. For example, 'one jurisdiction or one class of vessels tends to be cyclical or lumpy'.[91] Therefore, witnesses emphasised the importance of long-term 'visibility' in order to maintain the workforce, maximise shipyard use and ensure that ferry replacements and defence projects do not all occur at the same time. This is also relevant as the defence ship building industry in Australia also takes up local manufacturing capacity.[92]

2.47 Ms Terri Benson, Managing Director, Birdon, highlighted the importance of using Australian design and content when building ships. She observed that making everything as local as possible, including systems engineering and componentry, will help retain maintenance operations in Australia. This is important as the initial build of a hull is only a small part of the whole-of-life-cycle costs of a vessel.[93]

2.48 Therefore, witnesses encouraged greater collaboration, including between manufacturers, the defence industry and other Australian jurisdictions.[94] The report discusses the opportunities for national collaboration and co-ordination of transport manufacturing further in chapter 4.

2.49 Witnesses also encouraged government support and cross-industry collaboration to recruit skilled workers to the ship building industry. This is because there is a high demand for particular skill sets, including engineering, mechatronics and trade-based skills across multiple industries.[95]

---

[88] Mr Malcolm, Transcript of evidence, 19 August 2022, p 16; Submission 14, pp 1, 3; Submission 16, p 4.

[89] Ms Benson, Transcript of evidence, 19 August 2022, p 21.

[90] Ms Benson, Transcript of evidence, 19 August 2022, pp 19-20.

[91] Mr Malcolm, Transcript of evidence, 19 August 2022, p 21.

[92] Mr Malcolm, Transcript of evidence, 19 August 2022, p 21; Ms Benson, Transcript of evidence, 19 August 2022, p 21.

[93] Ms Benson, Transcript of evidence, 19 August 2022, p 20.

[94] Mr Malcolm, Transcript of evidence, 19 August 2022, p 21; Ms Benson, Transcript of evidence, 19 August 2022, p 21.

[95] Mr Malcolm, Transcript of evidence, 19 August 2022, p 22; Ms Benson, Transcript of evidence, 19 August 2022, pp 22-23.

2.50 The Committee recommends that TfNSW develops a long-term ferry procurement strategy that is based on the findings of the analyses that we have recommended above (Recommendations 6 and 7). This strategy should seek to maximise local content, while providing vessel manufacturers with clearer and less variable procurement timeframes.

Chapter Three – Reducing emissions caused by public rail transport

Introduction

3.1 Opportunities also exist for reducing the emissions caused by passenger trains operating on NSW's public transport network.

3.2 The Committee received evidence from several stakeholders who are engaged in the passenger rail sector. We were told about the progress that has been made in offsetting carbon emissions from the electricity required to power NSW's public rail network. We also heard of areas in which emissions could be reduced further.

3.3 The Committee was interested in ways that NSW-based manufacturers could be supported in the production of emission free passenger trains. We heard that the sector could be developed through policies that support and incentivise local rail manufacturing in NSW.

3.4 This chapter begins by highlighting the progress made by Transport for NSW (TfNSW) in reducing emissions generated by the NSW rail network, before outlining additional areas where emissions could be reduced, such as through hydrogen-powered regional rail. The chapter then discusses ways that local manufacturers could be supported by the NSW Government.

Decarbonising the electricity grid and offsetting rail emissions

Finding 2

Transport for NSW has made significant progress in offsetting the emissions generated by Sydney Trains, NSW TrainLink and Sydney Metro by purchasing green electricity.

3.5 The Committee found that TfNSW has successfully offset the emissions produced by the electricity that powers public train networks in NSW.

3.6 In July 2021, Sydney Trains achieved 100 per cent net zero emissions from electricity, becoming the first passenger rail operator in Australia to achieve this.[96]

3.7 Sydney Trains and NSW TrainLink have a dedicated offset program, which involves the purchase of renewable energy certificates from Red Energy and Avonlie Solar Farm until the end of 2030.[97] Ms Rebecca McPhee, Deputy Chief Executive, Sydney Metro, Transport for NSW, told the Committee that a cost-benefit analysis of Sydney Metro's green energy purchases found that the

[96] Ms Julie Morgan, Executive Director, Environment and Sustainability, Safety Environment and Regulation, Transport for NSW, Transcript of evidence, 19 August 2022, p 32; Answers to written questions, Australasian Railway Association, 10 October 2022, p 2.

[97] Mr Collins, Transcript of evidence, 19 August 2022, pp 38-39.

benefits of avoided adverse environmental impacts outweighed the costs of the power purchase.[98]

3.8 The Committee heard that the Sydney Trains network consumes 1.3 per cent of the energy produced in NSW.[99] Offsets from 2021/22 equated to approximately 708 203 tonnes of carbon dioxide saved, and a 98 per cent reduction in Sydney Trains' total emissions footprint.[100] Importantly, the transition has also given a clear signal to the energy industry that the NSW Government is prepared to purchase clean energy.[101]

3.9 Transport for NSW is replacing the ageing regional rail fleet of XPT, XPLORER and Endeavour trains with bi-mode (diesel-electric hybrid) technology. These trains will be able to operate on overhead power while on the electrified train network and on-board diesel generators outside of the electrified network. It is expected this will contribute to an annual reduction in carbon emissions of around 540 tonnes.[102]

3.10 The University of Sydney Net Zero Initiative argue that, as well as transitioning vehicle technology to emission free alternatives, the electricity generation sector should be decarbonised 'concurrently'.[103] This will be critical in realising the state's ambitious emissions reduction targets.

Challenges and opportunities for achieving an emission free public rail network

3.11 While offsetting emissions is an important step in decarbonising the public passenger rail system, there are ways to reduce emissions further.

3.12 The Australasian Railway Association (ARA) highlighted that system efficiencies and optimisation of the existing network offer further opportunities for achieving decarbonisation of rail transport. For example, a transition to more intelligent controls for heating, ventilation and air conditioning (HVAC) systems, coupled with better vehicle insulation, would lessen environmental impact and improve passenger comfort. Intelligent Driver Advisory Systems (DAS) available on the market offer the potential for optimising driving performance and reducing traction energy consumption through braking and acceleration.[104]

3.13 The Australian company Trapeze Group has developed a Driver Advisory System that connects to a central control system and can update train schedules in real time. Known as TTG Energymiser, the system has been installed on more than

[98] Ms Rebecca McPhee, Deputy Chief Executive, Sydney Metro, Transport for NSW, Transcript of evidence, 19 August 2022, p 39.

[99] Ms Morgan, Transcript of evidence, 19 August 2022, p 39.

[100] Submission 25, Transport for NSW, p 4.

[101] Ms Morgan, Transcript of evidence, 19 August 2022, p 39.

[102] Answers to supplementary questions, Transport for NSW, 16 September 2022, p 2; Transport for NSW, Regional Rail, viewed 21 October 2022, pp 1-2.

[103] Submission 18, University of Sydney Net Zero Initiative, pp 3-4.

[104] Answers to written questions, Australasian Railway Association, 10 October 2022, p 3.

8000 trains globally and consistently delivers a 10-12 per cent reduction in energy consumption. The technology can be implemented on any train type.[105]

3.14 The ARA described some of the regulatory and technical challenges associated with decarbonisation of rolling stock and associated infrastructure. These include:

- the current absence of a framework of standards, safety protocols and regulations
- the issue of range on regional routes and capacity of existing options in the market
- interoperability of new and old technologies, particularly where it involves retrofitting ageing rolling stock with new systems
- costs associated with battery or fuel cell replacements over the lifetime of the asset
- the need for more investment and research to determine appropriate sources of energy to meet the network's various requirements.[106]

3.15 The *Journey to net-zero* report also notes that implementing solutions like Driver Advisory Systems in Australia is challenging due to our national and state-based procurement models for rolling stock and control systems, which 'do not provide a whole of system approach'. The report recommends 'a standardised approach where… barriers to innovative ways of optimizing (sic) our rail network are removed'.[107]

3.16 In light of the above challenges, the Committee was interested in how manufacturers in both NSW and Australia could be better supported by government.

3.17 While there are NSW-based firms that are part of the Australian rail manufacturing supply chain, we heard that this is an area that could be further developed through government support. In particular, support is required for hydrogen-powered rail to become a viable emission free mode of rail transportation in NSW.

Supporting NSW-based companies in the rail manufacturing supply chain

Recommendation 9

That the NSW Government introduce incentives and support to develop the capacity of NSW-based manufacturers who contribute to the Australian supply chain for rail manufacturing and construction.

[105] KPMG, *The journey to net zero: Inspiring climate action in the Australian transport sector*, Roads Australia, Australasian Railway Association, Infrastructure Sustainability Council & ARUP, May 2022, p 95.

[106] Answers to written questions, Australasian Railway Association, 10 October 2022, p 1.

[107] *The journey to net zero: Inspiring climate action in the Australian transport sector*, May 2022, p 95.

3.18 The Committee was interested in the capacity and capabilities of the rail manufacturing sector in NSW, and the benefits that could be realised by developing the sector through government support.

3.19 The Australasian Railway Association (ARA) told the Committee about their 2021 report, *The Australian rail supply chain*. The report identified that Australian rail firms are concentrated in NSW and Victoria. In NSW, approximately 160 rail firms are domiciled within state borders. Roughly 40 of these firms are from the manufacturing and supply sector, with the remaining firms engaged in the procurement, infrastructure, maintenance and operations sectors.[108]

3.20 The ARA told us that there is 'existing local capability (skills and facilities) in NSW and across all Australian states.'[109] However, the ARA's report noted that most manufacturing sites are concentrated in Victoria. The presence of the rail supply chain in NSW is largely due to the number of offices and head offices based in Sydney.[110]

3.21 The ARA described how, across Australia, achieving a '100% local build is not possible, but rather a maximum of 70% local content.'[111] In their *Towards a national local content policy* report, the ARA note that NSW's approach to rail procurement has largely been 'based on value for money', with a resulting 'reliance on overseas suppliers for the last decade'.[112]

3.22 The Committee heard that there would be many benefits to supporting local rail manufacturing. These benefits include:

- economic benefits, such as job creation and increased investment in local suppliers and facilities
- a higher degree of quality control, where it may be possible for design specifications to 'ensure the rollingstock are constructed and tested for Australia's rail conditions'
- an opportunity to establish local maintenance and supply facilities, so that 'rollingstock remains fully operational and can be repaired quickly and returned to service.'[113]

3.23 As with the bus and ferry manufacturing sector, procurement policies may lack certainty and long-term scope for local manufacturers. The ARA told us that there needs to be a 'consistent demand pipeline' in order for local train manufacturing to become more established:

---

[108] BIS Oxford Economics, *The Australian rail supply chain: state of play, challenges and recommendations*, Australasian Railway Association, Canberra, March 2021, p 17.

[109] Answers to written questions, Australasian Railway Association, 10 October 2022, p 5.

[110] *The Australian rail supply chain: state of play, challenges and recommendations*, p 15.

[111] Answers to written questions, Australasian Railway Association, 10 October 2022, p 5.

[112] NineSquared, *Towards a national local content policy*, Australasian Railway Association, Canberra, September 2022, p 23.

[113] Answers to written questions, Australasian Railway Association, 10 October 2022, p 4.

> 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.[114]

3.24 The NSW Government could introduce more incentives and support to develop the capacity of local manufacturers. This includes pursuing partnerships between government, industry and academic stakeholders for the development of emission free trains and trams, with public research funding provided for this purpose.[115]

3.25 The ARA also highlighted recommendations that it made to the Commonwealth Government in its *Journey to net zero* report, in relation to the need to introduce policies, investment and incentives for developing sustainable transport systems.[116] In responses to written questions from the Committee, the ARA told us that 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'.[117]

3.26 The Committee notes that Transport for NSW (TfNSW) has commenced engagement with local manufacturers in relation to the Parramatta Light Rail Stage 2 Final Business Case. TfNSW submitted that 'briefings are being held with experienced local manufacturers, to understand their capacity and capability to provide rolling stock and equipment locally.'[118]

3.27 While local briefings such as these are important, the Committee also believes that there are further opportunities for the NSW Government to support rail manufacturers based in NSW, by advocating for a national approach to rail manufacturing and procurement. These considerations will be discussed in the next chapter.

3.28 At a state level, the Committee recommends that the NSW Government introduce incentives and support that contribute to the development of NSW-based passenger rail manufacturing, expanding on its commitment for the procurement of locally designed and built ZEBs, ferries and light rail. These initiatives should be developed in consultation with local manufacturers engaged in the Australian rail supply chain, with a view to encouraging investment and innovation in the design and production of emission free trains and trams.

The potential for hydrogen-powered passenger rail in NSW

Recommendation 10

That Transport for NSW develop a medium-term strategy to prepare for the potential utilisation of hydrogen-powered rail in the future, including the development of the necessary infrastructure for refuelling and maintenance.

---

[114] Answers to written questions, Australasian Railway Association, 10 October 2022, p 5.

[115] Answers to written questions, Australasian Railway Association, 10 October 2022, p 5.

[116] *The journey to net zero: Inspiring climate action in the Australian transport sector*, May 2022, p 10.

[117] Answers to written questions, Australasian Railway Association, 10 October 2022, p 2.

[118] Submission 25, Transport for NSW, p 8.

3.29 The Committee also learned about the progress being made in NSW and foreign jurisdictions in relation to hydrogen powered rail. Stakeholders told us that TfNSW and other jurisdictions are generally at a scoping study or trial phase of hydrogen passenger trains, and the implementation of infrastructure for hydrogen refining and refuelling requires further development.

3.30 We recommend that TfNSW develop clear plans for utilising hydrogen-powered rail in the future. These plans should incorporate targets and strategies for building the required facilities for refuelling and maintaining hydrogen trains.

3.31 Using hydrogen-powered trains could be particularly important for longer, regional routes that are currently powered by diesel engines. The University of Sydney's Net Zero Initiative told us that converting diesel routes to electric power can be difficult, using current technology. Electrifying a long-distance corridor by installing overhead catenary cables would be expensive and would likely require construction equipment that is not electrically-powered itself, 'and will thus have a longer environmental payback time than other investments.'[119]

3.32 Other jurisdictions have made progress with the introduction of hydrogen-powered regional trains. In particular, Germany has recently introduced a fleet of 14 hydrogen-powered trains to service 100 km regional routes in Lower Saxony that are normally serviced by diesel engines. The trains were manufactured by Alstom, who have manufacturing facilities in Victoria and will be supplying trains to Sydney Metro.[120]

3.33 Industrial gas supplier BOC Limited told the Committee that the emission free trains in Germany have a range of 1000 km and can run on a single tank, as '[one] kilogram of hydrogen replaces 4.5 litres of diesel fuel'. A hydrogen refuelling station was commissioned in 2021 to support their operation.[121]

3.34 Other jurisdictions overseas are trialling hydrogen rail vehicles. Germany has also introduced hydrogen-powered track maintenance machines, while South Korea is commencing trials of hydrogen trams in 2023. Trials of hydrogen passenger trains are also underway in the United States, where hydrogen fuel cell design standards are also being reviewed for adoption in the rail sector.[122]

3.35 While hydrogen fuel cells may hold promise for regional passenger rail, introducing this technology to local rail networks requires significant investment and planning, and construction of supporting infrastructure for refuelling. In particular, a steady and easily accessible supply of hydrogen is required, 'preferably green hydrogen' that is generated through renewable energy.[123]

3.36 The Committee notes that the NSW Department of Planning, Industry and Environment (DPIE) released the *NSW Hydrogen Strategy* in October 2021 ('the

[119] Submission 18, University of Sydney Net Zero Initiative, p 3.

[120] Submission 26, BOC Limited, p 4; Answers to written questions, Australasian Railway Association, 10 October 2022, p 2; Al Jazeera, Germany inaugurates world's first hydrogen-powered train fleet, 24 August 2022, viewed 21 October 2022; Alstom, Alstom in Australia and New Zealand, viewed 21 October 2022.

[121] Submission 26, p 4.

[122] Answers to written questions, Australasian Railway Association, 10 October 2022, p 2.

[123] Answers to written questions, Australasian Railway Association, 10 October 2022, p 2.

Strategy'). The Strategy provides up to $3 billion of incentives to commercialise and develop green hydrogen and production in NSW, with the Hunter and Illawarra regions targeted as future 'hydrogen hubs'.[124]

3.37 We were pleased to hear that the development of hydrogen-powered rail is included in the Strategy. In particular, we note that DPIE conducted a feasibility study in partnership with Alstom in 2021-22, with the goal of improving 'understanding of hydrogen fuel for rail and [to] assess what is required for a trial in terms of infrastructure, standards and accreditation'.[125]

3.38 However, actual implementation of hydrogen-powered passenger rail in NSW is unlikely to take place in the short-term. In addition to technological and infrastructure considerations, the Australasian Railway Association identified that it takes three years to manufacture hydrogen trains.[126]

3.39 For these reasons, interim solutions to decarbonise regional rail may be required. Stakeholders told us that NSW and other Australian jurisdictions are actively pursuing the use of diesel-electric hybrid engines. The Department of Infrastructure and Transport (SA) submitted that they are currently converting a fleet of diesel powered trains to hybrid that are 'expected to operate on the network for approximately 10 years.'[127]

3.40 TfNSW told the Committee about the new Regional Rail Fleet, which uses 'bi-mode' technology to run on electrified sections of the train network, while using diesel power where overhead power is unavailable (discussed above). The new trains may be a valuable interim solution until hydrogen-powered trains are ready to enter service in NSW.[128]

3.41 The ARA also suggested that developing small trial corridors and introducing hydrogen fuel cell track maintenance machines would be one way to progress further towards wider utilisation of hydrogen passenger rail.[129]

3.42 The Committee considers that DPIE's feasibility study on hydrogen-powered rail is an important step for decarbonising regional passenger rail transport.

3.43 To support this, we recommend that Transport for NSW develop a medium-term strategy to prepare for the potential utilisation of hydrogen-powered rail in the future. This strategy should consider the infrastructure required for refuelling and maintenance of hydrogen trains. Such a strategy should build on the existing feasibility study and wider *NSW Hydrogen Strategy*, and set clear targets for trials, infrastructure building and the eventual procurement and rollout of hydrogen trains.

---

[124] Department of Planning, Industry and Environment (NSW), *NSW hydrogen strategy: making NSW a global hydrogen superpower*, Sydney, October 2021, pp 7, 47.

[125] *NSW hydrogen strategy*, p 55; Answers to written questions, Australasian Railway Association, 10 October 2022, p 5.

[126] Answers to written questions, Australasian Railway Association, 10 October 2022, p 5.

[127] Submission 19, Department of Infrastructure and Transport (SA), p 1.

[128] Submission 25, p 5.

[129] Answers to written questions, Australasian Railway Association, 10 October 2022, p 2.

Chapter Four – Broader challenges and opportunities in the transition to emission free modes of public transport

Introduction

4.1 The Committee heard that there are broader challenges in the transition to emission free modes of public transport, in addition to the unique considerations for bus, ferry and rail discussed in the previous chapters.

4.2 Several stakeholders told the Committee that encouraging use of public transport presents the biggest opportunity for NSW to reduce transport emissions, and ensure that new emission-free vehicles are utilised to their potential.[130] This chapter explores the need to make public transport more appealing and responsive to customer needs, in order to decrease reliance on private vehicles.

4.3 The Committee was also interested in the ways that manufacturers in NSW could be supported through a national approach. The chapter also discusses opportunities for developing the capacity and capabilities of NSW manufacturers through NSW Government advocacy to encourage co-operation across Australian jurisdictions.

Increasing uptake of public transport in NSW

Recommendation 11

That the NSW Government targets an increase in the proportion of people using public transport in NSW in the next five to ten years, and works with other government stakeholders to reduce reliance on private vehicles.

4.4 The Committee heard that the best way to reduce emissions is to increase the number of people who use public transport in NSW.

4.5 The Committee recommends that the NSW Government sets a short- to medium-term target for the number of people in NSW who are regular users of the public transport network. This target should be ambitious and supported by initiatives that aim to improve the appeal and service quality of public transport. These initiatives should also include policies that aim to reduce NSW residents' reliance on private motor vehicles for short trips and daily commutes.

Sydney is a 'car city'

4.6 Stakeholders identified many positive aspects of NSW's public transport network, and the Committee heard that uptake of public transport in Sydney is higher than

[130] Submission 12, Climateworks Centre, p 3; Submission 15, Institute for Sensible Transport, p 5; Submission 18, University of Sydney Net Zero Initiative, pp 4-5.

in other Australian jurisdictions.[131] However, we also heard that residents in Sydney remain high users of private car transport, and public transport's overall mode share could be significantly increased.

4.7 Approximately 65 per cent of NSW residents live in Sydney.[132] Numerous witnesses described how Sydney is largely a 'car city', in which most people rely on private vehicles rather than use public transport. The Institute for Sensible Transport submitted that 65.6 per cent of journeys to work in Sydney are undertaken by car, compared with 18.6 per cent undertaken by train and 7.0 per cent by bus.[133] Approximately 4.5 million car trips under four kilometres are undertaken in Sydney every day.[134]

4.8 The majority of private motor vehicles in NSW have internal combustion engines. While the development of emission free buses, ferries and trains will be beneficial for reducing emissions from public transport, a behavioural shift towards public transport will have a more immediate effect on transport-related emissions.[135] Dr Eliot Fishman, Director, Institute for Sensible Transport, told the Committee that:

> Even if that public transport wasn't zero emission, that is still a much better outcome from an emissions perspective than having the many millions of trips that happen in Sydney every day that are in a car.[136]

4.9 Dr Fishman added that, while it may be 'a mammoth task' to convert the diesel bus fleet, it is 'an even harder task to convert the private car fleet to zero emission, because [it is] all up to the financial decisions of individual households.'[137]

4.10 Mr Howard Collins, Chief Operations Officer, Greater Sydney, Transport for NSW, told the Committee that usage of public transport in Sydney may be as low as 17 per cent of the population. He drew the comparison between Sydney and London, in terms of residents' use of public transport:

> In London, 70 per cent of the people who commuted or worked in London went by public transport. I worked with mayors who made it quite obvious that if you wanted to use your car, you paid dearly. If you left it for two minutes on a street corner it was towed away and you had to spend £2,000 to get it back. However, here it's almost the reverse.[138]

4.11 Ms Julie Morgan, Executive Director, Environment and Sustainability, Safety Environment and Regulation, Transport for NSW, also told us that the COVID-19 pandemic has created 'some headwinds' in the transition away from private car

---

[131] Professor David Levinson, Professor of Transport, School of Civil Engineering and Net Zero Initiative, University of Sydney, Transcript of evidence, 19 August 2022, p 9.

[132] NSW Government, Key facts about NSW, viewed 25 October 2022.

[133] Submission 15, p 10.

[134] Dr Fishman, Transcript of evidence, 19 August 2022, p 13.

[135] Submission 12, p 3.

[136] Dr Eliot Fishman, Director, Institute for Sensible Transport, Transcript of evidence, 19 August 2022, p 8.

[137] Dr Fishman, Transcript of evidence, 19 August 2022, p 10.

[138] Mr Collins, Transcript of evidence, 19 August 2022, p 33.

use. In 2020-21, public transport patronage in Greater Sydney had fallen by 41.6 per cent on pre-pandemic figures.[139]

4.12 Ms Morgan acknowledged the need to transition NSW residents from car to public transport users. She said, 'Encouraging the transition from trips completed by car to public transport is crucial for lowering transport emissions.'[140]

Service and access improvements will increase the appeal of public transport

4.13 The Committee heard there are several ways that this transition could be achieved. Some stakeholders told us if improvements were made to the quality of public transport services, more people will use it. This includes:

- improvements to the integration of different modes of transport
- increasing service frequency
- consideration of how commuters access public transport
- fare structures that make public transport less costly
- the overall coverage of the network.[141]

4.14 Dr Fishman described how people 'don't make transport choices in isolation' – the decision to take public transport or use a private car is based on consideration of time, cost, convenience and safety. For many people in outer and suburban Sydney, 'public transport services don't provide a compelling value proposition to the user compared to the car.'[142]

4.15 Witnesses highlighted that connections between services were particularly important, especially for those who need to take multi-modal journeys on their way to work or home.

4.16 Dr Fishman told the Committee that it was important to have network and timetable integration across buses, ferries and trains, 'so that the amount of delay between transport services is minimised.'[143] As an example, he described an occasion when he rode a ferry on Parramatta River towards Circular Quay. A bus was waiting at the ferry terminal but, when the ferry was about 700 metres from a wharf, the bus departed and ferry passengers had to wait for the next service.

> That would've been a very easy problem to solve but, for one reason or another, the bus driver felt there was no need to wait for the ferry even though it was clear that

[139] Ms Julie Morgan, Executive Director, Environment and Sustainability, Safety Environment and Regulation, Transport for NSW, Transcript of evidence, 19 August 2022, pp 32-33.

[140] Ms Morgan, Transcript of evidence, 19 August 2022, p 32.

[141] Submission 15, p 15; Professor Levinson, Transcript of evidence, 19 August 2022, p 8.

[142] Dr Fishman, Transcript of evidence, 19 August 2022, pp 10, 13.

[143] Dr Fishman, Transcript of evidence, 19 August 2022, p 10.

> many people that disembarked the ferry were going to need to use the bus immediately afterwards.[144]

4.17 Professor David Levinson, Professor of Transport, School of Civil Engineering and Net Zero Initiative, University of Sydney, added that multi-modal journeys should be supported by 'public transport fare structures [that] don't penalise transfers between public transport modes.'[145]

4.18 Improving and integrating 'first and last mile' options for commuters are also important considerations for increasing uptake of public transport.[146] People need to have safe and convenient access to the public transport network in order to want to use it. The University of Sydney's Net Zero Initiative submitted that:

> While having fast, direct, frequent, and reliable public transport service is important, being able to get to that service is also critical. The travel times involved in accessing transit stations at either end are often as long as the time spent moving aboard the transit vehicle.[147]

4.19 The first and last stage of public transport journeys commonly include walking and cycling. Stakeholders also noted the need to consider micro-mobility options, like e-bikes and e-scooters, as part of first and last mile integration.[148] These micro-mobility devices are often electrically-powered and emission free, can extend the range of pedestrians and are 'increasingly used to replace or supplement traditional public transport modes.'[149]

4.20 Professor Levinson outlined a number of initiatives that could improve people's access to the public transport network. These include:

- constructing protected bike paths within a four-kilometre radius of public transport stations, for bikes and micro-mobility transport
- providing bike parking, and permitting shared micro-mobility services to have 'corrals', at all stations
- ensuring that all stops and stations have safe footpath connections within a one-kilometre radius.[150]

4.21 Mr Michael Timms, Deputy Chair, NSW Chapter, Australasian College of Road Safety, also described how the public transport network is reliant on non-motorised transport like walking and cycling. He told the Committee that pedestrian access to public transport stops was an important safety consideration, particularly for more vulnerable members of the community.

---

[144] Dr Fishman, Transcript of evidence, 19 August 2022, p 10.

[145] Professor Levinson, Transcript of evidence, 19 August 2022, p 8.

[146] Submission 23, Australasian College of Road Safety, p 4.

[147] Submission 18, University of Sydney Net Zero Initiative, p 5.

[148] Submission 18, p 5; Submission 12, p 4.

[149] Submission 18, p 5.

[150] Professor Levinson, Transcript of evidence, 19 August 2022, p 8.

> Is crossing the highway to get to the bus stop the riskiest part of the trip, particularly for seniors and people with a disability? The lack of safe walking, cycling and public transport infrastructure is a barrier to that modal shift towards sustainable transport.[151]

4.22 Witnesses from Transport for NSW (TfNSW) told the Committee that 'alternative strategies' to first and last mile journeys are being considered by TfNSW. This includes facilitating a range of zero-emission options for commuters, such as micro-mobility devices.[152] Mr Collins illustrated how European cities like Zurich have already accommodated this, with commuters afforded a 'sweet shop of choices' after arriving at a train station, such as using a shared scooter or bike for the next stage of their journey.[153]

Mobility as a service

4.23 'Mobility as a service' (MaaS) is also an important consideration in increasing the appeal of NSW's public transport network. The Committee has previously taken an interest in the implementation of the MaaS framework by TfNSW, in its 2021 inquiry into the transport technology sector.[154]

4.24 The MaaS framework utilises digital tools to allow customers to plan, book and pay for multiple transport services using a centralised platform, and provides a 'flexible, seamless and personalised transport experience.'[155] Ms Morgan told us that TfNSW is developing MaaS 'as a fully integrated public transport service, allowing travel across all modes in an easy and integrated way'.[156]

4.25 Mr Collins also outlined how MaaS is being considered as part of TfNSW sustainability strategies. MaaS represents a pathway to integrating mass transit systems with emission free micro-mobility options. He told us that TfNSW wants to ensure 'that the mobility of services are connected products, so you don't have to fumble for one app for the next app to get on your Lime scooter or whatever.'[157]

4.26 We were pleased to hear that TfNSW continues to work on the implementation of MaaS systems and policies. We urge the NSW Government and TfNSW to continue improving the service quality of the public transport network, particularly in terms of first and last mile options, and the integration of multi-modal journeys.

Encouraging people to choose public transport over private vehicles

4.27 There are further considerations about how to encourage use of public transport, with the aim of reducing overall transport emissions. This includes reducing the

---

[151] Mr Timms, Transcript of evidence, 19 August 2022, p 25.

[152] Ms Morgan, Transcript of evidence, 19 August 2022, pp 32-33; Mr Collins, Transcript of evidence, 19 August 2022, p 40.

[153] Mr Collins, Transcript of evidence, 19 August 2022, p 40.

[154] Committee on Transport and Infrastructure, *Transport technology sector*, report 2/57, Parliament of New South Wales, December 2021, recommendation 1, findings 1, 2-3, 5.

[155] *Transport technology sector*, pp 1-2.

[156] Ms Morgan, Transcript of evidence, 19 August 2022, p 33.

[157] Mr Collins, Transcript of evidence, 19 August 2022, pp 40, 43.

incentive to use private vehicles as a primary mode of transport, and urban planning and design that prioritises access to public transport.

4.28 We heard that increasing the appeal of public transport may be a case of discouraging travel by private car where possible. Dr Fishman described how road-user pricing could play a role in encouraging people to avoid using their cars. Distance-based pricing could charge people for travelling further by private car, which would serve as an effective 'price signal to help people make better transport choices'.[158]

4.29 Stakeholders also told us increasing uptake of public transport requires consideration of how our cities are designed and planned.

4.30 For example, the Australasian Railway Association described how 'placemaking' is essential to achieving the mode shift towards public transport. Effective placemaking in urban planning should 'limit people's need to travel to work, school or to access services', and encourage walking and cycling instead.[159] Professor Levinson also argued that higher density development should be permitted near train stations.[160]

4.31 The Committee notes that some planning has been undertaken by the NSW Government. Ms Morgan noted that the NSW Government has 'city-shaping plans' that target an increase in 'population densities around public transport nodes'.[161] TfNSW also submitted that a Net Zero Cities Action plan is in development, which will promote 'precinct-level projects' that encourage 'active transport solutions.'[162]

4.32 Each of the considerations outlined above provides the NSW Government with ways of achieving greater usage of NSW's current fleet of public transport vehicles, and of emission free fleets in the future.

4.33 The Committee recommends that the NSW Government work with TfNSW and other government agencies to set specific and urgent targets for the utilisation of public transport in NSW. These targets should be achievable within 5-10 years, but should be ambitious enough to see a significant increase in the number of people in NSW who choose to use public transport as a primary mode of transport.

[158] Dr Fishman, Transcript of evidence, 19 August 2022, pp 14-15.

[159] Answers to written questions, Australasian Railway Association, 10 October 2022, p 2.

[160] Professor Levinson, Transcript of evidence, 19 August 2022, p 8.

[161] Ms Morgan, Transcript of evidence, 19 August 2022, p 33.

[162] Submission 25, Transport for NSW, p 3.

Supporting NSW manufacturers through consistency and co-ordination across Australian jurisdictions

Recommendation 12

That the NSW Government work with the Commonwealth and other states and territories to develop a co-ordinated and nationally consistent approach to the local manufacture of emission free modes of public transport.

4.34 The Committee was interested in how national leadership and inter-jurisdictional coordination could better support local manufacturers. Witnesses told the Committee that transport manufacturers in NSW are often disadvantaged when it comes to exporting to other states and territories.

4.35 We heard that greater support could be provided at a national level, whereby the capacity and capabilities of NSW manufacturers could be developed through a co-ordinated Commonwealth response to the supply chain for emission-free bus, ferry and rail manufacturing.

4.36 The Committee recommends that NSW's response to supporting local manufacturers in the public transport sector should prioritise the development of a nationally consistent framework for supporting Australian manufacturers developing emission free modes of public transport.

4.37 As noted in the previous chapters, manufacturers in the bus, ferry and rail sectors face challenges to production and staffing when governments' procurement strategies do not offer long-term certainty and consistency. For example, the Australasian Railway Association (ARA) identified that the most critical factor in achieving a 'consistent demand pipeline' is to ensure 'a national approach and alignment between jurisdictions'.[163]

4.38 This is also true in bus manufacturing. Different procurement policies between states and territories can limit NSW manufacturers' ability to export to other Australian jurisdictions.[164]

4.39 We heard that some jurisdictions only procure buses from manufacturers based in that state or territory.[165] Mr Scott Dunn, Managing Director, Custom Denning, argued that it can be easier for bus manufacturers in NSW to 'export to the UK than to sell to Victoria', for example. He told the Committee:

> If you're based in New South Wales, it's very hard to supply to other states because all the other states procure local, except for New South Wales. Ninety-nine per cent of our orders are with New South Wales for that reason. If you're based in Queensland or if you're based in Victoria, you've actually got an advantage over New South Wales.[166]

[163] Answers to written questions, Australasian Railway Association, 10 October 2022, p 4.

[164] Mr Matt Threlkeld, Executive Director, BusNSW, Transcript of evidence, 19 August 2022, p 28.

[165] Mr Scott Dunn, Managing Director, Custom Denning, Transcript of evidence, 19 August 2022, pp 3-4.

[166] Mr Dunn, Transcript of evidence, 19 August 2022, pp 3-4.

4.40 If state governments worked more co-operatively, there would be greater potential for developing the Australian transport manufacturing sector's capacity to deliver emission free vehicles. Mr Rallapalli told the Committee that this may not be happening 'sufficiently enough'.[167]

> We are running the risk of almost creating a cottage industry within a cottage industry, if there is the continued dialogue around hyper-localisation of manufacturing. In different states the dialogue should be around value. What is the value chain? What is a supply chain? And what is the assistance needed at a national level?[168]

4.41 If state and territory jurisdictions support their own manufacturers at the expense of national supply chains, the effectiveness of the Australian transport manufacturing sector may be limited. Such an approach may produce duplications in supply or inefficiencies in manufacturing which, in turn, may reduce investment opportunities and the viability of Australian manufacturing operations.[169]

4.42 There would be numerous benefits to fostering a national approach to the local manufacture of public transport vehicles. For example, in relation to buses, TfNSW witnesses described the benefits of a common, rather than competitive, national approach to emission free public transport.

> It's actually seeing all the opportunities that could flow from this transformation, whether that's in terms of manufacturers, energy changes, changes to the grid, more renewable energy, the training and opportunities for people who work on these buses, and new skills and new industries.[170]

4.43 The Committee also heard that national co-ordination of transport manufacturing could leverage the capacity and capabilities of other industries, such as defence or mining.

4.44 Mr Rallapalli noted that Australia has 'the legacy of an automotive industry' and an associated skilled workforce, and that the mining and defence industries have technologies and components that could contribute to supply chains in bus manufacturing. Achieving co-ordination between jurisdictions and across different industries had the potential to 'indigenise the supply chain broader'.[171]

4.45 We heard that this was equally true for the maritime manufacturing sector. Mr Andrew Malcolm, Chief Digital Officer and Vice President Strategy and Commercial Development, Austal, also highlighted how the defence shipbuilding market presents opportunities to develop the capabilities of ferry manufacturers. Mr Malcolm suggested that co-ordination between civilian and defence vessel

---

[167] Mr Rallapalli, Transcript of evidence, 19 August 2022, p 3.

[168] Mr Rallapalli, Transcript of evidence, 19 August 2022, p 3.

[169] Answers to written questions, Australasian Railway Association, 10 October 2022, p 5.

[170] Ms Julie Morgan, Executive Director, Environment and Sustainability, Safety Environment and Regulation, Transport for NSW, Transcript of evidence, 19 August 2022, p 38.

[171] Mr Rallapalli, Transcript of evidence, 19 August 2022, p 3.

manufacturing could contribute to the sense of certainty that is needed for ferry manufacturers.

> …maximising supply from local suppliers across the country is a key part of all defence contracts in shipbuilding. They are improving their own outlook and certainty around future build programs. I think there is an opportunity to dovetail with the civilian market.[172]

4.46 Ms Terri Benson, Managing Director, Birdon Pty Ltd, drew a comparison with the construction sector. She told us how Infrastructure Partnerships Australia 'tries to pull together a pipeline view of what's happening in the construction sector', and argued that a similar arrangement in the maritime sector would be worthwhile.[173]

4.47 In addition to co-ordination of this sort, Mr Rallapalli told the Committee that support from the Commonwealth Government does not need to be confined to funding. He described how '[s]upport capability' could involve procurements or incentives for manufacturers. Mr Rallapalli made a further comparison with the Australian mining industry to illustrate that national leadership could lead to creating 'a national capability that has an export value as well'.[174]

4.48 The ARA also identified alternatives to direct funding or procurement. New national standards and requirements for rollingstock could help harmonise Australian transport manufacturing and supply. The ARA encouraged NSW to collaborate with other jurisdictions on 'research, trials and planning for the roll out of emissions free transport.'[175]

4.49 The Committee heard that some opportunities for collaboration and dialogue between NSW and national stakeholders are presently available. Mr John Tozer, Business Development Mangager, Volgren Pty Ltd, explained that local suppliers and operators in the bus sector meet through their national body, the Bus Industry Confederation (BIC). BIC conferences provide an opportunity for industry leaders to form a 'national voice' on relevant issues like manufacturing, financing and the electricity grid.[176]

4.50 Ms Gillian Geraghty, Chief Development Officer, Infrastructure and Place, Transport for NSW, also noted that the European-based International Association of Public Transport (UITP) convene roundtables for stakeholders and government agencies in Australia and New Zealand.[177]

4.51 However, the Committee believes that further opportunities exist for deepening and encouraging co-operation across Australian jurisdictions more formally.

---

[172] Mr Andrew Malcolm, Chief Digital Officer and VP Strategy and Commercial Development, Austal, Transcript of evidence, 19 August 2022, p 21.

[173] Ms Terri Benson, Managing Director, Birdon Pty Ltd, Transcript of evidence, 19 August 2022, p 21.

[174] Mr Rallapalli, Transcript of evidence, 19 August 2022, p 3.

[175] Answers to written questions, Australasian Railway Association, 10 October 2022, p 5.

[176] Mr John Tozer, Business Development Manager, Volgren Pty Ltd, Transcript of evidence, 19 August 2022, p 4.

[177] Ms Gillian Geraghty, Chief Development Officer, Infrastructure and Place, Transport for NSW, Transcript of evidence, 19 August 2022, p 38.

4.52 As the ARA identified, the Infrastructure and Transport Ministers Meeting (ITMM) would be a useful avenue for the NSW Government to pursue collaborative relationships with the Commonwealth Government and other states and territories. This could lead to greater harmonisation of state and territory government procurements.[178]

[178] Answers to written questions, Australasian Railway Association, 10 October 2022, p 5.

Appendix One – Terms of reference

That the Legislative Assembly Committee on Transport and Infrastructure inquire into and report on the feasibility of emission free modes of public transport in the long term, with particular reference to:

a) the capacity and capability for industry to provide emission free modes of public transport,

b) benefits and costs to taxpayers,

c) the opportunities for, and impact to, local manufacturing operations,

d) other jurisdictions that have emission free modes of public transport, and

e) any other related matters.

Appendix Two – Conduct of inquiry

Adopting terms of reference

On 19 May 2022, the Committee resolved to conduct an inquiry into the feasibility of emission free modes of public transport in the long term. The full terms of reference are at Appendix One.

Call for submissions

The Committee called for submissions through media releases and wrote to key stakeholders inviting them to make submissions. Information about the inquiry was posted on the Legislative Assembly's Facebook page and Twitter feed. Submissions were scheduled to close on 4 July 2022, however the Committee resolved to extend this deadline to 11 July 2022.

Twenty-nine submissions were received from the members of the community, transport manufacturers based in NSW and elsewhere in Australia, research groups, unions, peak bodies and advocacy groups, and government organisations.

A list of submissions is at Appendix Three and submissions are available on the Committee's website.

Site visits

The Committee members visited facilities of the following manufacturers:

- Monday, 1 August – Express Coach Builders, Macksville
- Monday, 1 August – Birdon Group, Port Macquarie
- Tuesday, 6 September – Custom Denning, St Marys
- Tuesday, 6 September – Nexport, Glendenning

Hearings

The Committee held one hearing at Parliament House on 19 August 2022. A second hearing was scheduled for 9 September, which was cancelled due to the suspension of Parliament as a result of the death of the Monarch. Members resolved to send written questions to relevant stakeholders in place of this second day of hearings.

A list of witnesses who appeared at the hearings is at Appendix Four. The transcript of evidence taken at the hearing is on the Committee website. The Committee thanks all witnesses who participated in the Committee's hearings.

Appendix Three – Submissions

No.	Author
1	Professor David Hensher
2	Mr Tony Prescott
3	Confidential
4	Mr Callum Dowling
5	Bus & Coach International Pty Ltd (trading as BCI)
6	Mr Benjamin Cronshaw
7	Confidential
8	Austal
9	Mr John Morandini
10	Ms Daisy Norfolk
11	Volgren Australia Pty Ltd
12	Climateworks Centre
13	Mr Andrew Fraser
14	Steber International
15	Institute for Sensible Transport
16	Harwood Marine
17	Public Transport Association Australia New Zealand
18	University of Sydney Net Zero Initiative
19	Department for Infrastructure and Transport (SA)
20	Transport Workers' Union of NSW
21	Confidential
22	Nexport Pty Ltd
23	Australasian College of Road Safety

24	BusNSW
25	Transport for NSW
26	BOC Limited
27	Custom Denning
28	Transdev Australasia Pty Ltd
29	Australian Rail, Tram and Bus Industry Union (NSW Branch)

Appendix Four – Witnesses

19 August 2022 – Macquarie Room, Parliament House, Sydney and via video conference

Witness	Position and Organisation
Mr Scott Dunn	Managing Director, Custom Denning
Mr Sid Rallapalli	Head of Global Partnerships, Nexport Pty Ltd
Mr Yuri Tessari	Chief Commercial Officer, Volgren Australia Pty Ltd
Mr Jon Tozer	Business Development Manager, Volgren Australia Pty Ltd
Dr Elliot Fishman	Director, Institute for Sensible Transport
Professor David Levinson	Professor of Transport in the School of Civil Engineering, University of Sydney Net Zero Initiative
Mr Cameron Rimington	Senior Project Manager - Transport, Climateworks Centre
Ms Terri Benson	Managing Director, Birdon Pty Ltd
Mr Tim Curtis	Capture Manager, Birdon Pty Ltd
Mr Andrew Malcolm	Chief Digital Officer and Vice President Strategy and Commercial Development, Austal
Mr Matt Threlkeld	Executive Director, BusNSW
Mr John King	President, BusNSW
Mr Michael Timms	Deputy Chair, NSW Chapter, Australasian College of Road Safety
Ms Marija Marsic	Assistant State Secretary, Director of WHS & Education, Transport Workers' Union of NSW
Ms Emily Armstrong	WHS & Research Official, Transport Workers' Union of NSW
Mr Jason Hart	Industrial Officer, Australian Rail, Tram and Bus Industry Union (NSW Branch)

Mr Rhys Patton	Intern, Australian Rail, Tram and Bus Industry Union (NSW Branch)
Mr Howard Collins	Chief Operations Officer, Greater Sydney, Transport for NSW
Ms Gillian Geraghty	Chief Development Officer, Infrastructure and Place, Transport for NSW
Ms Julie Morgan	Executive Director, Environment and Sustainability, Safety Environment and Regulation, Transport for NSW
Ms Rebecca McPhee	Deputy Chief Executive, Sydney Metro, Transport for NSW

Appendix Five – Site visits report

In August and September 2022, members of the Legislative Assembly's Committee on Transport and Infrastructure and secretariat conducted a series of site visits to support its inquiry into emission free modes of public transport. We visited:

- Express Coach Builders, Macksville
- Birdon Group, Port Macquarie
- Custom Denning, St Marys
- Nexport, Glendenning

The site visits allowed the Committee to see current and emerging emission free technologies first-hand, as well as to hear from manufacturers about challenges and opportunities in their industries.

The inquiry explored numerous technical considerations related to the feasibility of emission free transport technologies, and the site visits were very informative for the Committee. By seeing manufacturing facilities and new emission free vehicles first-hand, the Committee was able to appraise the capabilities and capacity of local manufacturers to contribute to the transition to emission free public transport.

During its Mid North Coast trip, the Committee visited the Birdon shipyard in Port Macquarie, where we heard about Birdon's innovative projects that have been completed in NSW and internationally. Committee members were particularly interested to hear about some of the specific challenges and opportunities related to the electrification of marine vessels.

We also had the opportunity to visit Express Coach Builders (ECB), a bus bodybuilder in Macksville. The Committee had productive discussions with senior staff about the unique operating environment for transport manufacturers based in regional NSW, and learned more about the design and production processes of ECB's zero emission buses.

We also visited Custom Denning and Nexport in Western Sydney, who are both Australian-owned companies with impressive facilities and design concepts. Both are manufacturing zero emission buses for the New South Wales bus fleet, and the Committee was grateful to hear their views on how bus manufacturers can be supported by the NSW Government.

Reducing emissions caused by public transport fleets represents a significant challenge for jurisdictions in Australia and internationally, but the Committee was encouraged by seeing the capabilities and expertise that exist in both metropolitan and regional NSW.

The Committee would like to express its gratitude to: Mr Dale Hancox, Manager, Express Coach Builders; Ms Terri Benson, Managing Director, Birdon; Mr Scott Dunn, Managing Director, Custom Denning; and Mr Michael van Maanen, Chief Executive Officer, Nexport.

We would also like to thank the managers and staff at ECB, Birdon, Custom Denning and Nexport for facilitating these site visits, and for sharing their considerable expertise with us, particularly those who appeared at the public hearing. In addition to stakeholders' submissions

and evidence given at the public hearing, the site visits played an important role in informing our understanding of this topic.

Appendix Six – Extracts from minutes

MINUTES OF MEETING No 13
3:08PM, 7 April 2022
Room 1043 and via Webex videoconference

Members present
Mr James, Mr Taylor (via Webex), Dr O'Neill, Mrs Pavey, Ms Haylen

Officers in attendance

Carly Maxwell (Deputy Clerk of the Legislative Assembly), Sam Griffith, Caroline Hopley, Imogen Wurf and Ze Nan Ma.

Under Standing Order 282, the Deputy Clerk of the Legislative Assembly opened the meeting.

Agenda

1. Committee membership

The Deputy Clerk advised the Committee of the change in membership, as recorded in the Votes and Proceedings of Thursday 31 March 2022, entry 17(7), where Timothy Charles James, Mark Owen Taylor and Melinda Jane Pavey were appointed to the Committee in place of Eleni Marie Petinos, Robyn Anne Preston and Gurmesh Singh who were discharged from the Committee.

The Deputy Clerk welcomed the new members and acknowledged the work and contribution of the previous members.

2. Election of Chair

The election for Chair was held under Standing Order 282.

There being a vacancy in the office of Chair of the Committee, the Deputy Clerk called for nominations for the office of Chair.

Mr Taylor proposed Mr James to be Chair. Seconded by Ms Pavey. No further nominations were received. There being only one nomination, the Deputy Clerk declared Mr James to be the Chair.

Mr James took the Chair.

3. Election of Deputy Chair

There being a vacancy in the office of Deputy Chair of the Committee, the Chair called for nominations for the office of Deputy Chair.

Mr James proposed Mr Taylor to be Deputy Chair. Seconded by Ms Pavey. No further nominations were received. There being only one nomination, the Chair declared Mr Taylor to be the Deputy Chair.

4. Standard procedural motions

The Committee noted the standard procedural motion adopted by the Committee at its first meeting as circulated to all members.

5. General Business

The Chair informed the Committee that he will contact each member prior to the next meeting to discuss their thoughts regarding a suitable topic for an inquiry.

Ms Haylen and Ms Pavey proposed topic areas that may be of interest to the Committee.

Discussion ensued.

6. Next meeting

The meeting adjourned at 3:14pm until a time and place to be determined.

MINUTES OF MEETING No 14

1:32PM, 19 May 2022

McKell Room and via Webex videoconference

Members present

Mr James, Mr Taylor (via Webex), Dr O'Neill, Mrs Pavey

Officers in attendance

Samuel Griffith, Imogen Wurf, Nathalie Pinson

Apologies

Ms Haylen

Agenda

1. Confirmation of minutes

Resolved, on the motion of Dr O'Neill, seconded Mrs Pavey: That the minutes of the meeting of 9 December 2021 be confirmed.

2. Motion to record the meeting

Resolved, on the motion of Mrs Pavey, seconded by Mr Taylor: That the meeting be recorded for the use of the Committee Secretariat

3. Proposed Inquiry – Emission Free Modes of Public Transport

The Chair proposed a new inquiry topic and spoke to the draft terms of reference.

Discussion ensued.

Resolved on the motion of Mrs Pavey, seconded by Mr Taylor:

- That the Committee conduct an inquiry into Emission Free Modes of Public Transport in accordance with the following terms of reference:
- That the Legislative Assembly Committee on Transport and Infrastructure inquire into and report on the feasibility of emission free modes of public transport in the long term, with particular reference to:
    - a) the capacity and capability for industry to provide emission free modes of public transport,
    - b) benefits and costs to taxpayers,
    - c) the opportunities for, and impact to, local manufacturing operations,
    - d) other jurisdictions that have emission free modes of public transport, and
    - e) any other related matters.
- That the Secretariat circulate a list of stakeholders to members, and that members have 3 business days after receiving that list to provide further input;
- That the Committee call for submissions to be received by 4 July 2022 and write to the listed stakeholders;
- That the Chair issue a media release announcing the inquiry; and
- That the Committee note the indicative inquiry timeline and that it be amended to include a site visit in August/September.

4. General Business

Nil

5. Next meeting

The meeting adjourned at 1:52pm until a time and date to be set.

MINUTES OF MEETING No 15

4:06PM, 27 June 2022
Webex videoconference

Members present (via Webex)

Mr James, Mr Taylor, Dr O'Neill, Mrs Pavey

Officers in attendance

Rohan Tyler, Matthew Johnson, Imogen Wurf, Nathalie Pinson

Apologies

Ms Haylen

Agenda

1. Confirmation of minutes

Resolved, on the motion of Mr James, seconded by Mrs Pavey: That the minutes of the meeting of 19 May 2022 be confirmed.

2. Site visits for inquiry into emission free modes of public transport

The Chair updated the Committee on proposed plans to visit a number of transport manufacturers in NSW.

Discussion ensued.

Resolved, on the motion of Mr James, seconded by Mr Taylor: That the Committee, subject to funding approval from the Speaker, undertake up to two days of site visits for its inquiry into emission free modes of public transport.

3. General business

The Chair updated the Committee on the submissions that have been received to date to the inquiry into emission free modes of public transport.

Discussion ensued.

Resolved on the motion of Mr James, seconded by Mr Taylor:

- That the Committee extend the deadline for submissions until 11 July 2022 and write to the listed stakeholders (circulated at the previous meeting) advising them of the extension;
- That the Chair issue a media release announcing the extension of the deadline for submissions; and

That the relevant details be updated on the Committee's webpage.

4. Next meeting

The meeting adjourned at 4:24pm until a time and date to be confirmed.

MINUTES OF MEETING No 16

9:04AM, 27 July 2022
Webex videoconference

Members present (via Webex)

Mr James, Ms Haylen, Dr O'Neill

Officers in attendance

Sam Griffith, Matthew Johnson, Imogen Wurf and Nathalie Pinson

Apologies

Mr Taylor, Mrs Pavey

Agenda

1. Confirmation of minutes

Resolved, on the motion of Dr O'Neill, seconded by Ms Haylen: That the minutes of the meeting of 27 June 2022 be confirmed.

2. ***

3. Inquiry into emission free modes of public transport

a. Submissions and publication table

The Committee discussed the submissions that have been received for the inquiry.

Resolved, on the motion of Mr James, seconded by Ms Haylen: That the committee accept and authorise the publication in full of submissions 1, 2, 4-6, 8-19, and 22-29.

Resolved, on the motion of Mr James, seconded by Dr O'Neill: That the Committee accept submissions 3, 7, and 21 and authorise them to be treated as confidential.

Resolved, on the motion of Mr James, seconded by Ms Haylen: That the Committee accept and authorise the partial publication, with redactions, of submission 20 with the first paragraph on page 6 redacted.

4. General Business

Nil.

5. Next meeting

The meeting adjourned at 9:26am until 9:00am on 1 August at Sydney Airport.

MINUTES OF MEETING No 17

9:16AM, 19 August 2022
Macquarie Room

Members present

Mr James, Mr Taylor, Ms Haylen, Dr O'Neill, Mrs Pavey

Officers in attendance

Sam Griffith, Matthew Johnson, Nathalie Pinson and Gerard Rajakariar.

Apologies

Nil.

Agenda

1. Confirmation of minutes

Resolved, on the motion of Mr James, seconded by Ms Haylen: That the minutes of the meeting of 27 July 2022 be confirmed.

2. Pre-hearing deliberative meeting

2.1 Procedural resolutions

Resolved on the motion of Mr James, seconded by Ms Haylen:

- That the Committee invites the witnesses listed in the notice of the public hearing for Friday, 19 August 2022 to give evidence in relation to the inquiry into emission free modes of public transport.
- That the Committee authorises the audio-visual recording, photography and broadcasting of the public hearing on 19 August 2022 in accordance with the NSW Legislative Assembly's guidelines for coverage of proceedings for parliamentary committees administered by the Legislative Assembly.
- That witnesses be requested to return answers to questions taken on notice and supplementary questions within 7 days of the date on which the questions are forwarded, and that once received, answers be published on the Committee's website.

2.2 Correspondence

The Committee noted correspondence received from stakeholders that declined the Committee's invitation to appear at the Public Hearing:

- Email from Emily Anderson, Business Development Officer, Transdev, dated 12 August 2022
- Email from Ian Shore, Customer Director, Alstom, dated 14 August 2022
- Email from the Office of the Chief Executive, South Australian Department of Infrastructure and Transport, dated 15 August 2022

2.3 Public hearing on 9 September 2022

The Committee discussed holding a brief second public hearing featuring rail stakeholders, in place of the private briefing scheduled for 9 September 2022.

Resolved, on the motion of Mr Taylor, seconded by Ms Haylen: That rail stakeholders be invited to attend a public hearing to be held on Friday 9 September 2022.

The Chair adjourned the meeting at 9:19 am.

3. Public Hearing: inquiry into emission free modes of public transport

Witnesses and the public were admitted. The Chair opened the public hearing at 9:35 am and made a short opening statement.

Mr Scott Dunn, Managing Director, Custom Denning, was sworn and examined.

Mr Sid Rallapalli, Head of Global Partnerships, Nexport Pty Ltd, was affirmed and examined.

Mr Yuri Tessari, Chief Commercial Officer, Volgren Australia Pty Ltd, was affirmed and examined via videoconference. Mr John Tozer, Business and Development Manager, Volgren Australia Pty Ltd, was affirmed and examined via videoconference.

Mr Dunn, Mr Rallapalli and Mr Tessari each made an opening statement. The Committee questioned the witnesses. Evidence concluded and the witnesses withdrew.

Dr Elliot Fishman, Director, Institute for Sensible Transport, was affirmed and examined via videoconference.

Professor David Levinson, Professor of Transport, School of Civil Engineering and Net Zero Initiative, University of Sydney, was affirmed and examined via videoconference.

Mr Cameron Rimington, Senior Project Manager, Transport, Climateworks Centre, was affirmed and examined via videoconference.

Dr Fishman, Professor Levinson and Mr Rimington each made an opening statement. The Committee questioned the witnesses. Evidence concluded and the witnesses withdrew.

The Chair adjourned the hearing at 11:04 am.

The Chair resumed the public hearing at 11:16 am. Witnesses and the public were admitted.

Ms Terri Benson, Managing Director, Birdon Pty Ltd, was affirmed and examined via video conference.

Mr Tim Curtis, Capture Manager, Birdon Pty Ltd, was affirmed and examined via videoconference.

Mr Andrew Malcolm, Chief Digital Officer and VP Strategy and Commercial Development, Austal, was affirmed and examined via videoconference.

Mr Malcolm and Ms Benson each made an opening statement. The Committee questioned the witnesses. Evidence concluded and the witnesses withdrew.

The Chair adjourned the meeting at 12.06 pm.

The Chair resumed the public hearing at 12.13 pm. Witnesses and the public were admitted.

Mr Matt Threlkeld, Executive Director, BusNSW, was affirmed and examined via videoconference.

Mr John King, President, BusNSW, was affirmed and examined via videoconference.

Mr Michael Timms, Deputy Chair, NSW Chapter, Australasian College of Road and Safety, was sworn and examined.

Ms Marija Marsic, Assistant State Secretary, Director of WHS & Education, Transport Workers' Union of NSW, was affirmed and examined via videoconference.

Ms Emily Armstrong, WHS & Research Official, Transport and Workers' Union of NSW was affirmed and examined via videoconference.

Mr Jason Hart, Industrial Officer, Australian Rail, Tram and Bus Industry Union (NSW Branch), was affirmed and examined via videoconference.

Mr Rhys Patton, Intern, Australian Rail, Tram and Bus Industry Union (NSW Branch), was affirmed and examined via videoconference.

Mr Timms, Ms Marsic, Mr Hart and Mr Threlkeld each made an opening statement. The Committee questioned the witnesses. Evidence concluded and the witnesses withdrew.

The Chair adjourned the hearing at 12.59 pm.

The Chair resumed the public hearing at 2:14 pm. Witnesses and the public were admitted.

Mr Howard Collins, Chief Operations Officer, Greater Sydney, Transport for NSW, was sworn and examined.

Ms Gillian Geraghty, Chief Development Officer, Infrastructure and Place, Transport for NSW, was sworn and examined.

Ms Rebecca McPhee, Deputy Chief Executive, Sydney Metro, Transport for NSW, was affirmed and examined.

Ms Julie Morgan, Deputy Chief Executive, Sydney Metro, Transport for NSW, was affirmed and examined. Ms Julie Morgan made an opening statement. The Committee questioned the witnesses. Evidence concluded and the witnesses withdrew.

The public hearing concluded at 3.27 pm.

4. Post-hearing deliberative meeting

The Committee commenced a deliberative meeting at 3.28 pm.

4.1 Procedural resolutions

Resolved on the motion of Ms Haylen, seconded by Mr Taylor:

- That the corrected transcripts of public evidence given on Monday and today be authorised for publication and uploaded on the Committee's website.
- That answers to questions taken on notice and supplementary questions be accepted by the Committee and published on the Committee's website.

4.2 Documents tendered

Resolved on the motion of Ms Haylen, seconded by Mr Taylor: That the Committee accept and approve the publication of the following document tendered by Dr Elliot Fishman, Director, Institute for Sensible Transport, during the public hearing:

- Powerpoint slides, Emission free modes of public transport.

4.3 Evidence from the Transport Workers Union

The Committee discussed the evidence given today by witnesses from the Transport Workers' Union of NSW, and offering a right of reply to Transit Systems Australia.

Resolved, on the motion of Mr Taylor, seconded by Ms Pavey: That the Committee forward the evidence given by witnesses from the Transport Workers' Union of NSW to Transit Systems Australia, inviting them to respond in writing to the Committee within two weeks of receipt, with the response to be published on the Committee's webpage.

4. General Business

The Committee discussed arrangements for the upcoming sites visits on 6 September 2022.

5. Next meeting

The meeting adjourned at 3.36 pm until 6 September 2022 at a time to be determined.

UNCONFIRMED MINUTES OF MEETING No 18

1:50PM, 22 November 2022
Room 1136, Parliament House; Videoconference

Members present

Mr James, Mr Taylor (videoconference), Ms Haylen (videoconference), Dr O'Neill (videoconference), Mrs Pavey

Officers in attendance

Leon Last, Matthew Johnson, Patrick Glynn, Nathalie Pinson and Hayley Jarrett.

Apologies

Nil.

Agenda

1. Confirmation of minutes

Resolved, on the motion of Mrs Pavey, seconded by Mr Taylor: That the minutes of the meeting of 19 August 2022 be confirmed.

2. Inquiry into emission free modes of public transport

2.1 Evidence from the Australasian Railway Association

Resolved, on the motion of Mrs Pavey, seconded by Mr Taylor:

That the Committee:

- notes its agreement via email to send written questions to the Australasian Railway Association in lieu of the public hearing scheduled for 9 September 2022 and
- accept the answers to written questions as evidence, and publishes them on its webpage with contact details redacted.

2.2 Responses to questions taken on notice and supplementary questions

The Committee received the following answers to questions on notice and answers to supplementary questions:

- Answers to questions on notice and supplementary questions from Transport for NSW
- Answers to questions on notice from BusNSW
- Answers to supplementary questions from the Australian Rail, Tram and Bus Industry Union
- Answers to supplementary questions from the Transport Workers' Union of NSW
- Answers to supplementary questions from Austal
- Answers to supplementary questions from Volgren
- Answers to supplementary questions from Custom Denning
- Answers to supplementary questions from Birdon

Resolved, on the motion of Mrs Pavey, seconded by Ms Haylen: That the Committee accept the listed answers to questions on notice and supplementary questions, and publish on its webpage with contact details redacted.

2.3 Transcript correction from Mr Michael Timms

The Committee noted a letter of clarification from Mr Michael Timms, Deputy Chair, NSW Chapter, Australasian College of Road Safety, received on 13 September 2022. Mr Timms requested a minor correction to the transcript of the public hearing of 19 August 2022, which the secretariat has made.

2.4 Correspondence to Transit Systems Australia

The Chair sent a letter to Mr Jamie Sinclair, General Manager, Transit Systems NSW (TSA) on 20 September 2022, following the Committee's resolution to invite TSA to respond within two weeks to evidence given to the inquiry by the Transport Workers' Union of NSW (TWU). The Committee noted that it has not received a response.

2.5 Consideration of the Chair's draft report

The Committee considered the Chair's draft report of the inquiry into emission free modes of public transport.

By concurrence of all members, the Committee agreed to consider the report in globo.

Resolved, on the motion of Ms Haylen, seconded by Mr Taylor:

1. That the draft report be the report of the Committee and that it be signed by the Chair and presented to the House.
2. That the Chair and Committee staff be permitted to correct stylistic, typographical and grammatical errors.
3. That, once tabled, the report be published on the Committee's webpage.

The Committee acknowledged the secretariat's work in collating the evidence from stakeholders and drafting useful recommendations for the report.

3. General business

The Chair noted that this is the final meeting of the Committee for the 57th Parliament, and thanked members for their contributions to the Committee's work.

Members thanked the secretariat for their efforts and support throughout the inquiry.

The meeting closed at 2.05pm.

Appendix Seven – Glossary

ARA	Australasian Railway Association
BIC	Bus Industry Confederation
DAS	Driver Advisory Systems
DPIE	Department of Planning, Industry and Environment
HVAC	Heating, ventilation and air conditioning
ITMM	Infrastructure and Transport Ministers Meeting
MaaS	Mobility as a service
TAFE	Technical and Further Education NSW
TfNSW	Transport for New South Wales
ZEB	Zero emission bus