Transport and Infrastructure Net Zero Consultation Roadmap

Take the survey

Department of Climate Change, Energy, Environment and Water

Response received at:

July 26, 2024 at 3:32 PM GMT+10

Response ID:

sbm2f839f09de9cc6620f102

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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

Australian Academy of Technological Sciences and Engineering (ATSE)

4   Confirm that you have read and understand this declaration.

Yes

5   First name

██████

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7   Email

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8 Phone

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9 Who are you answering on behalf of?

Organisation

10 Organisation name

Australian academy of Technological Sciences and Engineering

11 What best describes you or your organisation?

Not for profit

12 What sector do you represent?

Other: "All technological sciences and engineering"

13 What state or territory do you live in?

Australian Capital Territory

14 Postcode

2603

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

SBM 2024-07-26 Transport and infrastructure sectoral plan submission.pdf

69 Upload a submission

Not answered

70 Upload supporting file

Not answered

71 Upload supporting file

Not answered

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

Submission to the Transport and Infrastructure Net Zero Roadmap

26 July 2024

Australia's transport sector accounts for nearly one-fifth of Australia's greenhouse gas emissions (Cheung et al. 2023). This is expected to grow to become Australia's largest source of greenhouse gas emissions by 2030 – exceeding electricity generation and agriculture, as emissions from these sources decrease (DCCEEW 2022). Action is urgently needed to cut these emissions if Australia is to reach our net zero emissions target by 2050 and do our part to contain global warming to less than 2°C. Beyond reducing emissions, a net zero transportation sector will also have multiple benefits to Australia and the public. Decarbonising transport will reduce Australia's reliance on foreign oil imports – supporting national security and reducing sovereign risk. Fewer vehicle emissions will improve air quality and the respiratory health of Australians in major population centres, reducing the healthcare burden and improving quality of life for Australians in urban centres.

To support this, where possible, alternative forms of transport, such as walking, cycling or public transport should be more accessible. Where these are not possible, the focus should be on transitioning to electric vehicles for personal transport and last mile deliveries[1] and rail for long-distance freight. Reaching net zero in transport will require a mix of technologies, with different parts of the sector – including road, rail, aviation and shipping – all requiring different regulatory, policy and technological solutions. Investment in the development of these new technologies will help Australia create an emission-free transport sector.

ATSE recommends the following actions to help decarbonise the transport sector:

Recommendation 1: Invest in making public transport a more practical and attractive option for commuters through increased coverage, reduced commuter costs and AI-enabled improved scheduling.

Recommendation 2: Use federal infrastructure funding to support the development of active transport infrastructure, including protected cycle lanes and improved safety.

Recommendation 3: Work with the State and Territory Governments to promote active transport through cycling infrastructure, storage requirements, and town planning to establish more walkable cities.

Recommendation 4: Invest in charging infrastructure for electric vehicles well in advance of customer demand.

Recommendation 5: Support lower socio-economic status households to access electric vehicles through developing a strong second-hand electric vehicle market and supporting access to household energy upgrades.

Recommendation 6: Incentivise public transport providers to switch to electric trains and buses.

Recommendation 7: Implement minimum sustainable fuel requirements for Australian shipping and aviation, in line with international best practice.

Recommendation 8: Invest in expanding rail networks to reduce freight emissions.

Recommendation 9: Boost investment in Australian research and development of sustainable transport, fuel and battery technologies.

Reducing emissions through changing modes of transport

With road vehicles contributing 85% of all transport emissions (Climate Change Authority 2021), the single most effective method for reducing emissions in the transport sector is to reduce the kilometres travelled as much as is practical. Australians are heavily reliant on cars for transport, and there are more vehicles in Australia than registered drivers (Cheung et al. 2023). More than four out of five Australians who travel to work each day do so in a personal vehicle, with just 14% taking public transport (Cheung et al. 2023). An Australian taking the bus will emit almost 14 times less carbon dioxide per kilometre travelled[2] - with emissions from trams and trains also well below car travel. Avoiding emissions-producing transport entirely, for example by working from home where possible, or by engaging in active transport[3] can reduce emissions even further.

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[1] The final step in freight transport where items are transferred from a local distribution centre to the customer.

[2] On average, bus transport emits 17.7g of Co2 per kilometre per passenger, while a single-occupant car emits 243.8g of CO2 per kilometre (Cheung et al. 2023).

[3] Active transport refers to walking, cycling and other modes of physical transport, including the use of e-mobility devices.

A central aspect of an effective net zero transport plan will be to rebalance incentives to make public transportation (ideally powered through net zero sources like renewable energy) more attractive and accessible to commuters. This will involve expanding networks to improve service coverage, concessions to make the cost of public transport more affordable where needed, and use of AI and modelling technologies to ensure public transport routes and schedules are responsive to peaks and troughs in demand. Each of these measures have been proven to work in Australia or globally. The WA Government's decision to cap public transport fares resulted in bus and ferry services breaking patronage records, while rail transport had the highest number of passengers since before the pandemic (Saffioti 2024). Adoption of AI to link traffic signals with city buses in San Jose in the United States saw travel times for commuters decrease by to 20% - allowing for increased public transport availability (Menard 2022).

To maximise efficiency, it is essential to better connect transport networks to allow commuters to smoothly transition between active and public transport. Other options to increase uptake of active transport include investment in better cycle infrastructure, mandated minimum bike storage requirements for major public spaces and public transport hubs, and city design that emphasises active transport. Particular attention should be given to improving cyclists' perceptions of safety and cycling infrastructure, which are rated as the main barriers to cycling by prospective cyclists (Pearson et al. 2022). Evidence from overseas suggest that when the length of cycling infrastructure exceeds 150km per 100,000 people, the proportion of cyclists approaches 25% (Mueller et al. 2018). While these kinds of infrastructure decisions are under the control of state and local planning authorities, the Federal Government can use infrastructure project funding and lead messaging to support these goals, by prioritising federal funding for projects that include suitable cycling infrastructure.

Recommendation 1: Invest in making public transport a more practical and attractive option for commuters through increased coverage, reduced commuter costs and AI-enabled improved scheduling.

Recommendation 2: Use federal infrastructure funding to support the development of active transport infrastructure, including protected cycle lanes and improved safety.

Recommendation 3: Work with the State and Territory Governments to promote active transport through cycling infrastructure, storage requirements, and town planning to establish more walkable cities.

Supporting the transition to less emissions-intensive commuter vehicles

While reducing transport requirements is the single most effective method for reducing emissions, many trips are unavoidable. Electric vehicles are the obvious choice for decarbonising both private and public transport, as they produce essentially no operational emissions when powered from renewable energy sources – though increased demand on our energy networks will needs to be carefully managed. Victoria has already committed to ensuring all public transport bus purchases are zero emissions by 2025 and other states should follow this example. Hydrogen fuel may be an alternative green transport fuel for larger road vehicles or those with a need to travel long distances – though improvements in battery technology may make this option obsolete.

Infrastructure for charging and refuelling networks are key for encouraging uptake of electric vehicles and needs to be rolled out in advance of demand. Range anxiety and cost are the two major reason peoples cite for choosing not to switch to electric vehicles. Commuters will be unlikely to adopt electric vehicles if they are waiting years for the supporting infrastructure to be rolled out. Helping to bring down the cost of owning and running an electric vehicle, for example by helping to develop a reliable second-hand market for electric vehicles, will help more people convert to greener alternatives. Support may also be needed to help lower socio-economic status households access personal energy generation, storage and management, which can play a major role in the viability of electric vehicles for consumers. The Transport and Infrastructure Sectoral Plan can interface with the National Electric Vehicle Strategy to harmonise these initiatives.

Recommendation 4: Invest in charging infrastructure for electric vehicles well in advance of customer demand.

Recommendation 5: Support lower socio-economic status households to access electric vehicles through developing a strong second-hand electric vehicle market and supporting access to household energy upgrades.

Recommendation 6: Incentivise public transport providers to switch to electric trains and buses.

Supporting the transition to less emissions-intensive industrial and freight vehicles

Not all vehicles can be electrified. While small electric aeroplanes have been developed, large-scale air transport is generally difficult to electrify. Air travel has the highest emissions per tonne of cargo (1054g of CO_2 per tonne), making avoiding air transport a key method for reducing carbon emissions (Climate Action Accelerator n.d.). Sea transport, by comparison results in just 1.8% of the emissions per tonne of cargo that air transport does (just 19g of CO_2), making it a clear low-carbon alternative for long distance or international transport (Climate Action Accelerator n.d.). Improving energy efficiency, using of low carbon fuels and AI powered logistical planning in shipping can further increase the benefits of swapping to shipping. For unavoidable air transport, improving aeroplane efficiency and increasing usage of sustainable aviation fuels can reduce emissions intensity. Mandating usage of sustainable aviation fuels can help to ensure their uptake. Mandates will also bring us in line with the European Union which is introducing growing minimum sustainability requirements for aviation fuels used at all European airports by 2025 - affecting all outbound flights from Europe, including those to Australia.

For long-haul terrestrial freight transport, switching from trucks and air freight to rail networks can deliver significant emissions savings. Road transport emits up to 200 times more carbon per kilometre travelled than rail, making rail an effective way to reduce freight emissions (Deloitte Access Economics 2020). Half of Australia's freight is currently transported by train, yet only 4% of transport emissions come from rail (Climate Change Authority 2021). Switching from road to rail for freight transport provides opportunities for significant emissions reductions and has the added advantage of taking trucks off the roads (freeing up capacity for other road users) but is limited by the available rail corridors. Expanding rail corridors to allow rail linkages to more places and improve transport efficiency should be a priority. Replacing diesel trains with electric alternatives can further reduce these emissions, as can combining rail with electric road vehicles for last mile deliveries.

Recommendation 7: Implement minimum sustainable fuel requirements for Australian shipping and aviation, in line with international best practice.

Recommendation 8: Invest in expanding rail networks to reduce freight emissions.

Investing in research and development to decarbonise hard to abate transport

Not all areas of the transport sector have the technological solutions to fully decarbonise. Targeted research is needed to find new methods of decarbonising parts of the transport sector that are hard to electrify. Areas such as heavy industrial vehicles, shipping and aviation still require innovation to develop new green technologies, or to enable these sectors to take advantage of existing technologies. The transport and storage of hydrogen, for example, is a major challenge that could be solved by future technological innovations and would enable the development of green heavy industrial vehicles. The development of sustainable aviation fuels that do not require the redesign of aircraft and can completely replace existing fuels (rather than just be blended with them) is ongoing.

To support future decarbonisation, increasing investment is required in sustainable transport research and development across all technology readiness levels. This should include investment in research and development for enabling technologies, such as green fuels, electric vehicle charging and energy management technologies, and hydrogen transport and storage improvements. This can be progressed faster through collaborations between industry and academia to ensure that good ideas are properly commercialised and implemented. This research can provide a pipeline of innovations to help build green industries made in Australia.

Recommendation 9: Boost investment in Australian research and development of sustainable transport, fuel and battery technologies.

ATSE thanks the Department of Infrastructure, Transport, Regional Development, Communications and the Arts for the opportunity to respond to the Transport and Infrastructure Net Zero Roadmap. For further information, please contact academypolicyteam@atse.org.au.

References

Cheung H, Arndt D, Bradshaw S and Rayner J (2023) *Shifting gear: the path to cleaner transport*, Climate Council, https://www.climatecouncil.org.au/resources/shifting-gear-the-path-to-cleaner-transport/.

Climate Action Accelerator (n.d.) *Shift from Air to Sea freight*, https://climateactionaccelerator.org/solutions/sea_freight/, accessed 25 July 2024.

Climate Change Authority (2021) 'Fact Sheet 6 - Transport'.

DCCEEW (2022) *Australia's emissions projections 2022*, Barrington Stoke, https://www.dcceew.gov.au/sites/default/files/documents/australias-emissions-projections-2022.pdf.

Deloitte Access Economics (2020) *Value of Rail 2020*, https://ara.net.au/about-rail/environmental-benefits/.

Menard T (2022) 'How AI and machine learning are reshaping transit: Menard', Fierce Electronics, Accessed 25 July 2024, https://www.fierceelectronics.com/sensors/lattice-pushes-low-power-limits-competitive-fpga-market, accessed 25 July 2024.

Mueller N, Rojas-Rueda D, Salmon M, Martinez D, Ambros A, Brand C, de Nazelle A, Dons E, Gaupp-Berghausen M, Gerike R, Götschi T, Iacorossi F, Int Panis L, Kahlmeier S, Raser E and Nieuwenhuijsen M (2018) 'Health impact assessment of cycling network expansions in European cities', *Preventive Medicine*, 109:62–70, doi:10.1016/j.ypmed.2017.12.011.

Pearson L, Berkovic D, Reeder S, Gabbe B and Beck B (2022) 'Adults' self-reported barriers and enablers to riding a bike for transport: a systematic review', *Transport Reviews*, 43(3):356–384, doi:10.1080/01441647.2022.2113570.

Saffioti R (2024) 'New year, new records for Transperth patronage in January', https://www.wa.gov.au/government/media-statements/Cook-Labor-Government/New-year%2C-new-records-for-Transperth-patronage-in-January-20240307, accessed 3 July 2024.