

# Transport and Infrastructure Net Zero Consultation Roadmap

## Take the survey

Department of Climate Change, Energy, Environment and Water

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Yes
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Yes
- 5 First name  
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Organisation

10 Organisation name

Engineers Australia

11 What best describes you or your organisation?

Not for profit

12 What sector do you represent?

Other: "Engineers across all sectors"

13 What state or territory do you live in?

Australian Capital Territory

14 Postcode

2600

15 What area best describes where you live?

City

16 1. Do you support the proposed guiding principles?

Yes

17 1.1 Please add details to your response.

Not answered

18 2. Do you support the use of the avoid-shift-improve framework as a tool to identify opportunities for abatement?

Yes

- 19 2.1 Please add details to your response.  
Not answered
- 20 3. Do you agree the development of a national policy framework for active and public transport will support emissions reduction?  
Yes
- 21 3.1 Please add details to your response.  
Not answered
- 22 4. What should be included in a national policy framework for active and public transport and how should it be developed?  
Not answered
- 23 5. What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to ensure the movement of people contributes to transport emissions reduction?  
Not answered
- 24 6.1 What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to ensure that the movement of goods contributes to transport emissions reduction?  
Not answered
- 25 6.2. How would these actions address the identified challenges and opportunities for emissions reduction in the movement of goods?  
Not answered
- 26 7. Do you agree with the proposed net zero pathway for light road vehicles?  
Yes

- 27 7.1 Please add details to your response.  
Not answered
- 28 8. The Australian Government is currently developing an Australian New Vehicle Efficiency Standard and has already begun to implement actions in the National Electric Vehicle Strategy.8.1 What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to reduce light vehicle emissions?  
Not answered
- 29 8.2 How would these actions address the identified challenges and opportunities to reduce light vehicle emissions?  
Not answered
- 30 9. Do you agree with the proposed net zero pathway for heavy road vehicles?  
Yes
- 31 9.1 Please add details to your response  
Not answered
- 32 10. The proposed pathway for heavy road vehicles relies on a mix of battery electric, hydrogen fuel-cell and low carbon liquid fuels.Rank from 1 to 3, the order in which these should be prioritised for emissions reduction.  
Not answered
- 33 10.1 Please add details to your response. Why did you rank them in that order?  
Not answered
- 34 11. What role should low carbon liquid fuels play in the heavy vehicle

decarbonisation?

Not answered

35 12. What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to reduce heavy vehicle emissions?

Not answered

36 13. Do you agree with the proposed net zero pathway for rail?

Yes

37 13.1 Please add details to your response.

Not answered

38 14. The proposed pathway for rail relies on a mix of battery electric, hydrogen fuel-cell and low carbon liquid fuels. Rank from 1 to 3, the order in which these should be prioritised for emissions reduction.

Not answered

39 14.1 Please add details to your response. Why did you rank them in that order?

Not answered

40 15. What role should low carbon liquid fuels play in rail decarbonisation?

Not answered

41 16. What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to reduce rail emissions?

Not answered

42 16.1 How would these actions address the identified challenges and

opportunities to reduce rail emissions?

Not answered

43 17. Do you agree with the proposed net zero pathway for maritime?

Yes

44 17.1 Please add details to your response.

Not answered

45 18. The Australian Government is engaging in consultation as part of the development of the Maritime Emissions Reduction National Action Plan and those consultations will also inform the final Roadmap and Action Plan. 18.1 What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to reduce maritime emissions?

Not answered

46 18.2 How would these actions address the identified challenges and opportunities to reduce maritime emissions?

Not answered

47 19. Do you agree with the proposed net zero pathway for aviation?

Not answered

48 19.1 Please add details to your response.

Not answered

49 20. The Australian Government has already engaged in consultation on aviation decarbonisation through the development of the Aviation White Paper and those consultations will also inform final Roadmap and Action Plan.

Not answered

- 50 20.1 What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to reduce aviation emissions?  
Not answered
- 51 21. Do you agree with the proposed net zero pathway for transport infrastructure?  
Yes
- 52 21.1 Please add details to your response.  
Not answered
- 53 22. What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to reduce transport infrastructure emissions and ensure that transport infrastructure is ready for and enables low-emission transport modes?  
Not answered
- 54 22.1 How would these actions address the identified challenges and opportunities to reduce transport infrastructure emissions?  
Not answered
- 55 23. What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to ensure the energy mix is ready to support transport emissions reduction?  
Not answered
- 56 24. How should the use of low carbon liquid fuels (LCLFs) be prioritised across different transport modes over time to achieve maximum abatement?  
Not answered

- 57 25. What are the best ways for the Australian Government to work collaboratively with industry, business, governments and communities to implement the proposed pathways?  
Not answered
- 58 25.1 What are good domestic or international examples of partnership and collaboration on transport and transport infrastructure emissions reduction that could inform the final Roadmap and Action Plan?  
Not answered
- 59 25.2 What opportunities can Government leverage to show leadership in Australia and internationally?  
Not answered
- 60 26. What measures and metrics should be used to evaluate the final Transport and Infrastructure Net Zero Roadmap and Action Plan?  
Not answered
- 61 26.1 What other data and evidence could governments use and how could this offer further insights on the pace, scale and location of transport emissions reduction pathways?  
Not answered
- 62 27. Do you have any feedback on the proposed review process?  
Not answered
- 63 28. Do you have any further feedback on the Consultation Roadmap and proposed pathways?  
Not answered
- 64 28.1 Is there anything missing? Are the sections appropriately integrated? Is the Roadmap appropriately ambitious?  
Not answered

65 29. Is there any further information or documentation that you wish to be considered with your submission?

Not answered

66 Would you like to upload a document?

Yes

67 Have you removed any identifying information from your submission?

Yes

68 Upload a submission

EA\_Submission\_Transport-and-Infrastructure-Net-Zero-Consultation-Roadmap.pdf

69 Upload a submission

Not answered

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Not answered





ENGINEERS  
AUSTRALIA



# Transport and Infrastructure Net Zero Consultation Roadmap



Engineers Australia Submission

## Transport and Infrastructure Net Zero Consultation Roadmap: Engineers Australia Submission

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# Executive Summary

Engineers Australia **endorses the development of the roadmap and action plan** for the transport and infrastructure sectoral component of Australia's Net Zero Plan. We welcome the opportunity to provide advice on a government consultation that delivers on the entirety of Engineers Australia's policy agenda: a sustainable future, a skilled future and an innovative and productive future.

Engineers play a critical role in planning, designing, building, commissioning, testing, operating and maintaining transport modes and infrastructure assets throughout Australia. They bring important insights into the critical role transport modes and infrastructure play in delivering on Australia's net zero ambitions. Although critical, we recognise that the decarbonisation of transport modes and infrastructure alone cannot achieve our national net zero goals.

Individual and collective behavioural change plays a critical role in the holistic decarbonisation of Australia's transport and infrastructure sector. The Transport and Infrastructure Net Zero Consultation Roadmap's current focus on rethinking our transport systems, particularly for active and public transport is welcome. This transformational, systems planning approach is the most effective way to achieve other societal goals such as supporting economic prosperity and designing equitable and inclusive transport systems for all while simultaneously achieving Australia's net zero goals.

This submission voices support for the proposed policy developments and general agreement with the anticipated net zero pathways for the various modes of transport discussed in the consultation paper. A diverse range of actions to maximise the opportunities presented by decarbonising our transport and infrastructure sector are presented in this submission. These recommendations are summarised below.

## Recommendations

### Section 1: Transport and Infrastructure Net Zero

- Consider the addition of non-carbon resources and non-human benefits to transport in the proposed guiding principles
- Ensure the hierarchy of the avoid-shift-improve framework is made explicit

### Section 2: Rethinking our transport network and systems

- Align and integrate the Transport and Infrastructure Sector Consultation Roadmap with other relevant existing or forthcoming decarbonisation plans, urban planning and transport policies
- Challenge Australia's traditional urban policy approach with the re-prioritisation of public and active transport – reflect this in Australian Government discourse around net zero transport and infrastructure
- Subsidise rail transport for freight to incentivise uptake
- Support the fast movement of road freight to minimise current road emissions
- Reduce the number of trips required beyond our borders

### Section 3: Net zero pathways for each transport mode

- Reduce the cost of electric vehicles
- Support the development of public electric vehicle charging infrastructure
- Plan for and support vehicle-to-grid integration
- Apply whole-of-life considerations to the decarbonisation of light vehicles
- Increase consumer access to information for light vehicles
- Invest in and take a systems approach towards an Australian battery industry, domestic green hydrogen and sustainable aviation fuel (SAF) production
- Develop a guarantee of origin or other certification scheme for hydrogen or other low carbon liquid fuels

- Increase funding for rail maintenance to reinvigorate rural rail infrastructure
- Incentivise fuel-switching to lower emissions fossil fuels in the short term and support price competition of low- and no-carbon renewable fuel sources, particularly for maritime transport
- Apply different decarbonisation policy settings by aircraft type
- Mandate the use of ADS-B transponders or fuel use monitors on civilian aircraft
- Create sector-specific definitions of hard-to-abate emissions

#### Section 4: Supporting transport's net zero pathways

- Ensure Australian transport infrastructure is adapted to current and future climate change impacts to avoid additional embodied carbon emissions
- Review existing transport infrastructure design standards and planning practices in the context of new energy and fuel source transport modes
- Centralised planning of the national electricity system is key to a renewable energy future

#### Section 5: Achieving net zero together

- Include support for the development of net zero transport workforce skills
- Include support for the adoption of innovative practices in transport and infrastructure development

# 1. Introduction

## 1.1 About Engineers Australia

As Australia's national body for engineering, Engineers Australia is the voice and champion of our 120,000-plus members. We provide them with the resources, connections, and growth they need to do ethical, competent and high-value work in our communities. A mission-based, not-for-profit professional association, Engineers Australia is constituted by Royal Charter to advance the science and practice of engineering for the benefit of the community. We are gold supporters of Infrastructure Net Zero and enthusiastic members of the Australian Sustainable Built Environment Council.

Engineers Australia maintains national professional standards, benchmarked against international norms. As Australia's signatory to the International Engineering Alliance, this includes accreditation of undergraduate university engineering programs.

Engineers are passionate participants in public discourse, contributing to meaningful community and policy discussions that impact the economy and society. Engineers Australia formulates its policy positions through engagement with members and non-member engineers, industry, educators, government officials, and other experts across Australia and internationally. By synthesising these diverse perspectives, we develop evidence-based policy aligned with the highest professional standards.

## 1.2. Transport and Infrastructure Net Zero

Engineers Australia **endorses the development of the roadmap and action plan approach** for the transport and infrastructure sectoral component of Australia's Net Zero Plan. We welcome the opportunity to provide advice on a government consultation that delivers on the entirety of Engineers Australia's policy agenda: a sustainable future, a skilled future and an innovative and productive future.

Engineers Australia **broadly agrees with the proposed guiding principles** for the development of the roadmap and action plan. To keep in line with the circular economy principles being applied across sectors in the development of the Net Zero Plan in addition to the carbon resources considered in the principle, 1. *Maximise emissions reduction*, Engineers Australia **suggests other key environmental**

**resources such as water and biodiversity be factored into the plan.** This is due not only to the massive material consumption of the transport and infrastructure sector but also the significant land use requirements of many of the recommendations in the roadmap. This inclusion could be achieved either via broadening the principle, *4. Inclusive and equitable*, to include broader environmental considerations, or via the addition of a new principle focused on the non-carbon resource and non-human aspects of the transport and infrastructure environment.

**The avoid-shift-improve framework** as a tool to identify opportunities for abatement is supported by Engineers Australia. While the hierarchical nature of the framework is acknowledged in the consultation glossary, we recommend the hierarchy be made more explicit in the final plan. This avoids the risk of overreliance on technological solutions (improve) to achieve emissions reduction outcomes and ensures a robust, multi-pronged approach with the prioritisation of behavioural and systemic improvements (avoid and shift). These measures also have a higher likelihood of delivering both emissions reductions and other co-benefits (such as human health and well-being).

## 2. Rethinking our transport networks and systems

### 2.1. Movement of people: promoting active and public transport

Engineers Australia agrees that **the development of a national policy framework for active and public transport will support emissions reduction.** A national policy framework allows for a systems-based approach to transport decarbonisation strategy, facilitating and enhancing a much-needed collaboration and connection between people and place. This approach allows for simultaneously achieving other societal goals such as transport design for equity, inclusion and safety, and minimising harms, such as those caused by unintentionally moving emissions to other sectors or overseas (known as carbon leakage).

**The areas identified for government leadership and investment to be included in a national policy framework for active and public transport are supported.** A national policy framework should be developed with the intent of challenging the status quo of Australian transport modes, currently dominated by private vehicles. It should be aligned with other relevant national planning policies such as the National Urban Policy<sup>1</sup> (when it is finalised) and the Infrastructure Policy Statement<sup>2</sup> as well as with state and territory government planning policies.

Australia's predominant urban transport policy approach has been to increase road capacity to accommodate population growth. This creates two key challenges:

1. Road widening creates a trade-off with active transport

Road widening often competes for the same land that is required by active transport infrastructure, such as pedestrian or cycling pathways. In the context of ever-increasing competition for land uses in Australia's urban environments, the expansion of road development and the increase in active transport infrastructure are often mutually exclusive. The result is that if future light-vehicle usage growth projections are realised, even if zero emissions, they are likely to result in a constrained set of active transportation options.

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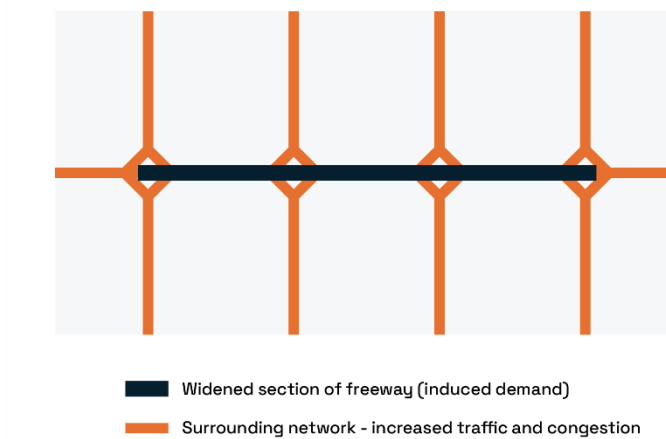
<sup>1</sup> Australian Government, 2024, *National Urban Policy: Consultation Draft*, accessed 23 July 2024, <https://www.infrastructure.gov.au/sites/default/files/documents/draft-national-urban-policy.pdf>

<sup>2</sup> Australian Government, 2023, *Infrastructure Policy Statement*, accessed 23 July 2024, <https://www.infrastructure.gov.au/sites/default/files/documents/infrastructure-policy-statement-20231114.pdf>

## 2. Induced demand increases traffic congestion

When a road is widened or built in an area where roads are congested, induced traffic on the widened road increases traffic on the surrounding roads. The resulting system-wide congestion is called induced demand (see Figure 1). Induced demand is likely to worsen under future road use projections. Even if light vehicles are quickly electrified, induced demand increases the emissions associated with heavy vehicles that will take longer to decarbonise. This increased congestion also impacts negatively on the safety and connectivity of active and public transport users, disincentivising the use of our public transport systems.

**Figure 1: Network impact of induced demand<sup>3</sup>**



The development of an effective national policy framework for active and public transport thus requires the explicit re-prioritisation of these transport modes above private transport. This reprioritisation has the potential to make a significant contribution to cost-of-living pressures by reducing transport user costs and providing good value for money – an implicit priority for the country that spends the highest percentage of its GDP on transport infrastructure out of any Western OECD nation.<sup>4</sup>

A public and active transit reprioritisation should be reflected not only in the national policy framework but in the Australian Government discourse around net zero transport and infrastructure, which is currently dominated by the “improve” (in the avoid-shift-improve framework) of fossil-fuelled vehicles to electric vehicles. A discourse shift sends a clear signal to state and territory governments, industry, and communities as to where the largest opportunities for emissions reduction lie in the transition of our transport and infrastructure to net zero. This discourse shift could be used to highlight complementary work that the Australian Government is conducting in this area such as the Infrastructure Policy Statement and National Urban Policy Strategy.<sup>5</sup>

The Australian Government could lead by example by expanding the Net Zero in Government Operations Strategy<sup>6</sup> to include targets around a shift in transport choices (i.e. promoting active and public transport over taxis and air travel for business travel and commuting). This would build on other Australian Government transport decarbonisation leadership, including the aspiration to electrify the Australian Government fleet and include electric vehicle charging in office spaces with allocated parking.

<sup>3</sup> Engineers Australia, 2023, *Urban Transport Systems: Policy and planning advice*, accessed on 12 July 2024, <https://www.engineersaustralia.org.au/sites/default/files/2023-08/Urban-Transport-Systems-Report-%28August2023%29.pdf>

<sup>4</sup> International Transport Forum, 2024, *Future transport infrastructure: Comparing national investments*, accessed 22 July 2024, <https://www.itf-oecd.org/future-infrastructure-comparing-national-investments>

<sup>5</sup> Ibid, p.4

<sup>6</sup> Australian Government Department of Finance, 2023, *APS Net Zero - our path to net zero*, accessed 26 July 2024, [https://www.finance.gov.au/sites/default/files/2023-11/APS\\_Net\\_Zero\\_Roadmap.pdf](https://www.finance.gov.au/sites/default/files/2023-11/APS_Net_Zero_Roadmap.pdf)

## 2.2 Movement of goods: decarbonising freight and supply chains

Engineers Australia **strongly supports the proposed net zero pathway for freight**. Shifting more road freight to move via rail is essential for transport decarbonisation. We propose several additional actions that could be taken by government now and in the future to ensure that the movement of goods contributes to transport emissions reductions.

### Subsidise rail transport for freight

Case-specific subsidies for rail freight could replace the use of heavy vehicles on Australia's roads. For example, the Western Australian State Government has established the Fremantle Container Rail Subsidy to lower costs and increase the use of rail in the inner harbour.<sup>7</sup> This subsidy has seen an increase in the number of containers moved by rail to the port and is the equivalent of 105,000 truck movements off the road every year.<sup>8</sup>

### Support the fast movement of road freight

While rail freight should be prioritised wherever possible, the reality is that some freight will remain dependent on our road networks. The induced demand for private vehicles on new or widened roads impedes the fast movement of freight, increasing time and emissions on our roads. Priority lanes for heavy freight vehicles and demand management, when roads are created or upgraded, could help to ease congestion and emissions in the short- to medium-term while heavy vehicles decarbonise or are shifted to rail.

### Reduce the number of trips required beyond our borders

Although not included in Australia's national inventory, leadership should be taken in reducing the number of freight trips required beyond our borders. Localised processing of raw materials not only reduces mass and volume exported but allows for Australian goods to move up the value chain, increasing both the economic returns from overseas trade and sovereign capability. This is in line with the goals of other major climate action initiatives such as the *Future Made in Australia* agenda. An opportune example of improving this domestic capability is the Australian Government's green metals strategy, which supports the local processing of ores, providing a local economic benefit and marine transport emissions reduction by exporting finished metals instead of raw materials.

## 3. Net zero pathways for each transport mode

### 3.1 Road – light vehicles

Engineers Australia **generally agrees with the proposed net zero pathway for light road vehicles**. We encourage greater investigation into bi-directional charging and vehicle-to-grid capabilities at an earlier date due to the existence of available technology today combined with the demonstrated benefits of additional battery capacity in energy grid resilience. We also advocate for an earlier phase-out of ICE vehicles from the system, as given the average vehicle life expectancy, these vehicles will need to be phased out soon to achieve net zero emissions by 2050 – just 25 years away.

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<sup>7</sup> Government of Western Australia Department of Transport, 2018, *Fremantle Container Rail Subsidy*, accessed 23 July 2024, [https://www.transport.wa.gov.au/mediaFiles/Freight-Ports/Freight\\_P\\_FS\\_FremantleContainerRailSub.pdf](https://www.transport.wa.gov.au/mediaFiles/Freight-Ports/Freight_P_FS_FremantleContainerRailSub.pdf)

<sup>8</sup> Fremantle Ports, 2021, *Highest percentage share of containers on rail nationwide*, accessed 23 July 2024, <https://www.fremantleports.com.au/landside/rail>

Engineers Australia commends the Australian Government's development of an Australian New Vehicle Efficiency Standard and the implementation of the National Electric Vehicle Strategy. We urge immediate action to build on the work done to date. Our previous input towards addressing challenges and opportunities to reduce light vehicle emissions can be found in the following submissions:

- [Future Fuels Strategy](#)
- [National Battery Strategy](#)
- [National Electric Vehicle Strategy](#)
- [Fuel Efficiency Standard](#)
- [New Vehicle Efficiency Standard](#)
- [Inquiry into the Transition to Electric Vehicles](#)

Engineers Australia seeks to reinforce some key actions to address challenges related to electric vehicle (EV) uptake.

### **Reduce the cost of EVs**

A key barrier to EV uptake has been the purchase price relative to internal combustion engine (ICE) vehicles.<sup>9</sup> Australian consumers nominate high costs as their biggest purchase barrier, with limited low-priced EV supply being prioritised in overseas markets. Although EV prices are coming down quickly<sup>10</sup>, additional cost-saving measures such as waivers on import duties and taxes, stamp duty and registration directly address this barrier. This drives up demand, which then encourages manufacturers to bring more EV models to the Australian market.

### **Support the development of public charging infrastructure**

Some users are reluctant to embrace EVs until public charging infrastructure is more widely available and reliable, but many businesses will not invest in charging until EV uptake grows. While nearly all current EV owners charge mostly at home, people living in medium- to high-density housing without access to off-street parking will rely more on public charging infrastructure. Poor access to public charging infrastructure is likely to become a significant equity issue as fuel prices increase, once a critical mass of road users have transitioned to electric vehicles.

There is a need to provide appropriate charging for different purposes, including long-distance travel (particularly in regional areas where current EV black spots exist), commuting (integrating charging sites with public transport infrastructure, for example, in train station car parks), and activities closer to home. These different uses will require different rates of charging at relevant locations. The government should consider mandating the development of universal chargers and the installation of chargers on power poles.

In addition to government investment (direct or co-funded by the private sector), building codes and planning regulations could also be used to drive investment. New builds or major renovations of apartments, large commercial sites, and buildings in areas with minimal public charging could be required to deliver charging or in preparation for retrofitting at a later date. This work needs to ensure the safety of private charging infrastructure, especially for fire risk, which is a particular risk for medium- and high-density dwellings.

### **Plan for and support considered vehicle-grid integration**

With the right policies and technology in place, EVs could assist the transition to renewable energy generation, storage and consumption by providing the distributed storage needed to smooth variable supply. Not only does this provide significant customer savings but can result in the continued supply of critical power in times of grid disruption, increasing the resilience of our energy grid. The technology

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<sup>9</sup> The University of Sydney, 2024, *Transport Opinion Survey*, accessed 26 July 2024, <https://www.sydney.edu.au/business/our-research/institute-of-transport-and-logistics-studies/transport-opinion-survey.html>

<sup>10</sup> Toby Hagon, 2024, *Price driven: electric cars have never been cheaper. Is it now time to buy an EV?*, accessed 19 July 2024, <https://www.theguardian.com/australia-news/article/2024/jun/01/ev-electric-vehicle-sales-prices-australia>

exists (if not yet scaled) and we are already seeing the benefits of vehicle-grid integration today<sup>11</sup> – we must not delay its planning and adoption to ensure EV integration supports the integrity of our future renewable energy and electricity systems. This planning will also allow for a better understanding of the impact that bi-directional charging is likely to have on the cycle life of batteries, and the consequences for battery waste related to EVs.

### **Apply whole-of-life considerations to the decarbonisation of light vehicles**

In addition to considerations of embodied carbon required to manufacture new light vehicles, a plan for the decommissioning of electric vehicles should be considered in tandem. Regulation is needed to ensure that battery manufacturers consider the reduction, reuse, repair, refurbishment, repurpose and recycling of electric vehicle batteries at the design stage.

### **Increase consumer access to information**

Government and industry must work together to provide information on model choice, whole-of-life cost savings, emission reductions, safety (e.g. fire risk) and public charging networks to support the proposed net zero pathway for light vehicles. For example, the New South Wales government Vehicle Emissions Star Rating (VESR) website<sup>12</sup> provides consumers with information about emissions per kilometre driven, and could be endorsed or adopted by other governments.

### **Invest in an Australian battery industry**

The development of a battery industry in Australia, guided by the National Battery Strategy<sup>13</sup>, is an exciting opportunity to develop better batteries and systems for a sustainable future. While we acknowledge the challenges of competing with overseas gigafactories, Australia can:

- Move up the value chain, starting in minerals processing and focussing on all processes and precursors before mass manufacturing
- Focus on assembly in niche applications, including those designed and built for Australia's climate, remote communities and defence needs
- Concentrate on safety standards and sustainability credentials as a competitive advantage.

## **3.2 Road – heavy vehicles**

Engineers Australia **agrees with the proposed net zero pathway for heavy road vehicles**. Heavy vehicle road users can be further broken down into two transport modes – long distance and short distance. Because of the different calculations of energy storage against weight and space requirements for these modes, batteries are likely to be more suitable for short distances while biofuels and hydrogen pose an energy-to-weight saving solution for longer distances. Blended biodiesel can be utilised in existing vehicles and distributed via existing infrastructure almost immediately while hydrogen technologies mature in the medium- to long-term. The prioritisation of limited hydrogen and low carbon liquid fuel availability will need to be negotiated between other Sector Plans, such as the Industrial Sector Net Zero Plan, as there is unlikely to be enough supply in the short- to medium-term to meet both Australia's transport and industrial manufacturing needs.

Engineers Australia commends the Australian Government's development of the National Hydrogen Strategy and additional consultation on low-carbon liquid fuels and supports the use of these to inform the Transport and Infrastructure Net Zero Plan. Engineers Australia seeks to reinforce some key actions to address challenges in reducing heavy vehicle emissions.

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<sup>11</sup>Bjorn Sturmberg, Kathryn Lucas-Healey, Laura Jones, Lahiru Hapuarachchi, Justus van Biljon, 2024, *Vehicle-to-grid response to a frequency contingency in a national grid – successes and shortcomings*, accessed 19 July 2024, <https://doi.org/10.21203/rs.3.rs-4445838/v1>

<sup>12</sup> NSW Department of Climate Change, Energy, the Environment and Water, 2024, *Vehicle Emissions Star Rating*, accessed 23 July 2024, <https://www.vesr.gov.au/>

<sup>13</sup> Australian Government, 2024, *National Battery Strategy*, accessed 23 July 2024, <https://www.industry.gov.au/sites/default/files/2024-05/national-battery-strategy.pdf>

### **Support domestic green hydrogen production**

Using locally made hydrogen can help reduce Australia's dependence on imported liquid fuels and reduce emissions from the transport required to import them, but this may not be realised in time to achieve Australia's 2050 Net Zero commitment. Today there is virtually no green hydrogen produced in Australia, nor hydrogen trucks or refuelling stations – we need to act quickly across value and supply chains to remain a credible contender in green hydrogen. While The Hydrogen Headstart initiative is a good first step, further long-term support will be required to develop a robust pipeline of projects.

The development of international and domestic hydrogen markets can leverage each other and should be considered in tandem, not as competition. The development of these markets should be also considered in the context of international carbon border adjustment mechanisms (CBAM) and the potential for a domestic CBAM in the future.

### **Develop a guarantee of origin scheme**

An internationally aligned guarantee of origin scheme ensures access of Australian products to international markets and provides a competitive advantage for Australia to scale production of domestic hydrogen or other low carbon liquid fuels.

## **3.3 Rail**

Engineers Australia **agrees with the proposed net zero pathway for rail**. As stated in [Section 2: Rethinking our transport networks and systems](#), we reiterate the need for a reprioritisation of the role of rail in Australia's transport future for both passenger and freight travel. Governments and industry could take additional actions now and into the future to reduce rail emissions including:

### **Increased funding for rural rail maintenance**

Opportunities exist for decreasing reliance on road freight if rural rail lines are restored to full operation. This may require addressing access to funding for rail maintenance rather than those costs being shifted onto those responsible for the road network.<sup>14</sup>

## **3.4 Maritime**

Engineers Australia **agrees with the proposed net zero pathway for maritime**. Adopting alternative low-carbon and zero-carbon fuels and energy-efficient technologies is essential. Additional actions by governments that could be taken now and into the future to reduce maritime emissions include:

### **Incentivise fuel-switching to lower emission fossil fuels in the short term**

In the short-term, considerable emission reductions are possible by transitioning to lower-carbon fuels, such as liquid natural gas (LNG), until zero-carbon fuels become readily available to cut emissions in the medium- and long-term.

### **Support the price competition of low- and no-carbon renewable fuel sources**

The current low costs of shipping fuel, such as bunker fuel, will make it challenging for technologies such as low-carbon liquid fuels or hydrogen to achieve market penetration. Emissions tariffs on high-emissions fuel sources could make low-carbon or no-carbon fuels more cost-competitive.

## **3.5 Aviation**

Engineers Australia **partially supports the proposed net zero pathway for aviation**. Acknowledging the challenges that decarbonising aviation presents, the currently proposed pathway is unlikely to achieve

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<sup>14</sup> Elias Visontay, 2023, *Of fumes and freight: why Australian cargo is increasingly being sent on trucks, not trains*, accessed on 22 July 2024, <https://www.theguardian.com/australia-news/2023/jan/29/of-fumes-and-freight-why-australian-cargo-is-increasingly-being-sent-on-trucks-not-trains>

net zero emissions as it currently stands, with the timing of technology adoption too late to achieve scale by 2050.

We support the development and implementation of sustainable aviation fuels (SAFs), electric and hybrid propulsion systems, and the integration of renewable energy sources in airport infrastructure. Clear regulatory frameworks need to be established with incentives to accelerate the adoption of low emissions technologies in Australian aviation. Flight alternatives such as digital technologies that enable a reduction in air travel overall should be prioritised when considering the avoid-shift-improve framework as a hierarchy. Supporting behavioural change through land-based transport modes is likely to have the largest impact in the short- to medium-term as aviation decarbonises at a slower rate than land transport.

Engineers Australia commends the Australian Government's development of the Aviation White Paper. Engineers Australia seeks to reinforce some key actions to address challenges related to aviation decarbonisation.

### **Legislate minimum SAF usage for airlines that operate in Australia**

While industry first-movers should be commended, voluntary commitments on minimum SAF usage will only take the aviation industry so far in its decarbonisation journey. The Australian Government should look to international examples, such as the European Union's progressive SAF targets<sup>15</sup> to bring Australian aviation standards in line with international expectations, or better yet, exceed current standards.

### **Take a systems-planning approach to secure domestic SAF production**

Global demand for SAF is skyrocketing, with manufacturers unlikely to keep pace.<sup>16</sup> Australia must manufacture SAF locally to deliver on its net zero pathway or risk being unable to meet its own growing demand. This requires greater direct investment in SAF research, development, demonstration and production, increased industry collaboration, and feedstock planning and prioritisation to ensure that other critical land uses, such as agriculture for food production, are not compromised for SAF. A systems-planning approach ensures that all aspects of SAF development, from intellectual property contribution to feedstock sources, contribute towards our economy-wide net zero goals, rather than compromise on them.

### **Develop a certification scheme for SAF**

Not all SAF is created equal. Certification of SAF needs to factor in the whole product lifecycle from production through to final use. Australia needs a standard framework to drive sustainability into the SAF supply chain. This should include aligning the aviation fuel supply chain with the climate-related disclosure requirements mandated by the Australian Government, creating efficiencies and reducing barriers to compliance. This must be balanced with the alignment of international frameworks where possible so that Australia can integrate with global markets for the import and export of SAF and its feedstocks.

### **Apply different policy settings by aircraft type**

Different aircraft will require different policy settings to achieve net zero. Large long-haul aircraft will likely need finite SAF prioritised in the short- and medium-term as they are unlikely to transition to other fuel sources. Small short-haul aircraft could be prioritised for electrification by comparison, instead of consuming SAF that could be used for larger aircraft.

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<sup>15</sup>Aviation Businessme.com, 2023, *EU approves new binding SAF targets for aviation*, accessed 19 July 2024, <https://www.aviationbusinessme.com/news/saf-targets-eu#:~:text=Binding%20targets,-The%20proposal%20imposes&text=The%20new%20targets%20will%20mandate,finally%2C%2070%25%20by%202050.>

<sup>16</sup>McKinsey & Company, 2024, *How the aviation industry could help scale sustainable fuel production*, accessed 23 July 2023, <https://www.mckinsey.com/industries/aerospace-and-defense/our-insights/how-the-aviation-industry-could-help-scale-sustainable-fuel-production>

### **Mandate the use of ADS-B transponders or fuel use monitors on civilian aircraft**

Not all aircraft in Australian airspace are easily traceable, creating gaps in fuel use data. All civilian aircraft could be regulated to have ADS-B transponders fitted or fuel usage directly monitored so that real flight data could be automatically captured to allow for more accurate emission calculations.

### **Create sector-specific definitions of hard-to-abate emissions**

Carbon offsets, regardless of quality, are never a perfect substitute for direct emissions reductions. While widely agreed that offsets should only be used for hard-to-abate emissions, the qualification of this difficulty in abatement varies widely, resulting in an unequal use of offsets from organisation to organisation. Australia could set an example, both domestically and in advocating for the Carbon Offsetting Reduction Scheme for International Aviation (CORSIA) for stricter definitions on which emissions are considered “residual” or “hard-to-abate” and thus the use of carbon offsets is accepted, as well as which kinds of offsets can be used for different emissions sources.

## **4. Supporting transport’s net zero pathways**

### **4.1 Transport infrastructure**

**Engineers Australia agrees with the proposed net zero pathway for transport infrastructure.**

Transport infrastructure was Australia’s second-largest source of embodied carbon in 2022-23 (10 Mt CO<sub>2e</sub>).<sup>17</sup> The magnitude of these emissions relative to other infrastructure represents not only the opportunity for realising massive emission reductions in decarbonising transport infrastructure but also in sharing learnings across other infrastructure and built environments, which will face many of the same challenges and opportunities. We recommend several additional actions that could be taken now and in the future to reduce transport infrastructure emissions and ensure that transport infrastructure is ready for and enables low-emissions transport.

#### **Integrate the decarbonisation of transport infrastructure with the development of the Built Environment Net Zero Sector Plan**

Identifying where the sector plans overlap is essential to a successful economy-wide Net Zero Plan. Integrating with the forthcoming Built Environment Sector Plan will be key to decarbonising transport infrastructure. These plans must have shared definitions of what net zero looks like for these sectors.

Infrastructure Australia recently released a report that quantifies a baseline of the upfront embodied carbon in Australia’s built environment.<sup>18</sup> The report presents several recommendations on how government and industry can support decarbonisation in the sector.

Infrastructure Australia has put forward six recommendations to the Australian Government for consideration. While these are intended for general applicability for infrastructure and the built environment, they are relevant to transport infrastructure. Engineers Australia strongly supports these recommendations.

- Develop a comprehensive national plan to actively promote the decarbonisation of emissions embodied in Australia’s built environment
- Build carbon confidence and literacy in buildings and infrastructure

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<sup>17</sup> Infrastructure Australia, 2024, *Embodied Carbon Projections for Australian Infrastructure and Buildings*, accessed 18 July 2024, [https://www.infrastructureaustralia.gov.au/sites/default/files/2024-07/IA24\\_Embodied\\_Carbon\\_Report.pdf](https://www.infrastructureaustralia.gov.au/sites/default/files/2024-07/IA24_Embodied_Carbon_Report.pdf)

<sup>18</sup> Infrastructure Australia, 2024, *Embodied Carbon Projections for Australian Infrastructure and Buildings*, accessed 21 July 2024, <https://www.infrastructureaustralia.gov.au/embodied-carbon-projections>

- Develop a nationally standardised embodied carbon measurement system, which allows for consistent methods to collect, measure and assess data about embodied carbon
- Agree on a common national approach to drive market demand for low-carbon solutions
- Develop new methods for project delivery that share risks and rewards for innovative approaches
- Work with industry to drive greater national alignment on low-carbon expectations through performance-based standards and specifications

### **Ensure Australian transport infrastructure is adapted to current and future climate change impacts to avoid additional embodied carbon emissions**

Our infrastructure must be designed to be adapted to current and future climate risks such as extreme heat, intense rainfall events and sea level rise. Transport infrastructure that does not consider the impacts of future climate change at best will require repair and at worst require reconstruction, creating more emissions in the embodied carbon needed for repair and rebuilding. Government procurement for transport infrastructure should prioritise future-proofing over least-cost in tender evaluation criteria.

### **Review existing transport infrastructure design standards in the context of new energy and fuel source transport modes**

Old design standards are unlikely to stand up to the requirements of new transport modes, or the evolving nature of existing transport modes. For example, the design standards of future road tunnels could consider decreasing vehicle emissions which may reduce the requirements for substantial ventilation shafts and tunnel ventilation requirements on our road network.

### **Review planning practices in the context of new energy and fuel source transport modes**

Net zero aligned transport infrastructure requires a major rethink of existing land-use planning practices. For example, fuels storage sites near key transit hubs, such as airports and heavy vehicle refuel depots, will require new storage facilities. The acquisition of new land may be necessary to isolate fuels such as hydrogen offsite (due to its explosive nature). Identifying this land and infrastructure needs to occur now to avoid forced acquisitions in future.

## **4.2 Transport energy use**

Engineers Australia commends the Australian Government's development of the **Electricity and Energy Sector Plan**. We urge immediate action in the decarbonisation of our energy systems as a key enabler of decarbonising our transport and infrastructure sectors. Engineers Australia seeks to highlight a key action to address challenges related to the decarbonisation of the energy and electricity sector and the prioritisation of low carbon liquid fuels for different transport modes.

### **Centralised planning of the national electricity system is key to a renewable energy future**

The current open access regime allows energy developers to drive decisions about where to make connections, which complicates the task of engineering the system and does not provide the best renewable energy network overall. Centralised land-use planning would allow for the considered placement of renewable energy generation to maximise benefits (e.g. co-location with industrial hubs, minimisation of transmission services) and minimise trade-offs (e.g. by being placed on marginal, rather than productive agricultural land). It would also allow for planning for the faster-than-expected uptake of Consumer Energy Resources, such as rooftop solar and the role it will play in transmission and distribution as well as demand management as vehicle-to-grid integration becomes a larger share of Australian energy storage capacity.

## 5. Achieving net zero together

The current Transport and Infrastructure Net Zero Roadmap is extremely comprehensive. Engineers Australia commends the work and consultation that has been conducted to date to develop this once-in-a-generation plan to guide the sector to net zero. We put forward some suggestions to further strengthen the final plan.

### **Include support for the development of net zero transport workforce skills**

Engineers are poised to play a critical role in the skills demand required to achieve net zero across all six sector decarbonisation plans, including transport and infrastructure. The technological advancements towards net zero transport, including R&D, design, deployment, systems integration, and maintenance and monitoring, necessitate new skills, knowledge and ways of working to meet the evolving demands of the sector. Engineers are best placed to provide these skills, in both the private and public sectors, but the profession in Australia is also undergoing significant workforce pipeline challenges which will require addressing by all levels of government and industry to deliver on transport decarbonisation. Skills challenges can be addressed by encouraging STEM education, improving tertiary education completion rates, retaining engineering talent and supporting migrant engineers into employment, enhancing workforce planning, and supporting increased workforce diversity and inclusion in engineering, including for women in transport. Materials to support the above claims can be seen in our previous submissions and discussion papers:

- [Strengthening the engineering workforce in Australia](#)
- [The Engineering Profession: A statistical overview \(fifteenth edition\)](#)
- [Women in Engineering](#)
- [Barriers to employment for migrant engineers](#)
- [Strengthening diversity in STEM](#)

### **Include support for the adoption of innovative practices in transport and infrastructure development**

Broad uptake of digital technologies at all phases of asset lifecycles will enhance productivity in transport infrastructure delivery and operation. The benefits of digital technologies include enabling more collaboration and coordination between teams and stakeholders and increasing innovation through improved data capture. Government and industry must look to training and upskilling the labour force both in using the technology and rolling out new digital tools to support transport decarbonisation. Training in these skills should complement and expand core competencies and drive the standardisation of methods.