

Transport and Infrastructure Net Zero Consultation Roadmap

Take the survey

Department of Climate Change, Energy, Environment and Water

Response received at:

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1 Confirm that you have read and understand this privacy notice.

Yes

2 Please indicate how and if you want your submission published.

Public

3 Published name

Dr Dia Adhikari Smith

4 Confirm that you have read and understand this declaration.

Yes

5 First name

Dia

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- 8 Phone
[REDACTED]
- 9 Who are you answering on behalf of?
Organisation
- 10 Organisation name
The University of Queensland
- 11 What best describes you or your organisation?
University
- 12 What sector do you represent?
Heavy road vehicles (trucks, buses etc.)
All transport
Public transport
Rail
Light road vehicles (cars, utes etc.)
Infrastructure
- 13 What state or territory do you live in?
Queensland
- 14 Postcode
4072
- 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.
Included in our submission

- 18** 2. Do you support the use of the avoid-shift-improve framework as a tool to identify opportunities for abatement?
Yes
- 19** 2.1 Please add details to your response.
Included in our submission
- 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.
1: Battery electric
2: Low carbon liquid fuels
3: Hydrogen fuel cell

- 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

215 Redacted

Submission_to_the_Transport_and_Infrastructure_Net_Zero_Consultation_Roadmap.45f54792.pdf

69 Upload a submission

Not answered

70 Upload supporting file

Not answered

71 Upload supporting file

Not answered

05 August 2024

Australian Government

Department of Infrastructure, Transport, Regional Development, Communications and the Arts

Department of Climate Change, Energy, Environment and Water

Canberra ACT 2601

Lodged electronically

Re: Submission to the consultation on Transport and Infrastructure Net Zero Consultation Roadmap – Heavy Vehicles

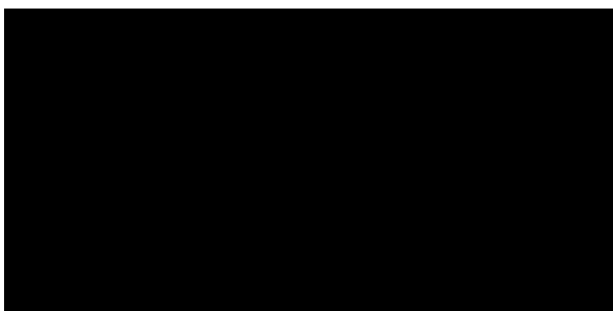
As a Research Fellow at the University of Queensland (UQ), I am pleased to submit this response to the Government's consultation on the Transport and Infrastructure Net Zero Roadmap. My research, specifically targeting the decarbonisation of heavy vehicles, highlights the critical role this sector plays in achieving Australia's net zero emissions target. Heavy vehicles, including freight trucks, specialised trucks, public transport buses, rail systems, maritime vessels, and aviation, are essential to Australia's transportation infrastructure but present unique challenges for decarbonisation.

This submission aims to provide a comprehensive roadmap and strategic recommendations for decarbonising heavy vehicles within Australia's transport sector. Our approach aligns with the [Avoid-Shift-Improve framework](#), focusing on reducing transport demand, promoting shifts to lower-emission modes, and improving the efficiency of existing systems through advanced technologies and fuels. Additionally, we incorporate the [US Decarbonisation Blueprint](#) strategies, which aim to increase convenience, improve efficiency, and transition to clean options to achieve a decarbonised transportation system.

- 1. Government Policies and Incentives:** Achieving net zero in the heavy transport sector requires a multi-pronged approach. Financial incentives such as subsidies, tax credits, and grants can mitigate high upfront costs of zero emission heavy vehicles (ZEHV). Regulatory support through updating mass and dimension regulations, setting progressive emissions standards, and establishing zero-emission zones is crucial. A combination of incentives and infrastructure support will accelerate adoption, supported by public-private partnerships and ongoing research and development. Additionally, promoting modal shifts from private vehicles to public transport and active transport, shifting appropriate road freight to rail, and reducing transport demands through urban planning initiatives and advanced logistics technologies, are vital strategies. Setting ambitious targets, such as committing to the Global MOU on zero-emission medium- and heavy-duty vehicles, can drive progress and signal Australia's commitment to the transition.

2. **Supporting Transport's Net Zero Pathways:** Significant infrastructure investments are required to support a transition to ZEHVs, including developing fast-charging networks, establishing hydrogen refuelling stations, and investing in rail electrification. Ensuring the availability of renewable energy sources is vital, which involves increasing renewable energy in the grid, supporting Vehicle-to-Grid (V2G) technology, promotion of low carbon liquid fuels (LCLF) like sustainable aviation fuel and renewable diesel, and supporting the development of other advanced biofuels. Advocating for policies that bolster Australia's heavy vehicle manufacturing sector and establishing local battery production facilities can improve efficiency and promote economic growth. Ensuring that infrastructure investments prioritise cost-effectiveness and sustainability will maximise their impact on reducing emissions.
3. **Movement of Goods: Decarbonising Freight and Supply Chains:** The freight sector offers significant opportunities for decarbonisation through modal shifts, freight route optimisation, improved logistics and urban planning, and the adoption of ZEHVs. Enhancing intermodal facilities will support seamless transitions between road, rail, and maritime transport, reducing emissions. Implementing goods movement management strategies, such as strategic warehouse siting, routing, and advanced logistics technologies, can reduce unnecessary travel and improve overall efficiency. Additionally, policies should include incentives for purchasing and operating ZEHVs, funding for pilot projects, and regulatory frameworks that encourage innovation and adoption. Establishing micro-hubs within urban areas and investing in driver training programs and LCLFs can further reduce emissions from existing fleets during the transition phase.
4. **Achieving Net Zero Together:** Achieving net zero in the transport sector requires coordinated efforts among federal, state, and local governments, industry, research institutions, and community stakeholders. Regular stakeholder engagement, integrated planning, and sharing best practices are crucial for aligning efforts and maximising impact. Public awareness campaigns are also essential to increase acceptance and adoption of zero-emission vehicles. Learning from successful international and local decarbonisation initiatives can accelerate progress, with best practices and successful pilot projects driving the transition to zero-emission transport.

The detailed responses provided in the following pages elaborate on these points, offering a comprehensive roadmap for the decarbonisation of transport heavy vehicles in Australia. We appreciate the opportunity to contribute to this critical discussion and look forward to further engagement on this important issue.



Specific areas under the inquiry's terms of reference

Net Zero Pathways for Heavy Vehicles

Achieving net zero for heavy vehicles in Australia requires a comprehensive and strategic roadmap. This roadmap integrates various strategies to reduce travel needs, shift to lower-emission transport modes, and improve the efficiency of existing systems while transitioning vehicle fleets to zero-emission technologies. Significant barriers include high capital costs for zero emission heavy vehicles (ZEHV), insufficient infrastructure for charging and refuelling, and regulatory constraints. The lack of extensive networks of fast-charging stations for urban electric trucks, megawatt charging systems for long-haul electric trucks, and green hydrogen refuelling points for hydrogen trucks impedes progress. Additionally, outdated mass and dimension regulations restrict the deployment of new technologies. Technological and logistical challenges, such as integrating green hydrogen and ammonia fuel systems for maritime vessels, dedicated charging depots for electric bus fleets, extensive electrification for rail systems, and sustainable aviation fuels (SAF) for aircraft, present substantial obstacles. These barriers necessitate a coordinated effort to develop supportive policies, enhance infrastructure, and foster technological advancements to facilitate the transition to a net-zero transport sector.

1. Government Policies and Incentives

A comprehensive set of policies and incentives can address these barriers. Our approach is based on two broad strategies: the [Avoid-Shift-Improve framework](#), which focuses on reducing travel needs, shifting to lower-emission modes, and improving vehicle efficiency and transitioning to zero-emission technologies, and the [US Decarbonisation Blueprint](#) strategies, which aim to increase convenience, improve efficiency, and transition to clean options to achieve a decarbonised transportation system.

- **Setting Ambitious Targets:** Committing to international agreements, such as the Global MOU on zero-emission medium- and heavy-duty vehicles, can provide clear targets and drive coordinated efforts. The Global MOU, currently signed by 36 countries, aims to achieve 100% zero-emission new truck and bus sales by 2040, with an interim goal of 30% by 2030.
- **Encouraging Modal Shifts:** Promoting the shift from private vehicles to public transport, cycling, and walking, and facilitating the shift of appropriate road freight to rail where feasible. Expanding and improving public transport infrastructure is crucial, as is promoting the use of electric bicycles and scooters. This aligns with the 'Shift' strategy of the Avoid-Shift-Improve framework and helps reduce emissions by encouraging the use of buses, rail, and ferries for passenger transport, and increasing rail use for suitable freight operations.

- **Reducing Transport Demands:** Implementing urban planning initiatives and policies that reduce the need for travel, such as encouraging remote work and developing mixed-use neighbourhoods to minimise commuting distances for passengers. Additionally, implementing advanced route planning and freight optimisation technologies can significantly lower emissions by reducing empty trips and optimising delivery schedules.
- **Financial Incentives:** Providing subsidies, tax credits, and grants to offset the high upfront costs of ZEHVs. For example, rebates on the purchase price of zero-emission trucks and buses can significantly reduce financial barriers for adopters, supporting the transition to clean options.
- **Regulatory Support:** Updating mass and dimension regulations, setting progressive emissions standards, and establishing zero-emission zones. Implementing stricter heavy vehicle emission standards in Australia can drive the transition by promoting the use of cleaner vehicles.
- **Infrastructure Investment:** Significant investment in infrastructure is required, particularly in developing robust charging networks and hydrogen refuelling stations along major transport routes. Strategic placement of these stations is crucial for their effective utilisation, thereby improving efficiency.

Encouraging Adoption

Strategies to encourage the adoption of zero-emission technologies for heavy vehicles include:

- **Incentivising Early Adoption:** Financial support for early adopters to create initial market demand and demonstrate viability.
- **Public-Private Partnerships:** Collaborations between government and industry to share the costs and benefits of infrastructure development.
- **Research and Development Support:** Continuous funding for R&D to improve the efficiency and reduce the costs of ZEHV technologies. Advances in battery technology, such as solid-state batteries, can also play a crucial role in making electric trucks more viable. Continuous R&D is essential to improve battery energy density and reduce costs.

2. Supporting Transport's Net Zero Pathways

➤ Infrastructure Investments

Significant infrastructure investments are required to support ZEHVs. This includes:

- **Developing fast-charging networks:** Establishing charging stations along major freight routes and urban areas to support electric trucks, buses, and vans.
- **Hydrogen refuelling stations:** Building green hydrogen refuelling stations for long-haul trucks and maritime applications.

- **Electrification of rail networks:** Investing in the electrification of rail networks where feasible and supporting the use of hybrid electric-diesel locomotives for non-electrified routes.
- **Dedicated infrastructure for buses and ferries:** Developing charging depots for electric buses and infrastructure for electric ferries at key terminals.
- **Future Made in Australia initiative:** Advocate for policies that bolster Australia's existing heavy vehicle manufacturing sector, focusing on electric buses, trucks, caravans, and non-road vehicles. Support the establishment of local battery production facilities focused on light and heavy EV applications, leveraging Australia's mineral resources. This not only improves efficiency but also promotes economic growth and job creation.

➤ **Low-Emission Energy Sources**

Ensuring the availability of renewable energy sources is vital for decarbonising the transport sector. This includes:

- **Renewable Energy Integration:** Increasing the percentage of renewable energy in the electricity grid to power electric vehicles.
- **Vehicle-to-Grid (V2G) Technology:** Supporting the deployment of V2G technology to allow electric heavy vehicles to feed energy back into the grid, enhancing grid stability and energy efficiency.
- **Low Carbon Liquid Fuels (LCLF):** Supporting the development and adoption of sustainable aviation fuels, renewable diesel, and other advanced biofuels for sectors where electrification is not feasible (further details included in our response to the consultation on [Australia's LCLF Opportunity](#)).
- **Fiscally Responsible Investments:** Ensuring that infrastructure investments prioritise cost-effectiveness and sustainability to maximise their impact on reducing emissions and enhancing energy efficiency.

3. Movement of Goods: Decarbonising Freight and Supply Chains

The freight sector offers significant opportunities for decarbonisation through modal shifts, improved logistics and urban planning, and the adoption of ZEHVs. Shifting freight from road to rail and optimising supply chain operations can substantially reduce emissions. Enhancing intermodal transport infrastructure will facilitate seamless transitions between road, rail, and maritime transport, reducing road freight emissions. Optimising logistics and supply chain operations could lead to a significant reduction in emissions by 2030.

➤ **Leveraging Intermodal Facilities:**

Investment in intermodal terminals and rail freight infrastructure, supported by policies encouraging their use, is essential. Enhancing intermodal facilities will support modal shifts and reduce emissions. Government policies should incentivise the use of rail for long-haul freight, while promoting electric trucks and vans for urban and regional freight. Additionally, establishing micro-hubs within urban areas can facilitate last-mile delivery operations. These hubs, located in prime locations such as current service stations, can serve as consolidation points where goods are transferred to smaller, more efficient delivery vehicles like electric vans or cargo bikes, reducing congestion and emissions in city centres.

➤ **Strategic Warehouse Siting, Routing and Advanced Logistics Technologies:**

Implementing goods movement management strategies, such as strategic warehouse siting, routing, and advanced logistics technologies, can significantly reduce unnecessary travel and improve overall efficiency. Logistics sprawl, where distribution and warehousing facilities are scattered across urban areas, contributes to increased traffic congestion, emissions, and inefficiencies in last-mile delivery operations. Addressing this through better urban planning can reduce these negative impacts by ensuring that essential goods are available closer to consumers, minimising the need for long-distance freight trips within cities. Advanced logistics technologies, such as route planning and freight optimisation systems, can further lower emissions by reducing empty trips and optimising delivery schedules. These technologies ensure that trucks are used more efficiently, decreasing the number of trips needed and minimising fuel consumption.

➤ **Policies for Transition:**

To support the transition to low and zero-emission technologies in the freight sector, policies should include incentives for purchasing and operating ZEHVs, funding for pilot projects to demonstrate new technologies, and regulatory frameworks that encourage innovation and adoption. Successful policies from other countries can serve as models for Australia, ensuring that regulatory frameworks encourage innovation and adoption. Furthermore, setting ambitious targets, such as committing to international agreements like the Global MOU on zero-emission medium- and heavy-duty vehicles, can provide clear goals and drive coordinated efforts.

➤ **Low and Zero Emission Technologies and Fuels:**

Transitioning to low and zero-emission technologies through a systematic and system-wide approach is critical for decarbonising freight. This includes significant investment in infrastructure, such as robust charging networks and hydrogen refuelling stations along major transport routes. For existing fleets running on fossil fuels, driver training programs focused on eco-driving techniques, such as minimising idling, optimising acceleration and deceleration, and maintaining efficient speeds, can lead to significant reductions in fuel use and emissions. For fleets that are challenging to decarbonise

immediately, adopting LCLF like renewable diesel can reduce emissions during this transition phase. Continuous funding for R&D to improve ZEHV technologies and exploring autonomous electric delivery vehicles are also crucial.

4. Achieving Net Zero Together

➤ Collaborative Efforts

Achieving net zero in the transport sector requires coordinated efforts among all levels of government, industry, researchers, academic institutions, regulatory bodies, and other stakeholders. Regular stakeholder engagement, integrated planning, and sharing best practices are crucial for aligning efforts and maximising impact. Public awareness campaigns are also essential to increase acceptance and adoption of zero-emission vehicles.

➤ Best Practices

Learning from successful decarbonisation initiatives is essential. International collaboration involves adopting best practices from countries that have successfully implemented ZEHV strategies. Additionally, scaling up successful local pilot projects and initiatives to broader applications will be critical for driving the transition to a zero-emission transport sector.