Transport and Infrastructure Net Zero Consultation Roadmap

Take the survey

Department of Climate Change, Energy, Environment and Water

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Queensland Government Department of Transport and Main Roads

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5 First name
Not answered

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9 Who are you answering on behalf of?

Organisation

10 Organisation name

Queensland Department of Transport and Main Roads

11 What best describes you or your organisation?

Government

12 What sector do you represent?

Not answered

13 What state or territory do you live in?

Queensland

14 Postcode

4006

15 What area best describes where you live?

City

16 1. Do you support the proposed guiding principles?

Not answered

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?

Not answered

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?

Not answered

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?

Not answered

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?

Not answered

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?

Not answered

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?

Not answered

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?

Not answered

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

Queensland submission_NZETR.docx

69 Upload a submission

Not answered

70 Upload supporting file

Not answered

71 Upload supporting file

Not answered

Transport and Infrastructure Net Zero Consultation Roadmap

Queensland Government submission

Department of Transport and Main Roads

Queensland Government

Contents

Introduction

The introduction of a Commonwealth Transport and Transport Infrastructure Roadmap is critical to ensuring Queensland is well placed to decarbonise the transport sector and achieve emissions reductions. Of all jurisdictions, Queensland is most at risk to the effects of extreme weather events. Increasing frequency and severity of extreme weather events is challenging the resilience and reliability of our transport infrastructure and services. If we continue to emit greenhouse gases at current rates, profound and potentially irreversible impacts to the planet, ecosystems, and society will occur now and in the future.

To address the growing and indisputable risks that climate change presents, it is vital each sector of our economy—including transport—plays its part in limiting temperature increases and minimising the consequences of climate change by charting a pathway to net zero emissions. The Queensland Government welcomes the opportunity to provide a submission to the Australian Government on the Consultation Roadmap as outlined in this paper.

Queensland Government position

The Queensland Government supports the Commonwealth Government's commitment to implement a comprehensive Transport and Transport Infrastructure Roadmap. The pathways identified throughout the consultation roadmap appear consistent in principle with existing Queensland Government transport emissions policies and actions. The roadmap provides a comprehensive summary of the nation's current situation, effectively outlining key challenges and opportunities.

Emphasising collaboration and policy coherence across governmental levels, Queensland stresses the importance of addressing regional disparities, enhancing disaster resilience, and promoting social equity. These priorities, integral to Queensland's vision of a sustainable and equitable future, resonate with federal objectives, reflecting a unified approach towards national development.

However, Queensland notes that while the Consultation Roadmap identifies potential pathways to net-zero emissions, it lacks details regarding scope, funding and implementation of the pathways, including any proposed State or Federal obligations. The Queensland Government recommends ongoing consultation and engagement will be needed between States and Territories and the Federal Government to establish detail around scope and implementation of the potential pathways and any implications, prior to development of the final Commonwealth Transport and Infrastructure Roadmap and Action Plan.

Queensland notes that the Infrastructure and Transport Ministers Meeting include a Decarbonisation of Transport Working Group and Senior Officials Group. These forums could provide opportunity to continue engaging with the Federal Government on the potential pathways identified in the Consultation Roadmap. It is noted that the Transport and Infrastructure Consultation Roadmap is one of several sectoral roadmaps released by the Federal Government as part of its Net Zero 2050 plan.

Feedback register

Feedback was sought across the Queensland Government. The following agencies and branches of the Department of Transport and Main Roads have contributed to the submission.

Queensland Government Departments

Department of Agriculture and Fisheries (DAF)

Department of Communities, Child Safety and Disability Services (DCSSDC)

Department of Education (DOE)

Department of Employment, Small Business, and Training (DESBT)

Department of Energy and Climate DEC

Department of Environment, Science and Innovation (DESI)

Department of Housing (DOH)

Department of Premier and Cabinet (DPC)

Department of Regional Development, Manufacturing and Water (DRDMW)

Department of Resources DOR

Department of State Development and Infrastructure (DSDI)

Department of Transport and Main Roads (TMR)

Department of Tourism and Sport (DTS)

Department of Treaty, Aboriginal and Torres Strait Islander Partnerships, Communities and the Arts (DTATSIPCA)

Queensland Corrective Services (QCS)

Queensland Fire and Emergency Services (QFES)

Queensland Treasury Corporation (QTC)

Department of Transport and Main Roads Branches

Accessible Transport Network

Strategic Insights and Organisational Direction

Customer Services, Safety and Regulation Division

- Land Transport Safety and Regulation

Infrastructure Management and Delivery Division

- Engineering and Technology
- RoadTek
- Statewide Network Operations
- Program Delivery and Operations

Policy Planning and Investment Division

- Policy Analysis and Engagement
- Portfolio, Investment and Programming

Translink

- Creating Better Connections Delivery
- Passenger Transport Integration
- Transport Strategy and Planning

Program Management and Delivery

Corporate

- Finance & Procurement

1. General Questions

1.1 Key challenges for delivering Queensland's priority transport and infrastructure related outcomes?

Long life of vehicles. The average age of light vehicles across Australia is more than 10 years old, with many heavy vehicles having a lifespan up to 20 years or more. As such, any fossil fuelled vehicles purchased after 2030 will likely remain in operation on Queensland roads after 2040 and potentially after 2050. Achieving net zero transport emissions will require replacing as many of these vehicles with zero emission vehicles (ZEV) or low emission alternatives as quickly as possible, while also reducing our reliance on private vehicles through a shift to more sustainable transport modes.

Queensland's geography. With an area of 1,727,000 square kilometres and low population density of three people per square kilometre, Queensland's geography presents unique challenges for decarbonising the transport sector. Outside of Queensland's metropolitan centres, long travel distances mean that ZEVs may not yet be an appropriate alternative to fossil fuelled vehicles, especially heavy vehicles. To support greater uptake of ZEVs in regional and remote areas of Queensland, strategically placed charging infrastructure (both electric and hydrogen), including fast-charging sites along highways, coupled with provision of energy supply to support EV charging infrastructure, is essential.

Increasing travel and transport. Emissions continue to rise as Queensland's population grows, vehicle ownership expands, transport demand increases, cities and towns expand in size, and we consume more goods that are shipped directly to households. Queensland's population is set to boom in the coming decades, growing from the current 5.4 million to between 6.4 and 8.27 million by 2046.

The way we travel. Queensland is a large and diverse state, and like most Australian states and territories, private vehicle travel is the dominant form of transport. For the last 70 years, our cities and towns have been designed and built to facilitate private vehicle travel. Despite its size, most of Queensland's population live and travel in our major metropolitan or regional cities.

How we transport goods. Road freight is a key enabler of Queensland's economy. Our freight system is responsible for moving goods around the state and connecting Queensland with the world. Heavy vehicles currently account for 25 per cent of Queensland's transport emissions. In addition to a longer life span than light vehicles, heavy vehicle technology is not as mature for alternative options across all vehicle segments and mode shift to more emission efficient modes such as rail or domestic shipping face economic disadvantages, when compared to road on similar routes. The impact on the network infrastructure from the introduction new emerging heavy vehicles is also under consideration.

Challenges and Barriers	
Identified challenges and barriers	**Additional considerations**
• **Challenges with Electric Vehicle (EV) adoption in regional and remote areas:** The discussion paper acknowledges some of the challenges faced by regional and remote communities. It highlights the increased likelihood of rural and regional Australians to experience transport inequality compared to their urban counterparts. It also notes concerns regarding the suitability of EVs for regional conditions, including towing capacity and terrain challenges. • **Cost escalation in construction:** Rising construction costs due to global and local market conditions are addressed in the paper. It highlights strategies like collaborative contracting and value engineering to manage cost-related risks in infrastructure projects, despite insufficient funding. • **Population growth and car reliance:** Queensland's growing population will continue to exacerbate our reliance on cars for transport, particularly in regional areas where distances are significant. The paper recognises the need to balance transport demand with emission reduction targets amidst a car-centric travel culture. • **EV and AT Infrastructure challenges:** The roadmap discusses issues with public transport reliability and availability, especially in less urbanised areas. It acknowledges gaps in infrastructure for active transport, such as safe bike lanes, which are crucial for encouraging alternatives to car travel. • **Heavy vehicle emissions:** Challenges in reducing emissions from heavy vehicles and potential infrastructure wear from increased vehicle weight are acknowledged. As are the current technology limitations. • **Supply of low/zero carbon materials:** There is recognition of challenges in supplying low or zero-carbon materials to rural and regional areas of Queensland. Concerns include the cost-effectiveness and logistical challenges of mandating these materials, which could negate their environmental benefits. • **Role of national policy frameworks:** The discussion paper supports the need for a coordinated national approach in active and public transport policies but notes the effectiveness depends on comprehensive coordination across federal, state, and local levels of government.	• **Skills uplift and education sector collaboration:** Greater acknowledgement for collaboration with the education sector to develop workforce capabilities needed for achieving net-zero emissions. • **Incorporating tourism growth in transport planning:** The discussion paper overlooks the substantial impact of tourism growth on transport demand, especially in tourist hotspots and peak seasons. Considering Queensland's significant influx of visitors annually, integrating tourism growth projections into transportation planning is crucial for ensuring a well-managed and accessible transport system. • **Emerging transport solutions:** Insufficient focus is placed on emerging technologies such as passenger drones, autonomous vehicle services, and smart transport systems. There's a gap in investment and regulatory support needed to develop these innovative solutions. • **Renewable energy demand for transport electrification:** The paper does not adequately address the increasing demand for renewable energy to support electrification of transport sectors like heavy vehicles and maritime transport. It is noted that this may be covered in the energy sector plan. • **Behavioural change and modal shift:** Detailed strategies and time-framed plans for achieving significant modal shift from private vehicles to public and active transport are lacking. More targeted approaches are needed to promote behavioural changes. • **Infrastructure and connectivity for remote and Aboriginal and Torres Strait Islander communities:** Challenges in providing sustainable transport solutions for remote and Aboriginal and Torres Strait Islander communities, including issues with power grid reliability and access to renewable energy, are not adequately addressed in the discussion paper. • **Bus networks and public transport investment:** Insufficient emphasis is placed on buses as a short-term tool for achieving modal shift and reducing emissions. There's a disparity in funding and planning between public transport modes, particularly in comparison to rail infrastructure. • **Games-related sustainability commitments:** Specific policies and support mechanisms required to meet sustainability goals related to major events like the Olympics are not adequately detailed.

1.2 The role of State vs Federal Government in the decarbonisation of the Transport and infrastructure sectors?

Sector	Commonwealth Government	State/Territory Government
Leadership	• Provide a clear, nationally coordinated approach across different levels of government, being responsive to changes in the technological environment, • Facilitate collaboration between parties, including industry and researchers, • Raise public awareness and acceptance of beneficial new technologies, • Strategically manage the transition from conventional to low and zero emission vehicles in the transport industry, considering the impacts on existing infrastructure, supply chains, and workforce. This includes addressing the interplay with other transportation modes and aligning with broader policy areas such as urban planning and energy management to support widespread adoption.	• Provide a clear and coordinated approach to decarbonising transport by developing comprehensive transport decarbonisation strategies and action plans. This involves aligning policies with state climate targets and Commonwealth commitments. • Facilitate collaboration between industry stakeholders, research institutions, and community groups to foster innovation in low-carbon transport technologies and practices. This includes partnerships for research, pilot projects, and knowledge sharing. • Raise public awareness about the benefits of low-carbon transport options through education campaigns, incentives for behavioural change (like promoting public transport use, cycling, and walking), and showcasing success stories of sustainable transport initiatives. • Manage transitions between old and new technologies by providing incentives for the adoption of EVs, supporting infrastructure development (charging stations), and phasing out high-emission vehicles through regulatory measures.
Enabling	• Ensure that the private sector is able to bring beneficial new technologies to market by supporting investment in digital infrastructure and/or data streams (such as highly accurate geo-positioning systems and real-time information on road conditions), • Support private sector innovation in the transport sector, such as by providing open and consistent access to transport data. Where practical, data will be aggregated to the national level.	• Support the private sector by investing in digital infrastructure such as intelligent transport systems (ITS), real-time traffic management, and data analytics. This enhances efficiency in transport operations and supports the integration of smart and sustainable transport solutions. • Ensure open and consistent access to transport data, facilitating innovation in mobility services, route optimisation, and emissions monitoring

Regulation	• Ensure that community expectations of safety, security and privacy are appropriately considered in new technology deployments, • Remove regulatory barriers to new technology in a proactive fashion, • Wherever possible, provide certainty about future regulatory requirements, • Develop regulations that promote the adoption of low-emission vehicles (LEVs) and infrastructure, while safeguarding public health and the environment.	• Ensure that new transport technologies meet safety, security, and environmental and vehicle standards. • Proactively remove regulatory barriers to the deployment of EV charging infrastructure, hydrogen refuelling stations, and other low-carbon transport technologies. Streamline permitting processes and provide regulatory certainty to investors and innovators. • Provide financial incentives such as grants and rebates to support the deployment of LEVs, EV charging infrastructure, and sustainable transport solutions. Establish clear long-term regulatory frameworks that provide certainty for investors and encourage private sector participation in decarbonisation efforts.
Investment	• Invest in research, development and real-world trials that benefit the entire transport network customer base or provide a sound basis for government decision-making (including in collaboration with the private sector). • Use taxation or spending powers to shape activity, including financing, local content incentives, grants, tax rebates or co-investment. Set clear incentives and priorities to de-risk, incentivise, and encourage innovation. Provide financial disincentives to influence activity.	• Invest in research, development, and real-world trials of low-carbon transport technologies and infrastructure. Collaborate with industry and research institutions to pilot innovative solutions and gather data on their effectiveness and scalability. • Use funding and spending mechanisms to shape activity towards decarbonisation goals. This includes financing infrastructure projects, offering local content incentives, and providing grants or subsidies for low carbon transport modes. • Provide incentives such as subsidies for public transport and grants for sustainable transport initiatives to promote cleaner and more efficient transport technologies. • Leverage public-private partnerships (PPPs) to co-invest in large-scale transport infrastructure projects, such as EV charging networks, hydrogen refuelling stations, and public transport upgrades.

Transport sector specific

Sector	Commonwealth Government	State/Territory Government
Infrastructure 	• Provide national leadership through legislative frameworks, policies, and roadmaps to incentivise investment in low to zero carbon technologies and materials. • Maintain interim carbon reduction targets and commit to long-term net zero goals. • Co-fund major passenger transport infrastructure projects and ensure national standards for EVs and related components. • Establish energy efficiency ratings for ZEVs and enforce public health standards around charging facilities.	• Fund, upgrade, maintain, and manage state-owned roads and highways. This includes ensuring road safety, managing congestion, and implementing infrastructure improvements to support economic growth and connectivity. • Design and construct resilient infrastructure resilient to climate change impacts. • Encourage the use of low to zero carbon materials in infrastructure projects. • Promote the supply of these materials, particularly in rural and regional areas. • Lead initiatives such as the Zero Emission Bus Program and The Queensland Electric Super Highway network.
Public Transport 	• Provide substantial co-funding for major public transport infrastructure projects, including electrification and expansion of public transport networks. • Set national standards and regulations for zero-emission public transport vehicles and infrastructure to ensure interoperability and safety. • Support research and development in new technologies for improving energy efficiency and reducing emissions in public transport operations. • Facilitate partnerships between federal agencies, state governments, and private sector stakeholders to accelerate the adoption of zero-emission technologies in public transport. • Promote national campaigns and initiatives to increase public awareness and acceptance of zero-emission public transport options.	• Transition the public transport fleet to zero-emission vehicles through strategies such as the Zero Emission Bus Program, ZEV Strategy and Queensland Transport Strategy. • Expand and enhance public transport infrastructure, including dedicated lanes, bus rapid transit systems, and integrated transport hubs. • Collaborate with local councils to integrate public transport into urban planning and development projects. • Promote community engagement and education programs to encourage public transport usage and awareness of environmental benefits. • Support the development of renewable energy infrastructure to power zero-emission public transport vehicles and facilities.

Active Transport 	• Provide funding and policy support to incentivise and enhance infrastructure for walking and cycling paths across states and territories. • Collaborate with local governments to support active transport infrastructure projects. • Develop national standards and guidelines for the design and safety of active transport infrastructure. • Support research and development in innovative technologies and materials for enhancing active transport infrastructure. • Facilitate knowledge sharing and best practices across jurisdictions to promote active transport as a viable and sustainable mode of urban mobility.	• Implement strategies such as the Queensland Walking Strategy and Cycling Strategy to enhance infrastructure and promote active transport modes. • Invest in the development of safe and interconnected walking and cycling networks, prioritising urban centres and regional areas. • Collaborate with local councils to integrate active transport infrastructure into urban planning and development projects. • Promote community engagement and education programs to encourage active transport behaviours and safety awareness. • Work with regional and remote communities to develop tailored solutions that meet their specific active transport needs.
Light Vehicles 	• Implement taxation settings and subsidy supports to drive uptake of EVs. • Support the training/retraining of automotive trades people to maintain and repair ZEVs as part of the Australian Qualifications framework. • Develop and maintain national standards for ZEVs and their components to ensure interoperability across brands. • Legislate achievable sunset dates for new ICE vehicle sales and commercial ICE vehicle sales. • Co-fund major initiatives like end-of-route charging facilities for public transport and develop public health standards related to charging infrastructure.	• Facilitate renewable electricity generation, storage, and transmission infrastructure to support EV adoption. • Streamline approval processes with local governments for charging station sites, ensuring compliance with public health standards. • Support training for automotive tradespeople through TAFEs and universities to maintain and repair ZEVs. • Invest in infrastructure to support electric and alternative fuel-powered public transport systems. • Collaborate with local communities to develop tailored initiatives and infrastructure projects supporting decarbonisation efforts.

Heavy Vehicles

- Set national heavy vehicle emission standards and regulations, to facilitate and drive the adoption of cleaner technologies and fuels.
- Support the National Heavy Vehicle Regulator and National Transport Commission in working with state and territory governments to ensure operators are purchasing cleaner and safer trucks maintaining productivity when the Euro VI standards become mandatory.
- Provide financial incentives and grants to support the transition to zero-emission heavy vehicles, including funding for research and development.
- Collaborate with state governments and industry stakeholders to develop a national roadmap for the deployment of zero-emission freight technologies.
- Facilitate the development of charging and refuelling infrastructure for heavy-duty electric and hydrogen-powered vehicles through leadership and investment.
- Support the integration of digitisation and smart technologies to enhance the efficiency and sustainability of freight transport operations.
- Ensuring the sustainability of revenue from heavy vehicle road access charging as the fuel-based road user charge becomes redundant over time.
- Allocate additional funding to state and local authorities to offset the increased road maintenance costs associated with the higher mass of low and zero emission heavy vehicles, ensuring the sustainability of road infrastructure as the transport sector transitions to cleaner technologies.
- Support the adoption of zero-emission heavy vehicles and sustainable freight logistics through strategies such as the Queensland Freight Strategy and Future Freight Energy Hubs.
- Invest in research and development initiatives focused on zero-emission technologies for heavy vehicles, including feasibility studies and pilot projects.
- Collaborate with industry partners to pilot new technologies and develop local supply chains for renewable fuels and advanced vehicle components.
- Enhance road infrastructure to accommodate zero-emission heavy vehicles and support efficient freight movements.
- Promote workforce training and skills development in emerging technologies related to zero-emission heavy vehicles.
- Work with the National Heavy Vehicle Regulator and National Transport Commission to ensure operators are purchasing cleaner and safer trucks maintaining productivity when the Euro VI standards become mandatory.

Rail 	• Lead the development of national rail emission standards and regulations to promote the adoption of low-emission and electrified rail technologies. • Provide funding and financial incentives to support the electrification of rail networks and the transition to sustainable fuels such as hydrogen for rail transport. • Collaborate with state governments and industry stakeholders to facilitate the development of interoperable rail systems and technologies across Australia. • Support research and development initiatives focused on enhancing the efficiency and sustainability of rail operations. • Invest in the expansion and enhancement of national rail infrastructure projects such as the Inland Rail.	• Provide support for Queensland manufacturers to capitalise on current and emerging rail transport and infrastructure projects. • Collaborate with industry partners to pilot new technologies and innovations for rail transport. • Invest in rail infrastructure upgrades and capacity enhancements to support increased freight and passenger rail services. • Promote workforce training and skills development within the rail sector. • Engage in regional and international partnerships to share best practices and lessons learned in rail decarbonisation.
Maritime 	• Lead the development of national maritime emission standards and regulations to promote the adoption of low-emission fuels and technologies in maritime transport. • Provide funding and financial incentives to support the transition to sustainable fuels such as SAF, biofuels, and hydrogen for maritime vessels. • Collaborate with state governments and industry stakeholders to facilitate the development of interoperable maritime systems and technologies across Australia. • Invest in the expansion and enhancement of national maritime infrastructure projects, including port facilities and shipping lanes, to optimise transport efficiency and reduce emissions. • Support research and development initiatives focused on enhancing the efficiency and sustainability of maritime operations, including digitalisation and smart technologies.	• Enhance the efficiency and sustainability of port operations, including shore power facilities and emission reduction measures. • Collaborate with industry partners to pilot new technologies and innovations for maritime transport, such as hybrid and electric vessels. • Invest in port infrastructure upgrades and capacity enhancements to support increased maritime traffic while reducing environmental impacts. • Promote workforce training and skills development in sustainable maritime technologies and practices. • Engage in regional and international partnerships to share best practices and lessons learned in maritime decarbonisation.

Aviation 	• Lead the development of national aviation emission standards and regulations to promote the adoption of sustainable aviation fuels (SAF) and technologies. • Provide financial incentives, grants, and tax credits to support the production, distribution, and adoption of SAF and other low-carbon aviation fuels. • Collaborate with state governments, industry stakeholders, and research institutions to advance research and development in sustainable aviation technologies. • Invest in the expansion and enhancement of national aviation infrastructure, including airports and air traffic management systems, to improve efficiency and reduce emissions. • Facilitate international cooperation and agreements to harmonize aviation emission standards and promote global adoption of sustainable aviation practices.	• Undertaken research to enable construction and operation of sustainable biofuel manufacturing facilities in Queensland. • Securing strategic bioeconomic investment and development projects across the State to substantially increase volumetric refining capacity of LCLFs. • Develop a SAF Feedstock Expansion Strategy to increase availability of existing feedstocks and to develop novel feedstocks. • Support infrastructure developments at Queensland airports to accommodate SAF distribution and adoption. • Partner with industry stakeholders and research institutions to pilot and scale innovative technologies for sustainable aviation. • Promote workforce training and skills development in sustainable aviation practices and technologies. • Engage in regional and international partnerships to share best practices, research findings, and collaborate on global aviation emission reduction efforts.

1.3 What opportunities exist in this sector for Queensland and the Commonwealth to better collaborate to deliver outcomes for Queensland?

Mechanism	Opportunities
Subsidies / Co-funded EV charging infrastructure	• Coordinated government funding to bridge economic barriers and expand EV charging infrastructure, particularly in rural, remote, and first-nations communities. • Foster partnerships with industry to facilitate affordable home charging solutions and support energy plans that drive widespread adoption of zero-emission vehicles (ZEVs).
Infrastructure investment	• Leverage Commonwealth co-funding for transport projects prioritising emission reductions, including rail, multi-modal terminals, and active transport infrastructure. • Advocate for increased Commonwealth co-funded investment in active transport infrastructure, particularly in regional and remote areas.

Heavy Vehicle Regulation	• Continue ongoing collaborative efforts to remove regulatory barriers and align with global fuel-efficiency standards (Euro VI). • Undertake reforms to mass limits that address productivity challenges faced by heavy zero-emission vehicles
Technological Investment and Development	• Coordinate Commonwealth and State funding to accelerate R&D in emerging technologies like hydrogen fuel cells, green hydrogen, and low carbon liquid fuels (LCLF). • Collaborate on research and innovation in local manufacturing to establish local industry manufacturing and design of EV technologies. • Jointly invest in smart transport systems to enhance efficiency and reduce emissions.
Collaborative forums and international partnerships	• Establish strategic collaborative groups at strategic, decision making and working group levels across all critical areas identified in the discussion paper. These forums must share success, challenges and engage in true partnership where each party commits to working together to achieve net zero emissions outcomes. Joint ownership or the very least complete buy in to commonwealth policies, strategies and targets is critical to success. • Establish bilateral/multilateral agreements with foreign nations/markets to coordinate greater investment and international partnerships with local industry. • Actively engage in investment support and cultivate international partnerships in technology, capital, and product marketing through bilateral and multilateral agreements with foreign nations.
Workforce development	• Align education agendas to produce a skilled workforce capable of contributing to net-zero emissions in the transport sector. • Invest in training programs across secondary, vocational, and university sectors focusing on sustainable transport practices.
Advocacy and Education	• Collaboration for more targeted advocacy efforts across the transport sector, focusing on EV adoption, emissions reduction in heavy vehicles, and circular economy principles. • Comprehensive education campaigns to raise awareness and encourage sustainable practices throughout transport lifecycle. • Promote the uptake of active transport modes through national awareness campaigns and establish cohesive policy frameworks to support sustainable commuting options.
Renewable energy and critical minerals	• Greater investment and international partnerships to capitalise on Queensland’s potential for renewable energy (solar, wind, hydrogen, etc.). • Support to establish MOUs for Queensland’s critical mineral resources to support the development of EV and renewable technologies.

Policy harmonisation	• Harmonise state and federal policies on urban development, transport, and environmental sustainability.
Expansion of Public Transport Services	• Support State initiatives to expand public transport networks with targeted federal funding streams. • Prioritise accessibility enhancements for vulnerable communities, including First Nations peoples, individuals with disabilities, and elderly populations.
Public transport and tax Incentives	• Advocate for federal tax reforms to include benefits like Fringe Benefits Tax (FBT) exemptions for public transport services. • Encourage modal shifts by making carbon-friendly transport modes more accessible and affordable.
Data sharing	• Establish better data-sharing arrangements across all levels of government and with industry
Regional and remote support	• Provide support and incentives tailored to regional and remote areas for adoption of low-carbon transport technologies.

2. Movement of people: promoting active and public transport

2.1 Development of a national policy framework for active and public transport

The Queensland Government agrees with the potential benefits of developing a national policy framework to guide strategic funding allocation, drive public awareness and establish mode share and investment targets to maximize the environmental and social benefits of active and public transport initiatives. Queensland advocates for collaborative policymaking involving all levels of government to ensure effective implementation and address challenges such as climate resilience and accessibility in remote areas. Queensland emphasises that while a national policy framework holds significant promise, its success hinges on collaborative efforts in development, implementation, and sharing of successes, while collectively addressing challenges. This approach is crucial for achieving nationwide support and ensuring effective adoption of the framework.

While there is strong support for technological advancements like electric micromobility, concerns regarding safety risks associated with new technologies, such as lithium-ion batteries in e-bikes and e-scooters, are also noted. QFES underscore the critical need for mitigating associated risks, particularly regarding fire hazards posed by lithium-ion batteries. The state's approach advocates for stringent safety regulations and community awareness campaigns to ensure the safe integration of these devices into everyday transport practices. Moreover, there is a call for prioritised funding towards active and public transport infrastructure over traditional road investments to facilitate a shift towards more sustainable transportation choices and reduce reliance on private vehicles. These perspectives highlight Queensland's proactive stance towards enhancing mobility options while addressing associated challenges to ensure a balanced and effective national policy framework.

2.2 What should be included in a national policy framework for active and public transport and how should it be developed?

Queensland generally agrees with initiatives outlined in the roadmap, but raises the following points for consideration:

- Ongoing road infrastructure at the expense of active and public transport (including rail) will continue to encourage reliance on the car. This will require a mindset shift for many involved in infrastructure prioritisation – capability to compare and prioritise across modality has become more important than ever, and this importance will only increase.
- Requirement for educational and advocacy campaigns to achieve a cultural/mindset shift that encourages the use of active and public transport over individual car use.
- Recognition for the needs of workers outside traditional "9 to 5" hours, especially those commuting from outer urban fringes to CBDs or other employment centres. Address the challenges of multiple mode changes and the lack of feasible mass transit options during non-peak hours.
- Address physical accessibility barriers to public transport infrastructure and networks, particularly in regional and outer suburban areas.
- Addressing transport disadvantage in outer suburban and regional areas where cycling or long-distance commuting to CBDs is impractical (e.g., distances exceeding 80km round trip).
- Encompassing enhanced safe infrastructure and network planning to reduce road trauma risks for vulnerable road users, particularly in managing interactions with heavy vehicles in urban settings, leveraging insights from Construction Logistics and Community Safety Australia (CLOCS-A).

3. Rethinking our transport network and systems

3.1.1.1.1 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?

Government's Role	Recommendation	Outcome
Investment	Increase policy support and infrastructure investment for coastal shipping, which has the potential to reduce emissions and improve supply chain resilience, particularly in the face of natural disasters like floods and fires.	Establish the necessary policy support and infrastructure investment to increase industry and investor confidence and enable EV uptake.
Leadership	Opportunities exist for government to engage with industry, state and local governments, and learn from international experience to support initiatives and strategies to create sustainable last-mile ecosystems.	Learning can inform initiatives that improve efficiency and reduce environmental impact in urban delivery logistics, ensuring that goods are transported with minimal emissions and congestion.
Leadership	Further investigation is required to sufficiently address the economic and practical feasibility of decarbonising these supply chains in remote and rural areas, including delivery of infrastructure to ensure the sector is supported in all areas of the nation.	Further investigation is necessary to assess the economic and practical feasibility of decarbonising supply chains in remote and rural areas.
Leadership	Conduct analysis to understanding the cost effectiveness of maintaining and expanding the road network under climate change scenarios vs investing upfront on rail infrastructure standardisation as part of the evidence gathering for the final roadmap.	Inform a strategic approach that balances immediate infrastructure needs with long-term sustainability goals.
Leadership	The Commonwealth Government is encouraged to provide clarity on Inland Rail infrastructure delivery timelines, as well as funding to support linking infrastructure from regional rail lines into the Inland Rail line. This information would benefit planning and investment attraction to support increases in agricultural freight on rail, as it has done in New South Wales.	Inform and support industry and investor confidence.
Leadership	The "avoid" segment of the "avoid-shift-improve" framework could be explored in greater detail with industry, particularly during the early phases of the roadmap, to innovate and manage costs of unconstrained freight task growth on low and zero emission fleet purchases and conventional freight network upgrades during later phases of the roadmap.	Manage the costs of unconstrained freight task growth on low and zero emission fleet purchases

Leadership & Investment	Consideration needs to be given to the application of innovative autonomous e-vehicles at both ends of rail transport nodes for delivery of fast-moving consumer goods (FMCG). Such transport innovations, including intermodal optimisation, urban freight consolidation centres, and key manufacturing-related outputs for the transport sector, would be both a State and Commonwealth responsibility.	Ensure strategic alignment between Federal and State Governments.

4. Net zero pathways for each transport mode

4.1 Road – light vehicles

Queensland generally agrees with the proposed net-zero pathways for light road vehicles. We recognise the significance of this transition and emphasise the need for robust charging infrastructure development to support widespread adoption, tailored strategies for rural and remote communities, enhanced infrastructure development, and careful consideration of the economic and geographic challenges specific to the state. In acknowledging the economic opportunities presented by the transition to EVs, Queensland underscores the potential for significant economic growth and job creation. Embracing EV technology opens avenues for the development of advanced manufacturing capabilities within the state, positioning Queensland as a hub for innovation and production in the rapidly evolving automotive sector. Furthermore, Queensland recognises the imperative of supporting a circular economy approach to battery recycling, thereby mitigating environmental impacts, and reducing dependence on finite resources.

Supportive	Areas of Concern
• Support for charging infrastructure investment to facilitate EV adoption. • Recognition of the need for EV-ready buildings and strata developments. • Calls for short-term government incentives and subsidies to offset initial EV costs. • Acknowledgment of the potential for micro mobility vehicles in urban settings. • Support for policy alignment and regional cooperation to achieve emissions reduction goals. • Support calls for transitional support for rural, regional, and remote communities will ensure that the decarbonisation of light vehicles is inclusive and equitable. • Acknowledgement requirement for charging infrastructure in regional and remote areas to support the adoption of EVs in these communities. • Support initiatives to advance Australia's capability and capacity to develop manufacturing opportunities to support EV supply, including in component parts and batteries.	• Insufficient consideration of economic barriers and infrastructure gaps in rural, remote, and Indigenous communities. The roadmap requires pathways for infrastructure development in rural and remote regions. • There is a shortage of information in the roadmap on safety considerations in relation to EV batteries. Greater discussion about enabling circular economy principles that focus on the life of EV's and mitigating future emissions are important considerations for the final roadmap. • Consideration of competition and consumer protection laws by enabling in policy the 'right to repair' will provide regional jobs and improve certainty of service and maintenance. • Challenges related to the suitability of EVs for emergency services and the need for more research into alternative technologies like hydrogen for light commercial vehicles. • Concerns about the impact of potential road user charges on EV adoption and the need for a balanced taxation regime that supports the transition. • Greater recognition for the mindset shift required to transition Australians from large petrol vehicles to smaller and renewable alternatives. • Greater consideration must be afforded to emerging energy pricing framework to make it more drive the transition to light road vehicle EV take up.

4.1.1.1.1 Does the Queensland Government agree with the proposed Net Zero Pathway for light road vehicles?

Timeframe	Government Objective	Supportive?	Comment / Recommendations
Short	EVs become more affordable and accessible to all Australians	Yes	Government needs to examine taxation arrangements to replace income from fuel excise and create an EV-friendly taxation regime. This has commenced but needs to be fast-tracked. It may be palatable to government to take a similar approach to tobacco excise applied to fossil fuels to provide incentives for private vehicle owners to move away from standard fuel powered vehicles. The paper does not consider options to discourage individual car ownership. Given research shows that parking supply strongly influences increased vehicle ownership and private car travel use, options to decrease parking supply should also be considered. The implementation of an effective National Vehicle Efficiency Standard (NVES) is critical to ensuring all states and territories are well places to decarbonise the transport sector and achieve emissions reductions. The Queensland Government have actively supported and engaged with the Australian Government on this through providing submissions to the National Electric Vehicle Strategy (NEVS), the Fuel Efficiency Standard (FES) – Cleaner, Cheaper to Run Cars for Australia, and the final design of the NVES consultation papers.
	Investments in charging infrastructure to keep up with projected EV uptake	Yes	There needs to be more and faster charging points to induce demand for EVs. This presents opportunities for PPPs and domestic research and development. Personalised transport vehicles have higher than average energy input needs for light vehicles. Due to the unique demands of the industry, drivers need access to both public and private fast charging facilities to support any transition to EVs. Many more publicly available sites are required to meet the perceived needs of the industry. This presents substantial opportunity for PPPs. State and territory governments must ensure robust plans are in place to transition to renewable energy sources in order to support the electrification of light vehicle transport.
Medium	Improvements in EV technologies and market offerings	Yes	The Australian Government should review current regulations to integrate Mini mobility vehicles into Australia's future urban mobility landscape, considering their role in net zero pathways in urban settings.

	Charging infrastructure is widespread across the country	Yes	A universal 'Right to Charge', has been implemented in other jurisdictions, a mechanism may need to be considered to ensure an equitable transition for all drivers, regardless of income or living conditions.
Long	Bi-directional charging and vehicle grid capabilities widespread	Yes	
	Fossil fuel demand decreases until it is only used in very specific circumstances	Yes	

4.1.1.1.2 What additional actions need to be taken now and into the future?

Government's Role	Recommendation	Outcome
Advocacy	Enhance community education programs to promote the benefits of EVs and alternatives to private car ownership, aligning with broader climate and transport goals.	Encourage increased EV uptake
Advocacy	The National Electric Vehicle Strategy released by the Commonwealth Government in 2023 committed to providing funding to support world-leading EV guidance, demonstrations, and training for emergency service workers. Queensland would welcome independent research to assess fire and life safety implications for building occupants and responding emergency services in the context of the proposed technologies fitted to new and existing buildings.	Establish the resources, systems and infrastructure to enable rapid EV uptake
Coordination	Given the challenges posed by the availability and affordability of EVs, along with the necessary charging infrastructure in remote areas, Government should investigate development of a separate roadmap for remote and discrete communities, in collaboration with Aboriginal and Torres Strait Islander peoples.	Establish the resources, systems and infrastructure to enable rapid EV uptake.
Regulation	Consideration should be given to amending emission standards in the Australian Design Rules (ADR) to decrease non-commercial light vehicle footprints is crucial for reducing congestion and enhancing energy efficiency. This adjustment can alleviate strains on electricity generation and transmission infrastructure, as well as lessen demand for publicly available charging points, given that larger vehicles consume more power per kilometre.	Encourage increased EV demand

Investment	The Commonwealth is encouraged to investigate subsidies and or tax relief for new EV light vehicle purchases through the VES to overcome high initial up-front costs and support light vehicle EV take up. A 2023 survey of the Queensland personalised transport industry revealed that up-front cost is an important consideration in vehicle decision.	Encourage increased EV uptake
Investment	Electric vehicles charged from home solar panels provide the fastest CO2 payback. The Federal Government should investigate subsidy schemes or incentives to encourage greater rooftop solar and as part of made in Australia provide subsidised batteries to support such infrastructure.	Establish the resources, systems, and infrastructure to enable rapid EV uptake.
Investment	Explore Public-Private Partnerships (PPPs) to develop charging infrastructure. This approach could help address the infrastructure gap, especially in remote and rural areas, where significant investment is needed.	Establish the resources, systems, and infrastructure to enable rapid EV uptake.
Regulation	The Australian Government should review current regulations to integrate mini-mobility vehicles into Australia's future urban mobility landscape, considering their role in net zero pathways in urban settings.	Encourage increased EV demand

4.2 Road – heavy vehicles

While Queensland supports the proposed net zero pathways for heavy vehicles, there are significant challenges that need to be addressed to ensure a smooth transition, including addressing limitations in load capacity for battery electric trucks and investing in charging infrastructure, technology suitability, and financial barriers. Collaboration between governments, industry, and other stakeholders is essential to overcome these challenges and capitalise on the economic opportunities presented by the shift to electric and hydrogen heavy vehicles.

Supportive	Areas of Concern
• Support reforms to remove regulatory barriers (width and mass limits) to support Euro VI standards and ensure Australia has access to the fuel-efficient engines being supplied in other global markets. • Recognition of the need to start planning for electric and hydrogen heavy vehicle charging infrastructure in transport planning. • Encouragement for pilot programs and demonstration projects to test new technologies. • Support partnerships with industry to implement low-emission vehicle technologies. • Support for practices that reduce emissions across the lifecycle of heavy vehicles, including manufacturing and disposal. • Potential benefits of hydrogen technology in heavy vehicle applications, though current limitations and infrastructure needs are noted.	• The adoption of electric heavy vehicles and buses may strain the electricity grid, necessitating substantial upgrades to ensure reliable power supply for both regular usage and electric vehicle charging demands, particularly during peak times. • Concerns over the high upfront costs of transitioning to low and zero-emission heavy vehicles. • Challenges posed by the increased mass of net zero vehicles on Queensland's road infrastructure. Local roads and streets may not be designed to accommodate the size and weight of zero-emission heavy vehicles, potentially causing damage or requiring upgrades. • Ensuring there are adequate charging stations available at the beginning and end of journeys to support these vehicles' operational needs. • Managing the integration of heavy vehicles with regular traffic in urban or suburban areas to avoid congestion and maintain safety. • Issues related to the suitability and capacity of current battery electric trucks for rural and remote applications. • Hydrogen fuel remains in the earlier stages of development, with limited current supply and infrastructure across the state. • Greater consideration must be given to decarbonisation of buses noting their critical role in public transport networks. Prioritising greening the bus fleet and enhancing bus infrastructure is key to achieve net zero goals. • As per the Standard Guidelines for Corrections in Australia, long distance transportation of prisoners in vehicles requires increased levels of amenities commensurate with the additional time of being held in a vehicle (1.97). This needs to be taken into consideration in future planning to ensure an appropriate vehicle in line with this roadmap is available.

4.2.1.1.1 Does the Queensland Government agree with the proposed Net Zero Pathway for heavy road vehicles?

Timeframe	Government Objective	Supportive?	Comment / Recommendations
Short	Continuing investment in charging and refuelling infrastructure for BEVs and FCEVs	Yes	The high costs of transitioning to low and zero emission heavy vehicles combined with the lack of refuelling and charging infrastructure, are of concern. The roadmap does not address the logistical and financial support needed for such transitions. Adequate renewable energy supplies are pivotal to facilitate this transition. Further information and discussions are required on how charging and refuelling infrastructure could be expanded across the state for public use.
	Increased use of LCLFs	Yes	Scaling up use of LCLF will require a concerted effort. Australia and Queensland have some advantages in terms of potential feedstock availability, and there are opportunities to scale up the industry and reduce reliance on imported fuels. The draft Queensland Sustainable Liquid Fuels Strategy identifies several actions for Queensland. Of particular relevance to agriculture is work to identify and unlock feedstock opportunities. This will include developing a better understanding of the current uses and price points for biological feedstocks, understanding the supply chain pathways, building capability within the renewable fuels ecosystem, as well as agronomic work to improve yield and profitability of growing biological feedstocks and processing with Australia / Queensland. Federal Government may also play a role in stimulating demand through requiring or incentivising the use of LCLF in procurement, including defence and infrastructure. There may be scope to coordinate with state jurisdictions on appropriate mechanisms to stimulate demand.
	Development of certification and accounting frameworks to verify emissions reductions from LCLFs	Yes	Relevant national actions include setting fuel standards, certification and accounting methods, and working with stakeholders to increase acceptance and understanding of renewable fuels as a drop-in alternative. As a drop-in fuel, certification and use of book-and-claim methods will be critical in uptake.

Medium	Scale up charging infrastructure and refuelling infrastructure	Yes	Develop a comprehensive plan for infrastructure deployment, focusing on high-traffic corridors and urban centres. Invest in power grid improvements to handle increased electricity demand from charging stations.
	Advanced feedstocks and pathways could be used in LCLF production with certification	Yes	Explore a wider range of sustainable biomass feedstocks, including agricultural residues, forestry waste, and algae. Improve processes for converting municipal solid waste and industrial waste into biofuels. Invest in research to improve the efficiency of thermochemical and biochemical conversion processes. Establish comprehensive lifecycle assessment methods to accurately measure and certify the carbon intensity of fuels. Develop guidelines for feedstock cultivation that avoid competition with food crops and protect biodiversity. Tailor feedstock choices to local climate and land availability to optimize sustainability.
	BEVs and FCEVs will continue to increase in efficiency and decrease in cost	Yes	Battery technology advancement: • Invest in research for higher energy density batteries • Develop solid-state batteries for improved safety and performance • Explore new materials to reduce reliance on rare earth elements Fuel cell optimisation: • Improve fuel cell stack durability and efficiency • Develop non-platinum catalysts to reduce costs • Enhance hydrogen storage technologies Government support: • Offer tax incentives for manufacturers investing in new technologies • Implement supportive policies to encourage mass adoption

Long	National charging infrastructure and refuelling networks completed	Yes	Strategic planning: • Develop a comprehensive national plan with clear targets and timelines • Identify key corridors and urban areas for prioritized deployment • Ensure coverage in rural and remote areas Standardisation: • Implement universal charging standards for interoperability • Standardise payment systems for user convenience • Develop common signage and wayfinding systems Grid upgrades: • Invest in smart grid technologies to manage increased demand • Implement load balancing and demand response systems • Encourage renewable energy integration at charging stations Hydrogen infrastructure: • Strategically locate hydrogen refueling stations • Invest in green hydrogen production and distribution • Ensure safety standards and public awareness
	Widespread use of battery and hydrogen fuel cell technologies	Yes	Research and development: • Invest in advanced battery chemistries (e.g., solid-state, lithium-sulfur) • Improve fuel cell efficiency and durability. • Develop cheaper, more abundant materials for both technologies. Infrastructure expansion: • Continue building out charging and hydrogen refuelling networks. • Integrate charging solutions into existing buildings and infrastructure. • Develop green hydrogen production facilities. Policy support: • Implement long-term incentives for consumers and businesses. • Set ambitious targets for zero-emission vehicle adoption. • Develop regulations to phase out internal combustion engines. Recycling and sustainability: • Establish efficient recycling processes for batteries and fuel cells. • Develop circular economy approaches for critical materials. Ensure sustainable sourcing of raw materials

4.2.1.1.2 The proposed pathway for heavy road vehicles relies on a mix of battery electric, hydrogen fuel cell and low carbon liquid fuels (LCLF). Rank from 1 to 3 the order in which these should be prioritised for emissions reduction.

(1) Electric (2) Low carbon liquid fuels (3) Hydrogen. Rankings based on cost and technology development maturity.

The roadmap provides options for hydrogen power and the Hydrogen Superhighway is in development, at Brisbane, Townsville, Kogan Creek. These stations are being developed at a large cost within these areas and investment along transportation routes would be beneficial with the options of battery tech and charging stations for further remote and discrete communities. At this stage the last station in Queensland to be announced will be in Townsville - more stations will be required to be located towards the Cape for heavy vehicle options to be viable. It is noted that hydrogen fuel is still in the earlier stages of development and continued development of battery technology is required to improve energy density and reduce weight to increase the feasibility for heavy commercial hydrogen vehicles.

LCLFs are likely to be required to play a significant role in heavy vehicle decarbonisation, certainly as a transition fuel but also potentially over long timeframes for some specific uses. LCLFs are likely to be required to play a significant role in heavy vehicle decarbonisation, certainly as a transition fuel but also potentially over long timeframes for some specific uses. Scaling up use of LCLFs will require a concerted effort. Australia and Queensland have some advantages in terms of potential feedstock availability, and there are opportunities to scale up the industry and reduce reliance on imported fuels. The draft Qld Sustainable Liquid Fuels Strategy identifies several actions for Qld. Of particular relevance to agriculture is the need to identify and unlock feedstock opportunities. This will include developing a better understanding of the current uses and price points for biological feedstocks, understanding the supply chain pathways, building capability within the renewable fuel's ecosystem, as well as agronomic work to improve yield and profitability of growing biological feedstocks and processing with Australia / Queensland.

Relevant national actions include setting fuel standards, certification, and accounting methods, and working with stakeholders to increase acceptance and understanding of renewable fuels as a drop-in alternative. As a drop-in fuel, certification and use of book-and-claim methods will be critical in uptake. The Federal Government may also play a role in stimulating demand through requiring or incentivising the use of LCLFs in procurement, including defence and infrastructure. There may be scope to coordinate with state jurisdictions on appropriate mechanisms to stimulate demand.

4.2.1.1.3 What additional actions need to be taken now and into the future?

Government's Role	Recommendation	Outcome
Leadership	Partner with logistics companies to test and implement low-emission vehicle technologies.	Support the transition and uptake of low and zero emission heavy vehicles
Leadership	Encourage adoption of practices that reduce emissions across the entire lifecycle of heavy vehicles, including manufacturing, operation, and disposal.	Establish the resources, systems, and infrastructure to enable rapid EV uptake.
Leadership	Prisoner transport vehicles (a type of specialised heavy vehicle) require further consideration to ensure they meet the vehicle and transportation standards set out in the Standard Guidelines for Corrections in Australia and Guiding Principles for Corrections in Australia and ensure safety issues that are present when transporting prisoners are addressed.	Establish the resources, systems, and infrastructure to enable rapid EV uptake.

Investment	Support pilot programs and demonstration projects to test the feasibility and performance of new technologies in real-world conditions, especially hydrogen.	Support the transition and uptake of low and zero emission heavy vehicles
Investment	Commonwealth Government Owned Corporations could be encouraged to further accelerate the uptake of EVs. It is recognised that Australia Post has Australia's largest fleet of electric delivery vehicles. Emphasis could be placed on further accelerating the adoption of EVs in its remaining conventionally fuelled fleet.	Support the transition and uptake of low and zero emission heavy vehicles
Investment	Acknowledging the pursuit of Battery Electric Vehicle (BEV) heavy vehicles, Queensland foresees substantial infrastructure upgrades needed to accommodate their increased weight and road wear. Coupled with the increased impact of natural disasters and the rising cost of public and active transport infrastructure, robust investment prioritisation from across government is required to enable the preparation and maintenance of the road network for this transition.	Establish the resources, systems, and infrastructure to enable rapid EV uptake. As the population of BEV and FCEV trucks increases it will be necessary to complete reforms to the national heavy vehicle charging system to ensure all heavy vehicles, including BEVs and FCEVs contribute their share of infrastructure costs after an agreed initial period to incentivise adoption.
Investment	Commonwealth support to expand the Hydrogen Superhighway currently under development in Queensland would be beneficial with further investigation required to evaluate battery tech and charging stations for further remote and discrete communities.	Establish the resources, systems, and infrastructure to enable rapid EV uptake.
Regulation	Progress efforts to remove regulatory barriers (width and mass limits) to support Euro IV standards and ensure Australia has access to the fuel-efficient engines being supplied in other global markets. Consider future reforms to mass limits to overcome the productivity penalty that zero emission trucks face because of their heavy batteries.	Support the transition and uptake of low and zero emission heavy vehicles
Investment and leadership	Build on the developing capabilities in battery manufacture, engineering and research, bus and train manufacturing, and pursue opportunities to establish a national flexible battery/hydrogen fuel cell/ LCLF capable rigid and prime mover manufacturing facility, sourcing the key components from Australian supply chains.	Aim to compete with international OEM vehicle importers/assemblers to help lower costs to Australian industry with a fit for purpose local produced product.

4.3 Rail

The Queensland Government generally supports the net zero pathway to achieve net zero emissions in rail transport, but requires clearer cost-effectiveness analysis, robust R&D investment, and strategies that help address the state's economic and geographic diversity more comprehensively.

Supportive	Areas of Concern
• Continued investigation into incentives and technologies to achieve zero net emissions in rail transport. • Recognition of the advantages of electrification over road transport, despite the initial large investment required. • Support for research and development (R&D) investment to advance rail technologies, including more efficient electric motors, advanced battery systems, and hydrogen fuel cells. • Acknowledgment of the low emissions intensity of rail freight compared to other modes of transport. • Acknowledge and supports work being undertaken through the National Rail Manufacturing Plan and establishing the High-Speed Rail Authority to develop more efficient rail transportation.	• Uncertainty regarding the cost and reliability of early-stage technologies listed in the draft roadmap for rail electrification and decarbonisation. • Challenges related to the cost and reliability risks associated with new technologies, considering the long useful life of existing rolling stock and rail infrastructure. • Insufficient consideration of economic barriers and infrastructure gaps in rural communities, which could limit the potential benefits of rail development. • The limited presence of rail infrastructure in rural communities away from regional centres overstates the potential for rail development and its benefits. • Across regional Queensland on ongoing reliance on heavy vehicle delivery is likely to remain and the report does not acknowledge the high initial investment for net-zero infrastructure upgrades support larger freight loads for alignments resilient to flooding, as well as the long-term maintenance costs.

4.3.1.1.1 Does the Queensland Government agree with the proposed Net Zero Pathway for Rail?

Timeframe	Government Objective	Supportive?	Comment / Recommendations
Short	Trials of battery electric and hydrogen technologies	Yes	Much of the Queensland's rail freight network and long-distance passenger rail (Brisbane-Rockhampton) is electrified. Important parts of the rail freight task, and the Rockhampton-Cairns long distance passenger rail, rely on diesel fuelled locomotives. The Queensland Government is supporting research into zero emission locomotives, for example, through establishing the Queensland Rail and CQUniversity research centre at the Rockhampton Rail Yards that are currently being rejuvenated. Aurizon is undertaking research into zero emission locomotives in conjunction with the University of Queensland.

	Accelerate the build out of low and zero emission charging and refuelling infrastructure	Yes	The decarbonisation of rail transport will require a supply of zero-emission technologies and the roll-out of enabling infrastructure as well as economic incentives to shift demand away from diesel locomotives. The rail sector will likely require a combination of technology improvements and pilot projects in the short-term to determine the pathway to the medium- and long-term solutions.
	Increased use of LCLFs	Yes	See comments above in relation to LCLFs and biological feedstocks. In particular, there are issues around competing uses for agricultural residues and international policy positions on the use of 'food crops' to produce energy. Further work is required to demonstrate how energy crops can be developed as part of a whole 'food / energy' system, e.g. using energy crops in rotation with food crops, to produce food and also as a break crop. Detailed lifecycle analysis will be important.
Medium	Investment in a national charging and refuelling network	Yes	
	Greater use of battery electric and hydrogen tenders, resulting in declining use of LCLFs	Yes	
	Scaled down production and investments in locomotive diesel technologies.	Yes	
Long	Wide scale adoption of battery and hydrogen fuel cell technologies	Yes	
	Phase out of LCLFs as the industry shifts to battery and hydrogen options	Yes	

4.3.1.1.2 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.

Electrification of the rail network is a mature and readily available solution. However, electrifying rail track infrastructure can be expensive, requiring high traffic use and shorter distances for financial viability. As such, the decarbonisation of our rail network will likely require some mix of these technologies. The

decarbonisation of rail transport will require a supply of zero-emission technologies and the roll-out of enabling infrastructure as well as economic incentives to shift demand away from diesel locomotives. The rail sector will likely require a combination of technology improvements and pilot projects in the short-term to determine the pathway to the medium- and long-term solutions.

4.3.1.1.3 What role should low carbon liquid fuels play in rail decarbonisation?

See comments above in relation to LCLFs and biological feedstocks. In particular, there are issues around competing uses for agricultural residues and international policy positions on the use of 'food crops' to produce energy. Further work is required to demonstrate how energy crops can be developed as part of a whole 'food / energy' system, ego using energy crops in rotation with food crops, to produce food and also as a break crop. Detailed lifecycle analysis will be important.

4.3.1.1.4 What additional actions need to be taken now and into the future?

Government's Role	Recommendation	Outcome
Investment	Investment in projects that seek to advance rail technologies, including more efficient electric motors, advanced battery systems, and hydrogen fuel cells.	Establish the resources, systems, and infrastructure to enable rapid EV uptake.
Leadership	Consider approaches to maximise the use of sustainable and recyclable materials in the construction and maintenance of rail infrastructure.	Establish the resources, systems, and infrastructure to enable rapid EV uptake.

4.4 Maritime

The Queensland Government supports the overarching goal of the roadmap but stresses the need for more immediate actions and tailored strategies that address the unique challenges of remote communities, accelerate technology adoption, and enhance infrastructure development in a timely manner.

Supportive	Areas of Concern
• Recognition of the importance of developing a Maritime Emissions Reduction Action Plan (MERNAP) to set strategic direction and support national emissions reduction targets. • Support for the development and adoption of electric and hybrid propulsion systems for ships, particularly for short-distance and coastal shipping. • Advocacy for green port initiatives, such as electrification of port equipment, shore power for ships, and integration of renewable energy. • Acknowledgment of local capabilities, such as Aus Ships' expertise in designing and manufacturing zero-emission passenger ferries, which could benefit from Commonwealth support. • Emphasis on the economic benefits and job growth potential from increased demand for zero-emission maritime vessels and infrastructure.	• Competing uses for agricultural residues and international policy positions on the use of 'food crops' to produce energy. • Concerns about the high cost and logistical challenges of modernising maritime vessels, particularly in remote areas like Cape York and the Torres Strait. • The roadmap does not discuss options for remote and regional communities or consider seasonal impacts on these transportation services. • Insufficient recognition of the reliance on maritime transport in the Torres Strait and the specific economic constraints and infrastructure needs of remote and discrete communities. • Need for accelerated expansion of shore power infrastructure and development of shoreside recharging facilities to facilitate faster adoption of battery technologies for vessels on defined short routes. • Identifying zero emission ports in the 2040-50-time horizon could lead to missed opportunities in the short and medium term.

4.4.1.1.1 Does the Queensland Government agree with the proposed Net Zero Pathway for maritime?

Timeframe	Government Objective	Supportive?	Comment / Recommendations
Short	Pilot projects of low and zero carbon propulsion technologies on short routes and coastal shipping operations	Yes	While not yet a practical solution for larger yachts, solar has been used in innovative ways on a number of vessels and could be used to mitigate emissions. Coastal Shipping ex Cairns travelling North servicing the Cape and Torres communities is well developed. There is opportunity to investigate feasibility and decarbonisation impact of coastal shipping travelling South (CNS-TSV-MKY-ROK-BDB-BNE etc)

	Vessel new-builds and retrofits prioritise low and zero carbon propulsion technologies	Yes	While cruise and superyachts contribute significant amounts of nitrogen oxides (NOx) and carbon emissions, this sector should be encouraged to consider mitigating impacts through transitioning to technologies such as diesel-electric hybrid technology.
	Improved battery technology extends the range and efficiency of small electric vessels	Yes	
	LCLFs are used in some small vessels	Yes	See comments above in relation to LCLFs and biological feedstocks. There are issues around competing uses for agricultural residues and international policy positions on the use of 'food crops' to produce energy. Further work is required to demonstrate how energy crops can be developed as part of a whole 'food / energy' system, e.g. using energy crops in rotation with food crops, to produce food and also as a break crop. Detailed lifecycle analysis will be important.
	Development of certification and accounting frameworks to verify LCLFs	Yes	
Medium	Widespread adoption of electric vessels for short routes, including public transport	Yes	
	Greater use of hydrogen and hydrogen-derived fuels	Yes	
	Expansion of shore power infrastructure	In principle	Expansion of shore power infrastructure should be given a higher priority in the net zero pathway for maritime and the roadmap / action plan should identify support mechanisms for faster deployment than the 2030–40 time horizon. Development of shoreside recharging infrastructure would incentivise faster adoption of battery technologies for vessels that are used on defined short routes such as barges and ferries.
Long	Significant increase in vessels powered by hydrogen and hydrogen-derived fuels	Yes	

	Zero-emission ports	In principle	Identifying zero emission ports in the 2040-50 time horizon could lead to missed opportunities in the short and medium term. Port authorities are investing in a range of efficiency optimisation technologies to reduce emissions from port operations and logistics, and effectiveness of this approach is likely to accelerate as AI and machine learning technologies are developed.
	National electric short haul vessel charging network	Yes	

4.4.1.1.2 What additional actions need to be taken now and into the future?

Government's Role	Recommendation	Outcome
Investment	Commonwealth support will be needed to overcome the challenges for Queensland's regional and remote transport infrastructure sectors, and to incentivise pilot projects necessary to demonstrate the viability of electrification and other low-carbon fuel technologies.	Support the transition and uptake of low and zero emission maritime vessels
Investment	Commonwealth financial support to boost coastal shipping in regional Queensland to accelerate short term actions.	Support the transition and uptake of low and zero emission maritime vessels
Investment	Commonwealth support for zero emission passenger ferries for operation in Brisbane and elsewhere in Australia, would provide substantial opportunities for shipbuilders such as Aus Ships to compete for design, build and maintain contracts. Additional demand for zero emission passenger ferries will have significant follow-on benefits to the local supply chain.	Establish the resources, systems, and infrastructure to enable low and zero emission maritime vessels
Investment	Green Port Initiatives: develop and implement green port initiatives, such as electrification of port equipment, shore power for ships, and renewable energy integration.	Support the transition and uptake of low and zero emission maritime vessels
Leadership	Commonwealth advocacy and investment is required to encourage the adoption of electric and hybrid propulsion systems for ships, particularly for short-distance and coastal shipping.	Support the transition and uptake of low and zero emission maritime vessels
Leadership	Commonwealth advocacy is required to help encourage the adoption of circular economy principles in the maritime sector, such as recycling and reusing materials.	Reduce shipping related emissions
Investment	The goal of zero-emission ports should consider planning to facilitate cold-ironing operations to reduce emissions from berthed vessels, in turn supporting the concept of green shipping corridors.	Reduce shipping related emissions

4.5 Aviation

Queensland supports initiatives promoting SAF adoption and sustainability in aviation, it underscores the need for technological advancements, cost-effective solutions, and equitable strategies to address the diverse challenges and opportunities in achieving net-zero emissions.

Supportive	Areas of Concern
• SAF as a primary pathway to decarbonise aviation due to its low carbon footprint and compatibility with existing infrastructure. • Acknowledge aviation's critical role in national and international supply chains, tourism, and high-value freight sectors. • Support initiatives that aim to balance decarbonisation goals with maintaining essential air transport services, particularly for remote and indigenous communities. • Endorse options for production incentives to support the establishment of an Australia low carbon liquid fuel industry. • Support ongoing work through the Australian Jet Zero Council to identify initiatives to reduce aviation emissions.	• Issues around competing uses for agricultural residues and international policy positions on the use of 'food crops' to produce energy. • Specific strategies and support mechanisms are required to ensure aviation decarbonisation is feasible and equitable for all communities, including those relying on air transport, notably the Torres Strait. • The roadmap does not consider the higher costs associated with transitioning to sustainable aviation fuels in remote and discrete indigenous communities and the essential nature of air transport for some remote communities which do not have an airstrip and relies on helicopter transport for emergencies. • Significant additional development support is required for the aviation industry to encourage domestic development and uptake required for longer haul travel. • Concerns regarding the current technological limitations that restrict SAF use to a maximum 50% blend with traditional jet fuel. • The variability in SAF carbon intensity depending on biomass sources and production distances, necessitating rigorous lifecycle assessments. • A robust regulatory framework is required to ensure offsets contribute meaningfully to achieving net-zero emissions goals in aviation.

4.5.1.1.1 Does the Queensland Government agree with the proposed Net Zero Pathway for aviation?

Timeframe	Government Objective	Supportive?	Comment / Recommendations
Short	SAF deployed in blended form	Yes	While acknowledging the critical role of Sustainable Aviation Fuel (SAF) in decarbonizing the aviation sector, the use of SAF still encounters several challenges. One significant challenge not discussed in the Consultation paper is the limitation of current aircraft technology, which cannot be powered by SAF alone. Research indicates that the use of SAF in aircraft is currently restricted to a 50% blend with traditional jet fuel. The Consultation paper should address the maximum blending ratio for SAF in existing aircraft. This is crucial for a realistic assessment of SAF's role in achieving net-zero emissions for the aviation sector by 2050.
	SAF production prioritises agricultural residues, waste materials and energy crops	Yes	SAF is primarily produced from biomass, such as food crops. Similar to biofuel production using biomass, the carbon footprint of SAF derived from biomass will largely depend on the type of biomass, as well as the distance between biomass production site and SAF plant. There have been studies indicating that certain feedstocks would generate carbon-intensive SAFs. However, SAF may provide an opportunity to repurpose certain wastes that are inexpensive, readily available in Australia, and suitable for SAF production (e.g., grease trap waste). See comments above in relation to LCLFs and biological feedstocks. There are issues around competing uses for agricultural residues and international policy positions on the use of 'food crops' to produce energy. Further work is required to demonstrate how energy crops can be developed as part of a whole 'food / energy' system, e.g using energy crops in rotation with food crops, to produce food and also as a break crop. Detailed lifecycle analysis will be important.
	Electric propulsion aircraft, including from hydrogen fuel cell technology, is trialled and becomes operational for small aircraft (up to 10 seats)	Yes	While electric aircrafts are still in the early stages of development, the advancements in battery technology and propulsion systems could eventually lead to electric or hybrid-electric planes for short-haul flights which can contribute to the reduction of emissions from air travel including in tourist destinations
	Development of certification and accounting frameworks to verify LCLF	Yes	

Medium	Continued investment in synthetic SAF, with a certification and accounting framework in place to verify emissions reductions	Yes	
	Airport operations move to net zero as airport infrastructure is upgraded to support the refuelling/recharging of electric and hydrogen aircraft	Yes	Improvements in the efficiency of airport operations including electrification of ground vehicles and facilities is recognised as an opportunity in the paper but is not included in the net zero pathway for aviation. Adoption of battery/hydrogen technologies for ground vehicles and other airport operations in short term also assists airports have refuelling / recharging infrastructure to support the aircraft once available.
	Electric propulsion aircraft, including from hydrogen fuel cell technology, is trialled and becomes operational for small aircraft (up to 50 seats)	Yes	While electric aircrafts are still in the early stages of development, the advancements in battery technology and propulsion systems could eventually lead to electric or hybrid-electric planes for short-haul flights which can contribute to the reduction of emissions from air travel including in tourist destinations.
Long	Majority of aviation fuel used in Australia is SAF	Yes	
	Infrastructure at Australian airports supporting flights close to 100% SAF as well as shortrange hydrogen and electric flights	Yes	

4.5.1.1.2 What additional actions need to be taken now and into the future?

Government's Role	Recommendation	Outcome
Investment	Identify options for production incentives to support the establishment of an Australia low carbon liquid fuel industry.	Support the transition and uptake of SAFs/LCLFs

Leadership	Advocate and support green airport programs focusing on electrification of ground support equipment, energy efficiency, renewable energy use, and waste reduction.	Establish the resources, systems, and infrastructure to enable the reduction of aviation emissions
Leadership	Lead and advocate for community education programs to encourage modal shift towards alternative transportation methods like low emission road transport, high-speed rail and increased use of videoconferencing to reduce demand for domestic aviation.	Encourage alternative low emission options
Leadership	Support work to investigate the implications of the transition on remote and isolate communities.	Support the transition and uptake of SAFs
Leadership	The Consultation paper should address the maximum blending ratio for SAF in existing aircraft. This is crucial for a realistic assessment of SAF's role in achieving net-zero emissions for the aviation sector by 2050.	Establish the resources, systems, and infrastructure to enable the reduction of aviation emissions
Leadership	Prior to approving the construction of any SAF manufacturing plant, a thorough pre-feasibility study must be conducted. This should assess the potential locations, availability of feedstocks, and lifecycle emissions to ensure that the chosen feedstock is sufficiently available and that its lifecycle carbon emission intensity is lower than that of conventional jet fuels.	Establish the resources, systems, and infrastructure to enable the reduction of aviation emissions
Regulation	Limit the use of offsets in Australia to ACCUs. ACCUs are rigorously regulated and verified, ensuring that they provide legitimate and measurable emissions reductions. By restricting offsets to ACCUs, the aviation sector can maintain higher standards of accountability and transparency, thus reinforcing the credibility and impact of its carbon offsetting efforts.	Ensure that the emissions reductions claimed are real and contribute effectively to Australia's climate goals.
Leadership	Align aviation route priorities with other modes of transport (e.g., the cruise industry) to reduce the carbon emissions and to support the flow of visitors into and throughout Queensland.	

5. Supporting transport's net zero pathways

Queensland supports the proposed net zero pathway for transport infrastructure, emphasising the integration of emissions considerations throughout the lifecycle of projects and endorsing increased use of recycled materials. The discussion paper appropriately captures the challenges and complexities of gas emissions contributed by transport infrastructure. The state acknowledges the importance of standardisation efforts by ATAP, Austroads, NTRO, and NACOE, highlighting network planning as crucial for achieving transport net zero goals. However, concerns exist regarding the cost implications of using low-carbon materials, logistical challenges in regional and remote communities, and barriers to adopting low-carbon solutions due to lack of awareness. Queensland seeks national consistency in data collection and reporting of emissions while advocating for partnerships to facilitate infrastructure decarbonisation and ensure readiness for low-emission transport modes.

Supportive	Areas of Concern
• Support for considering emissions at all stages of the infrastructure lifecycle, aligning with efforts by the National Asset Centre of Excellence (NACOE) and future integration into the ADVICE system. • Endorsement of increased use of recycled materials and greater reuse of existing materials in infrastructure projects. • Supportive of Australian Transport Assessment and Planning (ATAP), Austroads, National Transport Research Organisation (NTRO) and NACOE standardisation. • Agreement with the importance of network planning to facilitate transport net zero goals. • Recognition of the need for sustainable transport solutions that prioritize public transport, heavy vehicles, and active transport modes over commuter cars. • Acknowledgment of the need for a national standard on data collection, measurement, and reporting of emissions to ensure consistency across Australia.	• Concerns about the cost implications of using low-carbon materials in transport infrastructure projects. • Challenges associated with recycled materials including lower levels of quality or higher reprocessing costs than quarry sourced material. • Building and maintaining resilient, sustainable infrastructure in remote areas is costly and logistically challenging. The roadmap does not sufficiently address the specific needs for durable, climate-adapted infrastructure in these regions. • Challenges associated with integrating EV charging infrastructure into existing Queensland Health facilities and rural locations. • Issues regarding the lack of awareness, risk aversion, and inertia hindering the uptake of low-carbon solutions in infrastructure projects. • Planning policies need to be more explicit to support transport solutions that target PT, Heavy Vehicles and AT modes over commuter cars. • Reducing Government Infrastructure Emissions Roadmap – is not a Queensland Government Roadmap, this exists as an Engineer's Australia Discussion Paper. Probably should be removed from the list. • Landlords are hesitant to install charging stations due to the inherent risk with lithium battery fires.

5.1.1.1.1 Does the Queensland Government agree with the proposed Net Zero Pathway for transport infrastructure?

Timeframe	Government Objective	Supportive?	Comment / Recommendations
Short	National standards for data collection, measurement and reporting of embodied emissions, in order to enable a fair comparison and assessment of emissions from transport infrastructure	Yes	Queensland supports a national standard on data collection, measurement and reporting of emissions to support consistency of data and reporting across Australia.
	Increased investment in low and zero carbon materials (steel, cement & aluminium)	Yes	There was broad industry interest in partnering with the government to develop, pilot, and evaluate the performance of low carbon materials, products, and approaches. To support this, stakeholders urged government be more actively involved across the value chain, particularly in pre-competitive phases, to ensure that opportunities for emissions reduction are not missed. Partnership approaches, rather than just tendering, were recommended to promote circularity, design collaboration and risk-sharing. Although Queensland supports this approach, in the current market, using low-carbon materials for transport infrastructure works could result in more expensive materials being used and, therefore, an impact on the cost for project construction. Geopolymer concrete is currently available commercially and should be acknowledged and supported in embodied carbon reduction pathways. Queensland encourages expanding the investigation of low carbon materials beyond green steel, concrete/cement, asphalt, aluminium and low carbon recycled materials to include sustainable timbers.
Medium	Operational emissions are net zero, with a significant reduction in embodied emissions	Yes	
	Low and zero carbon concrete and steel is prioritised by industry	Yes	

Long	Low and zero carbon concrete and steel is price competitive and available for infrastructure projects	Yes	

5.1.1.1.2 additional actions need to be taken now and into the future?

Government's Role	Recommendation	Outcome
Leadership	Ensure our tertiary institutions are developing the capabilities in our existing and emerging planners which will be critical for implementation of a new planning mindset, approach and framework.	Establish the resources, standards, and frameworks to enable low or zero emission transport infrastructure
Leadership	Facilitate the establishment of consistent and agreed-upon standards for project procurement across all states and territories.	Establish the resources, standards, and frameworks to enable low or zero emission transport infrastructure
Leadership	The net zero pathway timeframes need to factor in the long lead times required to re-structure the many long-term contractual frameworks which the rail and port GOC businesses operate under, and the market-based regulated pricing frameworks (e.g. set by the QCA) that underpin the necessary capital investments required to make the transition to a low carbon operating environment.	Establish the resources, standards, and frameworks to enable low or zero emission transport infrastructure
Leadership	The Commonwealth needs to lead coordination of transport infrastructure and EV charging across Commonwealth, State and Local governments.	Accelerate the adoption of net zero infrastructure
Leadership	The Commonwealth should initiate and support rights-based discussions with Aboriginal peoples and Torres Strait Islander communities to foster genuine partnerships in the development of infrastructure projects.	Accelerate the adoption of sustainable practices.
Leadership	Develop and implement nationally consistent approaches to decarbonise infrastructure, integrating emissions considerations throughout the project lifecycle. This should include setting initial quantitative targets for the transport sector and sub-sectors to guide specific emission reduction efforts and technology development.	Establish the resources, standards, and frameworks to enable low or zero emission transport infrastructure

Leadership & Investment	Facilitate partnerships between government, industry, and research institutions to pilot and scale up low-carbon materials and technologies. Emphasise pre-competitive collaboration to foster innovation, circularity, and risk-sharing in infrastructure projects, thereby	Accelerate the adoption of sustainable practices

5.1.1.1.3 Feedback from consultation with industry stakeholders on opportunities to reduce emissions from the state's infrastructure program by the Department of State Development and Infrastructure (DSDI), Infrastructure and Regional Strategy group (IRS).

Building on recent developments regarding consistent approaches to measuring and valuing emissions, stakeholders flagged nationally consistent approaches to decarbonisation as key to facilitating efficiencies and certainty for industry participants and training providers to accelerate uptake of more sustainable practices.

A common theme was that it will take considerable time for both government and industry to make emissions reductions activities a business-as-usual (BAU) approach in project delivery. It is however noted that there are many low-cost commercially viable low-carbon solutions available now, but that lack of awareness, risk aversion and inertia are limiting uptake. Short, medium and long term culture change and initiatives to support this is required that respond to the long lead times for project planning, development, delivery and operational stages of infrastructure projects. Better integrating emissions reduction considerations into infrastructure decision-making frameworks in the same way as traditional economic, environmental and social factors was strongly supported with many stakeholders observing that there are little to no emissions reduction requirements in current procurement approaches.

Industry also encouraged reductions in emissions through design choices by adopting principles such as "build nothing, build less, build clever, build efficient." The early design phases offer the greatest opportunities to identify and mitigate whole-of-life embodied and operational emissions.

With respect to low carbon products and services, feedback centred on the need to grow both supply and demand sides of the market as focusing on only one side will not support an efficient industry transition. There was broad industry interest in partnering with the government to develop, pilot, and evaluate the performance of low carbon materials, products, and approaches. To support this, stakeholders urged government be more actively involved across the value chain, particularly in pre-competitive phases, to ensure that opportunities for emissions reduction are not missed. Partnership approaches, rather than just tendering, were recommended to promote circularity, design collaboration and risk-sharing.

DSDI (IRS) is supportive of key themes to support infrastructure decarbonisation outlined in the consultation document, including themes and future initiatives to support early decision-making and low-carbon design, and support for the development, commercialisation and adoption of low-carbon product, materials and methodologies. DSDI would also support ongoing engagement and promotion activities to support and accelerate transition to low-carbon economy and low-carbon as BAU on infrastructure projects.

DSDI currently participates on the Infrastructure and Transport Minister's Meeting (ITMM) Interdepartmental Working Group (and other ITMM forums) and will continue to engage and provide input through those forums as the roadmap is developed and implemented.

6. Transport energy use

6.1.1.1.1 What additional actions need to be taken now and into the future?

Government's Role	Recommendation	Outcome
Leadership	Partnerships with government and industry to develop an implementation framework including standards, guidance and incentives that makes low and zero emission transport options attractive and sustainable for both private and public transport.	Support the transition and uptake of low and zero emission transport options
Investment	Increased reliable generation, storage and transmission infrastructure that feeds to an exponentially increased array of charging facilities that compares with the current availability of fossil fuels.	Establish the energy to enable the reduction of emissions
Leadership	The Commonwealth should collaborate with state governments to promote operational contracts with green energy clauses. These clauses would incentivise investment in renewable energy infrastructure, ensuring that the electricity powering our public transport systems comes from renewable sources.	Accelerate the adoption of net zero infrastructure
Investment	The Commonwealth government is urged to provide greater financial support to help ports establish new import facilities or export infrastructure for hydrogen projects to overcome the initial barriers of costs needed to construct new import facilities.	Accelerate the adoption of net zero infrastructure
Leadership	Both State and Commonwealth governments need to ensure, as much as possible, that EV charging is aligned with renewable energy generation, particularly solar power during the day, through public education, widespread deployment of charging infrastructure at daytime parking locations, and incentives such as favourable tariffs.	Support the transition and uptake of low and zero emission transport options and minimise the impact on the electricity grid
Leadership	The Commonwealth is encouraged to publish and advertise the results of the LCLF consultation to broaden awareness of the future potential and encourage public take up of the technology.	Accelerate the adoption of net zero technologies.

6.1.1.1.2 How should the use of low carbon liquid fuels be prioritised across different transport modes over time to achieve maximum abatement?

The transport system in Australia is currently heavily reliant on direct combustion of fossil fuels. Transport makes up 75% of Australia's total liquid fuel demand. The primary method for reducing emissions in the transport sector will be through electrification. Where electrification is not feasible low carbon liquid fuel (LCLF) substitutions will be required to reduce emissions. Aircraft and maritime vessels, as well as some heavy road freight vehicles and rail, will need to rely on LCLFs where electrification is not viable. The Consultation Roadmap has highlighted that the decarbonisation opportunities are varied for Australia's transport sector. Light vehicles will likely decarbonise through electrification, but other modes are hard to electrify and have fewer alternatives to replace the use of liquid fuels. Low carbon liquid fuels (LCLFs) will enable those transport modes to use energy dense hydrocarbons as a fuel, produced in a way that minimises emissions. The

National Energy Performance Strategy sets out the Australian Government's approach to improve energy performance across the economy, lifting the role of the demand-side of the energy system to support the government's objectives to deliver net zero emissions, energy affordability and reliability.

7. Travelling in partnership

7.1.1.1.1 What are the best ways for the Australian Government to work collaboratively with industry, business, governments and communities to implement the proposed pathways?

The Queensland Government emphasises the critical importance of aligning goals across all sectors to ensure a cohesive national approach towards achieving shared objectives. Working in partnership with industry is critical and this may require amendment of existing current procurement rules which restrict governments to work in true partnership with industry. Collaboration and partnerships require the sharing of information on various levels which is sometimes not possible because of political constraints. These are key challenges which must be overcome to facilitate a true collaborative partnering model.

Queensland recommends that the Commonwealth Government consider revising procurement guidelines to better facilitate more flexible partnerships with industry in future initiatives. This adjustment would support more innovative approaches to tackling emissions reductions in transport and infrastructure. Regarding examples of successful partnerships internationally, Queensland highlights technologies such as wireless charging and battery swap systems, as well as collaborations between electric vehicle manufacturers and digital technology firms, which could inform Australia's final Transport and Infrastructure Roadmap.

Looking forward, Queensland proposes several opportunities for leadership at both national and international levels, including investments in R&D for zero-emissions transport, improved management of e-waste through policy and infrastructure development, and fostering industry-government partnerships for efficient EV charging solutions using smart technology.

7.2 Measuring success

7.2.1.1.1 What measures and metrics should be used to evaluate the final Transport and Infrastructure Net Zero Roadmap and Action Plan?

Key Performance Indicators play a crucial role in monitoring progress, guiding decision-making, and achieving sustainable outcomes in reducing transport emissions across Australia. There is a pressing need for improved interconnected national, regional, and local performance indicators that clearly identify priority areas for action and track progress effectively. These indicators must be consistently applied with transparency and timeliness throughout the entire evaluation process. Ensuring universality is essential so that KPIs can withstand advancements in performance measurement techniques, maintaining their relevance and reliability over time. Starting KPI assessments at lower levels and facilitating intuitive aggregation to the national level will provide comprehensive insights into Australia's collective efforts towards achieving emissions reduction targets.

Quantitative Measures	Qualitative Measures
National Decreases in Fossil Fuel Use: Track reductions in fossil fuel consumption across transport sectors.	**Improvements in Accessibility:** Evaluate improvements in accessibility to transport options, particularly for disadvantaged communities.
Percentage of National Fleet that are ZEVs: Monitor the adoption rate of zero-emission vehicles (ZEVs) in the national vehicle fleet.	**Decreases in Transport Disadvantage:** Measure reductions in transport disadvantage across different demographics.

Public Transport Trips per Capita: Measure changes in per capita usage of public transport.	**Equity of the Transport System:** Assess equity outcomes, ensuring that the transport system benefits all socio-economic groups fairly.
Mode Share of Public Transport and Active Transport: Assess change in mode share for public transport and active transport options.	**Integration of Transport Networks:** Evaluate the integration and efficiency of transport networks, including mitigation of cross-border impediments.
Expenditure ($) over CO2 Emissions Saved: Calculate the cost-effectiveness of various projects based on their emissions reductions.	**Customer Sentiment/Experience Surveys:** Implement regular surveys to gauge public satisfaction and perceptions regarding transport services and infrastructure.
Observed emissions as a percent of minimum possible emissions by trip purpose: quantify observed emissions as a percentage of the minimum possible emissions achievable for each trip purpose.	
Local Air Quality Monitoring: Utilise local air quality data to measure the impact of EV penetration and other emission reduction initiatives.	
Visitor Origin and Travel Distance: Collect data on visitor origin and travel distance to estimate emissions associated with tourism-related transport.	
Lifecycle Assessments (LCA): Commercial transport industry should conduct full LCAs to evaluate the environmental impacts of transport.	

7.2.1.1.2 What other data related points:

- **Granular Data Collection:** Collect detailed data on emissions by transport mode, purpose, and geographical location to understand where emissions reductions are most needed and effective.
- **Scenario Analysis:** Use scenario planning to model different pathways for emissions reduction, considering factors like technology adoption rates, policy interventions, and behavioural changes.
- **Comparative Analysis:** Benchmark against international best practices and performance metrics to assess Australia's progress and identify areas for improvement.
- **Longitudinal Tracking:** Implement consistent methodologies for measuring and reporting carbon emissions to enable longitudinal tracking of progress over time.
- **Specific Measures:** Ensure measures are precise, avoid double-counting, and are nuanced to capture diverse aspects of emissions reduction.
- **Equity:** Metrics must incorporate equity considerations, highlighting disparities in emissions between communities based on factors like access to low-emission transport options and financial feasibility. This insight will help inform tailor strategies to achieve equitable emission outcomes across diverse socio-economic contexts.
- **Data Consistency and Public Accessibility:** Queensland recognizes the importance of setting metadata standards for consistent reporting across jurisdictions. It supports making progress reports and data publicly accessible to enhance transparency and engage the public in the process.

- **Timeframe-Specific Targets:** specify an informed 2030, 2040 and 2050 target for each transport mode (as tailored net zero pathways) in table 4 to manage the transport and other sector and supply chains expectations and obligations under their scope 1, 2 and 3 emissions reporting.

8. Any other relevant matters.

8.1.1.1.1 Next Steps

To facilitate knowledge sharing and collaboration among states and local governments, it would be beneficial to compile and review submissions from various states. This exchange of ideas can enhance alignment and coherence in our efforts towards achieving net-zero emissions. Special consideration should be given to developing separate plans for remote and discrete communities in consultation with Aboriginal and Torres Strait Islander peoples, fostering a collaborative approach across sectors like tourism, agriculture, and urban planning. Investing in consistent data collection and analysis across industries will enable informed decision-making and adaptive management in our journey towards economy-wide net zero emissions.

8.1.1.1.2 Workforce Requirements – Department of Employment, Small Business, and Training (DESBT)

The Transport and Infrastructure Net Zero Consultation Roadmap (Roadmap), currently does not include a workforce focus, which is fundamental to delivering a pathway to net zero transportation. It is recommended that the Roadmap addresses the need for a skilled and ready workforce to support transport net zero pathways. The production and maintenance of relevant transportation technologies will require a workforce with the right training and skills. The Roadmap would be further strengthened by the inclusion of existing work that is being undertaken across States and Territories including Queensland to develop and support the clean energy workforce.

DESBT acknowledges the importance of the Australian Government's sectoral plans to support Australia's transition to Net Zero and is working to ensure that Queensland's existing and future workforce is suitably skilled to support the transition.

DESBT is leading the delivery of Queensland's Clean Energy Workforce Roadmap. Queensland's Clean Energy Workforce Roadmap recognises the importance of skills and training to foster a strong clean energy workforce and invests $30 million to ensure the right pathways and support are available in the right locations for workforce development and to ensure small businesses can take advantage of manufacturing and supply opportunities.

Ensuring Queensland's small business sector is well placed to overcome challenges and benefit from growth opportunities is a key focus of the new Queensland Small Business Strategy 2024–27. The new Strategy helps to lower costs and ease costs of living pressures on small business, as well as boosting productivity and maximising procurement and supply chain opportunities for small businesses.

The new Good Jobs, Great Training: Queensland Skills Strategy 2024-2028 sets out the future direction for the training system in Queensland over the next five years. It will ensure our training system is skilling workers for some of our fastest growing jobs as well as developing skills for the jobs of the future. This Strategy forms the basis of Queensland's jurisdictional approach to delivering key elements under the National Skills Agreement (NSA), which includes an inaugural national priority focused on supporting the Net Zero transformation,

Both Queensland's Clean Energy Workforce Roadmap and the new Queensland Skills Strategy form part of the Queensland Government's Good people. Good jobs: Queensland Workforce Strategy 2022–2032, a comprehensive whole-of-government workforce strategy to help capitalise on Queensland's workforce strengths, address workforce challenges and support secure job opportunities for Queenslanders. Working hand in hand, these strategies cement our plan to ensure Queensland has the skilled workforce it needs now and into the future.

8.1.1.1.3 Accessibility and engagement – The Department of Child Safety, Seniors and Disability Services (DCSSDS)

The Queensland Government is committed to implementing the priorities and objectives of Australia's Disability Strategy 2021-31 (ADS) to ensure equal participation for all people with disabilities in society. The Department of Child Safety, Seniors and Disability Services (DCSSDS) recognises the alignment between the Consultation Roadmap's Principle 4 and ADS commitments for inclusive communities. The ADS emphasises inclusive information, communication, and accessible transport systems under its outcome areas. Queensland has committed to various Target Action Plans (TAPs) under the ADS, including TAP 4.4, which mandates early consultation through the Queensland Accessible Transport Advisory Council (QATAC) on major transport projects. DCSSDS urges collaboration between the Department of Infrastructure, Transport, Regional Development, Communications and the Arts and Queensland's Department of Transport and Main Roads to consult QATAC on future initiatives. Additionally, DCSSDS requests meaningful engagement of people with disabilities and seniors in the Consultation Roadmap, ensuring accessible communication formats are integral to operation standards and infrastructure such as electric vehicle charging systems. All consultations and communications should be conducted in physically accessible spaces and provided in formats like Easy Read, Auslan, audio, or braille.

8.1.1.1.4 Decarbonising the existing fleet and R&D – The Department of Environment, Science and Innovation (DESI)

Significant consideration should be given to decarbonizing the existing vehicle fleet. This could be achieved by amending the existing fuel quality standards and/or introducing new policies to include low-carbon fuels, such as biodiesel and bioethanol.

In work that the Department of Environment, Science and Innovation has recently undertaken with industry decarbonisation stakeholders, the point is frequently made that all the technology needed to decarbonise Queensland's economy (including the transport sector) already exists, and much like this Roadmap, focus should be on adoption of this existing technology.

However, this Roadmap needs to factor in a pathway to promote the development of new technology to decarbonise the transport sector. Existing technology may be able to reduce transport emissions to net-zero, however support needs to continue for R&D and innovation for new decarb technologies that are both cheaper and more energy efficient. For example, the purchase of EVs are currently incentivised through government subsidies to make them more affordable for both households and businesses to purchase. Though, R&D needs to continue to make EVs more cost effective to purchase and run than ICE vehicles, and to make them a default purchase option for new car buyers (and relegate the ICE to the dustbin of superseded technology). Similarly, this Roadmap notes that decarbonising heavy vehicles using battery tech will be harder than for light passenger vehicles. Rather than focusing on addressing regulatory barriers, the Roadmap could propose options to for further R&D into new tech that will decarbonise Australia's heavy vehicle fleet.

This will ensure a pipeline of new decarbonisation technology that continues to deliver value for end users, and enhances the overall productivity of the Australian economy