

Transport and Infrastructure Net Zero Consultation Roadmap

Take the survey

Department of Climate Change, Energy, Environment and Water

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- 9 Who are you answering on behalf of?
Organisation
- 10 Organisation name
Australian Renewables Academy
- 11 What best describes you or your organisation?
Not answered
- 12 What sector do you represent?
Not answered
- 13 What state or territory do you live in?
Victoria
- 14 Postcode
Unknown
- 15 What area best describes where you live?
Regional area
- 16 1. Do you support the proposed guiding principles?
Yes
- 17 1.1 Please add details to your response.
Yes, ARA agrees with the guiding principles as they align with our own values and objectives. Emissions reduction, economic opportunity and inclusivity are crucial for a sustainable transition.
- 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.

Yes, the avoid-shift-improve framework is an effective tool for identifying opportunities for abatement. It provides a structured approach to reducing emissions by prioritising the avoidance of unnecessary travel, shifting to more sustainable modes, and improving the efficiency of transport systems.

Examples of the framework's application may be seen in the submission.

20 3. Do you agree the development of a national policy framework for active and public transport will support emissions reduction?

Yes

21 3.1 Please add details to your response.

Yes, a national policy framework for active and public transport is essential for supporting emissions reduction. Such a framework should include infrastructure investments, incentives for public transport use, and policies promoting active transport options like walking and cycling.

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

The framework should include:

- Investment in public transport infrastructure.
- Incentives for using public and active transport.
- Policies promoting urban planning that supports active transport.
- Collaboration with local governments and communities to ensure the framework meets local needs.

These framework elements could be achieved through measures such as the following:

Investment in Public Transport Infrastructure

Funding Allocation: Governments at all levels should allocate significant funding for expanding and modernising public transport systems. This funding should be applied to building new rail lines, upgrading bus fleets to electric or hybrid models, and enhancing stations and terminals.

Integrated Transport Systems: Develop and enhance integrated multimodal transport systems that allow seamless transitions between different forms of transport, such as

from trains to buses to pedestrian pathways.

Incentives for Using Public and Active Transport

Reduced Fares for Regular Users: Implement fare reduction schemes for regular commuters, such as monthly passes that offer unlimited travel at a fixed cost.

Rewards Programs: Create rewards programs that offer benefits like discounts or promotional offers from partner businesses to regular public transport users.

Employer-Sponsored Programs: Encourage employers to offer transit benefits, such as subsidised passes or flexible work hours for those who commute using public or active transport.

Policies Promoting Urban Planning that Supports Active Transport

Zoning Laws: Modify zoning laws to encourage the development of mixed-use neighbourhoods where residential, commercial, and recreational areas are within walking or cycling distance.

Infrastructure Development: Invest in developing safe and extensive cycling lanes and pedestrian path networks. Ensure these pathways are well-connected, well-lit, and secure.

Traffic Calming Measures: Implement traffic calming measures in urban areas to improve safety for pedestrians and cyclists, with community support. This may include lowering speed limits, installing speed bumps, and creating pedestrian-only zones.

Collaboration with Local Governments and Communities to Ensure the Framework Meets Local Needs

Community Engagement Initiatives: Engage regularly with local communities through town hall meetings, workshops and online forums to gather input on transport needs and preferences.

Partnerships with Local Authorities: Form partnerships with local government bodies to ensure that the planning and implementation of transport projects are closely aligned with local development plans and community needs.

Pilot Projects: Collaborate on pilot projects in selected areas to test and refine approaches before wider implementation. Feedback from these projects can help tailor solutions that effectively address specific local challenges.

These strategies require a coordinated approach involving multiple stakeholders, including government agencies, transport providers, urban planners, businesses, and the public. By implementing these actions, cities and regions can develop a more sustainable, efficient, and user-friendly transportation framework that encourages public and active transport options, reducing traffic congestion, lowering emissions, and improving urban liveability.

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?

Actions may include:

- Increasing investments in public transport infrastructure.
- Implementing policies that encourage the use of electric and low-emission vehicles.
- Promoting active transport through improved infrastructure and incentives.
- Engaging communities in planning processes to ensure local needs are met.

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?

Actions may include:

- Investing in rail and other low-emission freight transport options.
- Encouraging the use of electric and hydrogen fuel cell technologies in heavy transport.
- Developing policies that support the transition of freight fleets to low-emission alternatives.
- Collaborating with industry to promote innovation in sustainable logistics.

25 6.2. How would these actions address the identified challenges and opportunities for emissions reduction in the movement of goods?

Not answered

26 7. Do you agree with the proposed net zero pathway for light road vehicles?

Yes

27 7.1 Please add details to your response.

Enhanced Charging Infrastructure

Government Funding for Public Charging Stations: Increase the availability of public EV charging stations through government grants or subsidies. This could include fast-charging stations along major highways and more charging options in urban and rural areas.

Support for Private Charging Solutions: Offer incentives for installing home charging

stations to reduce the initial cost barrier for consumers who purchase electric vehicles.

Financial Incentives for Consumers

Rebates and Tax Credits: Provide direct rebates or tax credits to consumers who purchase electric vehicles, making EVs more financially accessible.

Reduced Registration and Stamp Duty Fees: Offer reductions in vehicle registration and stamp duty fees for electric vehicle owners.

Subsidies for Vehicle Trade-ins

Scrappage Schemes: Implement scrappage schemes where consumers receive financial incentives for trading in older, less efficient vehicles for new electric vehicles.

Trade-in Credits: Provide additional support through trade-in credits, enhancing the value offered when older vehicles are exchanged for electric models.

Expansion of Renewable Energy Integration

Green Energy for EV Charging: Promote using renewable energy sources for electric vehicle charging stations to minimise environmental impact.

Incentives for Solar-Powered Charging Stations: Offer incentives for developing and using solar-powered charging stations, providing a sustainable and cost-effective charging option.

Policy and Regulatory Support

Mandatory EV Quotas for Automakers: Introduce regulations that require automakers to sell a certain percentage of electric vehicles among their total vehicle sales.

Support for Local Manufacturing of EVs and Components: Provide subsidies or tax breaks for companies in Australia that manufacture electric vehicles or related components, such as batteries.

Public Awareness and Educational Campaigns

Information and Education: Conduct public awareness campaigns to educate consumers on the benefits of electric vehicles, including environmental impacts, cost savings, and available incentives.

Partnerships with Industry: Collaborate with automotive manufacturers and dealerships to promote electric vehicles through co-funded marketing campaigns and informational events.

Research and Development Investments

Funding for EV Technology Innovations: Invest in research and development focused on improving electric vehicle technologies, such as battery life, charging speed, and vehicle efficiency.

Collaborations with Universities and Research Institutes: Partner with academic institutions and research organisations to spearhead innovations in electric vehicle technology and infrastructure solutions.

Implementing these measures will help accelerate the transition to electric vehicles, making them a more viable and attractive option for consumers, thereby supporting the broader goals of achieving net zero emissions in the transport sector.

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?

Expanding Charging Infrastructure for Electric Vehicles

Public-Private Partnerships: Governments can partner with private companies to expand the network of EV charging stations. This could involve financial incentives for businesses that install charging stations and zoning adjustments to facilitate installations in key locations like shopping centres, workplaces, and multi-unit dwellings.

Community-Based Initiatives: Local councils can support community-led initiatives to establish charging infrastructure in residential areas and communal spaces.

Providing Incentives for the Purchase of Electric Vehicles

Financial Incentives: Governments can offer tax rebates, reduced registration fees, and direct subsidies to lower the upfront cost of electric vehicles. These incentives could be tiered based on the environmental performance of the vehicle.

Non-Financial Incentives: Offer benefits such as access to carpool lanes, reduced tolls, or preferred parking for electric vehicle owners.

Implementing Stricter Emissions Standards for New Vehicles

Legislative Measures: Implement and enforce stricter emissions standards for all new light vehicles, requiring manufacturers to meet higher environmental performance criteria. This could align with or exceed standards set by leading global markets.

Phasing Out High-Emission Vehicles: Set clear timelines for phasing out the sale of new internal combustion engine vehicles, providing a transition period for manufacturers and consumers.

Promoting the Benefits of Electric Vehicles to Consumers

Awareness Campaigns: Launch comprehensive public education campaigns that highlight the benefits of electric vehicles, including lower running costs, reduced environmental impact, and improved vehicle technology.

Experience and Test Drive Programs: Facilitate opportunities for consumers to experience electric vehicles firsthand through test drives and showcases at community events and shopping centres.

Future Actions

Continuous Improvement of Battery Technology: Support research and development into more efficient battery technologies that offer longer ranges and shorter charging times. This could involve funding university research programs and partnerships with tech companies.

Building a Circular Economy for EVs: Develop recycling programs for electric vehicle batteries and advocate for the design of vehicles that are easier to recycle, reducing the overall environmental footprint.

Integration with Renewable Energy: Encourage the use of renewable energy sources to power electric vehicle charging stations through incentives for solar-powered charging infrastructure and integration with smart grid technologies.

Strengthening Grid Infrastructure: Invest in strengthening the electrical grid to handle increased demand from electric vehicles, ensuring the grid remains stable and capable of supporting widespread EV adoption without reliability issues.

29 8.2 How would these actions address the identified challenges and opportunities to reduce light vehicle emissions?

Not answered

30 9. Do you agree with the proposed net zero pathway for heavy road vehicles?

Yes

31 9.1 Please add details to your response

Yes, ARA supports the proposed net zero pathway for heavy road vehicles, which includes a mix of battery electric, hydrogen fuel cell, and low-carbon liquid fuels, for several reasons aligned with ARA's broader objectives and actions outlined in its National Action Plan:

Diversified Energy Options

Comprehensive Coverage: The mix of technologies addresses various operational needs

and infrastructure limitations. For heavy vehicles, where long ranges and high energy demands can limit the viability of a single technology solution, having multiple options like battery electric for shorter routes and hydrogen or low-carbon liquid fuels for longer or heavier hauls

is pragmatic and efficient.

Infrastructure Development

Scalable Implementation: ARA's focus on mobilising infrastructure and resources aligns with the need for a robust charging and fuelling infrastructure to support diverse fuel technologies. This approach aids in overcoming one of the significant barriers to adopting new energy vehicles by ensuring the necessary infrastructure is developed concurrently with vehicle rollout.

Sustainable Workforce Transition

Skill Development and Job Creation: Transitioning to new energy technologies in the transport sector requires a skilled workforce. ARA's emphasis on workforce development through training and certification programs supports the growth of a labour force capable of manufacturing, maintaining, and operating a new fleet of low-emission vehicles.

Community and Industry Engagement

Stakeholder Collaboration: By advocating for a mixed-technology approach, ARA fosters collaboration across various sectors of the industry, from vehicle manufacturers and energy providers to infrastructure developers. This integrated approach is crucial for creating cohesive and sustainable energy solutions that benefit all stakeholders.

Environmental and Economic Benefits

Maximising Emissions Reduction: Utilising a combination of technologies allows for optimising emissions reductions across different types of heavy vehicle operations. It also positions the heavy vehicle sector to adapt more rapidly to evolving technologies and market conditions, potentially leading to significant environmental benefits and cost savings over time.

Innovation and Technological Advancement

Driving Research and Development: Supporting various technologies encourages ongoing innovation in the automotive and energy sectors. ARA's commitment to innovation and learning aligns with this strategy, as it helps catalyse technological advancements that can further reduce costs and improve the efficiency and viability of electric and hydrogen fuel cell vehicles.

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?

1. Hydrogen fuel cell
2. Battery electric
3. Low-carbon liquid fuels

The prioritisation of technologies for emissions reduction in heavy road vehicles—hydrogen fuel cells, battery electric, and low-carbon liquid fuels—requires a nuanced understanding of each technology's capabilities, infrastructure needs, and specific suitability for heavy-duty transport. Here's an expanded rationale for the proposed ranking:

Hydrogen Fuel Cells (Rank 1):

Range and Refuelling Efficiency: Hydrogen fuel cells are particularly suitable for heavy-duty vehicles like trucks and buses that require longer ranges and rapid refuelling capabilities comparable to diesel. Hydrogen can provide a range similar to conventional fuels and can be refuelled in under 15 minutes, making it ideal for vehicles that operate over long distances or have tight operating schedules.

Energy Density and Weight Considerations: Hydrogen has a higher energy density by weight than batteries, making it more effective for heavy loads and long distances without significantly increasing vehicle weight. This is critical for maintaining payload efficiency in commercial transport.

Scalability and Future Potential: While hydrogen infrastructure is currently less developed than electric charging networks, the potential for scaling up hydrogen production using renewable energy sources offers significant long-term benefits for large-scale emissions reductions. This aligns with global moves toward green hydrogen economies.

Battery Electric (Rank 2):

Technological Maturity and Availability: Battery electric vehicles (BEVs) are technologically advanced and increasingly available for various applications. They are well-suited for shorter routes and urban delivery vehicles, where frequent stopping can leverage regenerative braking for energy efficiency.

Infrastructure Integration: Electric charging infrastructure is more widely established in

urban and semi-urban areas, facilitating the adoption of BEVs in these settings. However, the weight and space required for batteries can limit the practical payload and range of heavy vehicles.

Environmental Impact: BEVs produce zero tailpipe emissions, crucial for improving air quality in urban environments. However, the overall environmental impact depends on the electricity grid's cleanliness when charging.

Low-Carbon Liquid Fuels (Rank 3):

Transitional Technology: Low-carbon liquid fuels, such as biodiesel or synthetic diesels, serve as transitional technologies that can be used with existing vehicle technologies and refuelling infrastructure. They offer immediate reductions in greenhouse gas emissions compared to traditional fossil fuels.

Compatibility and Ease of Implementation: These fuels can be used in existing internal combustion engine vehicles, reducing the need for new infrastructure and vehicle fleets. This makes them a practical short-term solution to reduce emissions while other more sustainable technologies are being developed.

Limitations in Long-Term Sustainability: Low-carbon liquid fuels can reduce emissions, but they often produce more greenhouse gases than electric or hydrogen options and may not be sustainable long-term solutions as global targets for net-zero emissions become more stringent.

This prioritisation reflects a strategic approach to adopting technologies that align with current capabilities and future sustainability goals, focusing on developing and enhancing solutions that provide the most significant benefits in emissions reduction, operational feasibility, and economic viability in the heavy vehicle sector

34 11. What role should low carbon liquid fuels play in the heavy vehicle decarbonisation?

Low-carbon liquid fuels should serve as a transitional solution where electrification and hydrogen are not yet viable, particularly in remote and regional areas.

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?

Actions may include:

- Investing in hydrogen production and refuelling infrastructure.
- Providing incentives for the adoption of low-emission heavy vehicles.
- Supporting research and development of advanced battery technologies.

- Collaborating with industry to accelerate the deployment of low-emission heavy vehicles.

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

Yes

37 13.1 Please add details to your response.

Not answered

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

Not answered

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

1. Electrification
2. Hydrogen fuel cell
3. Low-carbon liquid fuels

- Electrification is prioritised due to its proven efficiency and lower operational costs over the long term.

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

Low-carbon liquid fuels should be used where electrification and hydrogen are not feasible, particularly in regional and remote areas.

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?

Actions include:

- Investing in rail electrification projects.
- Supporting the development and deployment of hydrogen-powered trains.
- Encouraging the shift of freight from road to rail.
- Enhancing the efficiency of existing rail infrastructure.

- 42 16.1 How would these actions address the identified challenges and opportunities to reduce rail emissions?
Not answered
- 43 17. Do you agree with the proposed net zero pathway for maritime?
Yes
- 44 17.1 Please add details to your response.
Yes, ARA supports the proposed net zero pathway for maritime, which focuses on alternative fuels like sustainable aviation fuel (SAF) and low-carbon options for maritime.
- 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?
Actions include:
- Promoting the use of sustainable fuels in maritime transport.
 - Supporting research and development of low-emission maritime technologies.
 - Implementing policies that incentivise the adoption of cleaner maritime practices.
- Collaborating with international partners to develop and standardise sustainable maritime practices.
- 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?
Yes, ARA agrees with the proposed net zero pathway for aviation, which focuses on sustainable aviation fuel and the development of low-emission technologies.
- 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.

Actions include:

- Investing in research and development of sustainable aviation fuels.
- Providing incentives for the adoption of low-emission aviation technologies.
- Implementing policies that encourage airlines to reduce emissions.
- Collaborating with international partners to develop global standards for aviation emissions reduction.

50 20.1 What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to reduce aviation emissions?

Not answered

51 21. Do you agree with the proposed net zero pathway for transport infrastructure?

Yes

52 21.1 Please add details to your response.

Yes, ARA supports the proposed net zero pathway for transport infrastructure, which includes enhancing the sustainability of infrastructure and supporting low-emission transport modes.

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?

Actions include:

- Investing in sustainable infrastructure projects.
- Implementing policies that support the development of low-emission transport infrastructure.
- Encouraging the use of sustainable materials in infrastructure projects.
- Collaborating with industry to promote innovation in sustainable infrastructure.

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?

Actions include:

- Expanding renewable energy generation capacity.
- Investing in energy storage solutions to support renewable energy.
- Implementing policies that encourage the use of renewable energy in transport.
- Collaborating with industry to develop integrated energy solutions for transport.

56 24. How should the use of low carbon liquid fuels (LCLFs) be prioritised across different transport modes over time to achieve maximum abatement?

A strategic and phased approach is essential for prioritising using low-carbon liquid fuels (LCLFs) across different transport modes and achieving maximum abatement. The following are measures identified by ARA that could be implemented:

Identify and Prioritise High-Impact Sectors:

Immediate Focus on Hard-to-Electrify Sectors: As suggested, focus initially on sectors where electrification and hydrogen technologies are less feasible or cost-effective.

Aviation and maritime transport, which face significant challenges in adopting these technologies due to range and energy density requirements, are ideal candidates for the early adoption of LCLFs.

Assessment of Readiness and Impact: Conduct comprehensive assessments to identify which transport modes can benefit most from LCLFs regarding emission reductions and technical feasibility.

Gradual Implementation Based on Technological Advancements:

Phase-Based Integration: Develop a phased plan for integrating LCLFs into different transport modes. Initially, target those sectors most reliant on liquid fuels and gradually expand to others as suitability and infrastructure develop.

Monitoring Technological Developments: Keep abreast of advances in battery technology, hydrogen fuel cells, and other renewable energy technologies that might later displace the need for LCLFs in certain sectors.

Develop Supportive Infrastructure and Policies:

Investment in Fuel Production and Distribution Infrastructure: Build or retrofit infrastructure to efficiently produce and distribute LCLFs, ensuring supply meets targeted transport sectors' demands.

Regulatory Frameworks and Incentives: Implement policies that encourage the use of LCLFs, such as subsidies for LCLF production, mandates for blending conventional fuels with LCLFs, or tax incentives for users of LCLFs.

Stakeholder Engagement and Collaboration:

Industry Partnerships: Collaborate with fuel producers, transport companies, and technology developers to align strategies for LCLF adoption and to ensure that the fuels produced meet the specific needs of different transport modes.

International Cooperation: Engage in international efforts to standardise and promote LCLFs, sharing best practices and technology transfer to accelerate global adoption.

Transition Strategy as Technology Evolves:

Flexible Policy Design: Ensure policies are adaptable to technological advancements and market dynamics shifts. For example, if battery technology significantly advances, policies might shift to support more rapid electrification.

Scheduled Reviews and Adjustments: Regularly review the impact of LCLFs on emissions reductions, economic implications, and technological developments to adjust the prioritisation and application across sectors.

Education and Public Awareness:

Promote Awareness and Benefits: Run educational campaigns to inform stakeholders and the public about the benefits of LCLFs and their role in achieving net-zero emissions, fostering broader acceptance and support.

By implementing these steps, the prioritisation of low-carbon liquid fuels can be dynamically managed to adapt to the evolving landscape of technology and sector-specific needs, ensuring optimal environmental benefit and strategic transition towards more sustainable energy sources across all transport modes.

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?

To effectively implement the proposed pathways in the Transport and Infrastructure Net Zero Consultation Roadmap, the Australian Government can adopt several strategic approaches to enhance collaboration with industry, business, governments, and

communities. Here's an expanded explanation of the strategies outlined:

Establish Public-Private Partnerships to Drive Innovation:

Joint Ventures for Research and Development: Create joint ventures between government agencies and private companies to develop new technologies in renewable energy and transportation sectors. This could mirror the success of initiatives like the Cooperative Research Centres (CRCs), which involve both public and private sector partners in research that aims to achieve industrial and public good outcomes.

Infrastructure Projects: Engage in public-private partnerships (PPPs) to build and manage sustainable transport infrastructure, such as electric vehicle charging stations and hydrogen fuel infrastructure, ensuring government oversight and private sector efficiency.

Provide Funding and Incentives for Low-Emission Projects:

Grants and Subsidies: Offer financial support for projects that reduce emissions in the transport sector, such as subsidies for adopting electric vehicles or retrofitting existing vehicles with cleaner technologies.

Tax Incentives: Implement tax breaks or enhanced capital allowances for businesses investing in low-emission technologies and infrastructure, encouraging more private sector investment in sustainable projects.

Facilitate Knowledge Sharing and Collaboration Between Stakeholders:

Industry Forums and Conferences: Organise regular forums and conferences where stakeholders from various sectors can meet, exchange ideas and collaborate on net-zero projects. In ARA's experience, including through our Empower Australia national forums, these events can be crucial for sharing best practices and innovations, particularly when they are interactive and allow attendees to collaborate in groups to share insights and information.

Digital Platforms for Collaboration: Develop online platforms that allow stakeholders to easily share data, research findings, and project updates, enhancing transparency and collaboration across different sectors.

Develop Clear and Consistent Policies That Support the Transition to Net Zero:

Regulatory Frameworks: Establish clear regulatory frameworks that define emission reduction standards and expectations across different sectors. For example, setting phased targets for emission reductions in transport, similar to the European Union's approach with its Fit for 55 programme.

Stable Long-term Policies: Provide long-term policy certainty to encourage investment in low-emission technologies. This can include defining long-term goals and the steps to achieve them, which helps businesses and local governments plan and invest confidently.

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?

A detailed set of measures and metrics should be established to comprehensively evaluate the effectiveness of the final Transport and Infrastructure Net Zero Roadmap and Action Plan. These metrics should encompass not only environmental impact but also technological, economic, and social dimensions, ensuring a holistic assessment of the plan's outcomes:

Emissions Reductions Achieved in Each Transport Sector

Total Greenhouse Gas Emissions: Track and report each transport sector's total greenhouse gas emissions annually to assess progress against baseline levels and targeted reductions.

Sector-Specific Metrics: Use sector-specific emissions metrics, such as grams of CO₂ per passenger-kilometre for public transport or per tonne-kilometre for freight, to provide more granular insights into efficiency improvements.

Progress in the Adoption of Low-Emission Technologies

Adoption Rates: Measure the percentage of low-emission vehicles, such as electric hydrogen fuel cells and vehicles using low-carbon liquid fuels, within the total fleet across each sector.

Infrastructure Development: Track the development and availability of supporting infrastructure, such as charging stations and hydrogen refuelling stations, to gauge the accessibility and readiness of technology adoption.

Economic and Social Benefits Realised

Job Creation: Monitor the number of jobs created through new energy projects, infrastructure development, and technology manufacturing related to the transport sectors.

Economic Growth: Assess the transport sector's contribution to the national economy,

measuring aspects like increased productivity from improved transport efficiency and the economic output of new industries.

Social Impact Metrics: Evaluate improvements in social equity and accessibility, including increased access to clean and affordable transport options in underserved or remote communities.

Stakeholder Engagement and Satisfaction

Stakeholder Surveys: Conduct regular surveys and feedback mechanisms with stakeholders, including industry partners, local governments, and community groups, to assess satisfaction with the roadmap's implementation and engagement processes.

Public Perception and Support: Measure public support and awareness of the net zero initiatives through surveys, social media analysis, and public participation in related programs.

Performance Benchmarks and International Comparisons

Benchmarking Against International Standards: Compare performance and progress against international benchmarks and targets from similar initiatives in other countries to determine competitive standing and areas for improvement.

Best Practice Adoption: Evaluate the integration of international best practices within the roadmap's strategies and actions.

Sustainability and Resilience Metrics

Resilience to Climate Impacts: Assess the resilience of new infrastructure and systems against climate impacts, such as extreme weather events, which is crucial for long-term sustainability.

Lifecycle Assessments: Include lifecycle assessments of technologies and infrastructure to ensure that the environmental impact is minimised across all stages of development and operation.

By establishing and tracking these measures and metrics, stakeholders can ensure that the Transport and Infrastructure Net Zero Roadmap and Action Plan effectively reduces emissions and contributes positively to economic growth, social welfare, and sustainable development. This multi-dimensional evaluation framework will help identify successes, uncover improvement areas, and guide future policy adjustments.

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?

The process must be transparent, inclusive, and iterative. This approach should allow regular updates based on new data and stakeholder feedback, ensuring the roadmap remains relevant and effective. We expand on these comments as follows:

Transparency

Clarity of Methodology and Data Sources: The review process should clearly outline the methodologies and data sources. For instance, the Australian Government's approach to reviewing its carbon pricing mechanism involved publishing detailed methodologies and data sources, making it easier for stakeholders to understand the basis of policy decisions and to provide informed feedback.

Public Access to Review Findings: Ensuring that interim and final review findings are accessible to the public enhances transparency. An example is the annual transparency reports published by the Department of Climate Change, which detail Australia's emissions inventory and the effectiveness of emissions reduction strategies.

Inclusivity

Engaging a Wide Range of Stakeholders: The review process should involve various stakeholders, including industry experts, local governments, community groups, and Indigenous communities. The National Energy Guarantee (NEG) review process in Australia incorporated broad consultations with energy producers, consumers, and environmental groups to gather diverse perspectives on energy policy.

Feedback Mechanisms: Establishing structured feedback mechanisms such as public consultations, workshops, and online forums. The Australian Renewable Energy Agency (ARENA) often uses these tools to gather input on its projects and strategies, ensuring that they reflect the needs and opinions of a broad spectrum of the community.

Iterative Process

Regular Updates and Adjustments: The review process should not be static but adapt to new insights and changing circumstances. The ongoing management of the Murray-Darling Basin Plan is an example of how regular scientific reviews and community feedback have led to adjustments in water management policies to better meet environmental and agricultural needs.

Incorporation of Emerging Technologies and Practices: As new technologies and best practices emerge, particularly in renewable energy and transport technologies, the review process should incorporate these advancements to remain at the forefront of sustainable transport solutions.

These elements ensure that the review process is robust and forward-thinking, adaptable to new information, and inclusive of all stakeholder voices, thereby enhancing the

63 28. Do you have any further feedback on the Consultation Roadmap and proposed pathways?

The roadmap should be balanced, considering regional and remote areas' unique needs. It should also emphasise the importance of workforce development and training to support the transition and make provision for ensuring that this training and support can be provided 'in place' so that regional workforce participants are not required to travel and access often

expensive and unfamiliar accommodation options in capital cities to get the training and support they need.

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

Response to the Transport & Infrastructure Net Zero Transmissions Road Map Discussion Paper_FINAL.pdf

69 Upload a submission

2024 National Action Plan Final.pdf

70 Upload supporting file

Not answered

71 Upload supporting file

Not answered

**The Australian
Renewables Academy**



**New Energy
Workforce
National Action
Plan 2024 - 2028**

*Delivering on Australia's renewables
workforce challenge*



Acknowledgement of Country

We respectfully acknowledge Aboriginal and Torres Strait Islander people as the Traditional Custodians of the lands and waters on which we work and live. We commit to collaborating with First Nations people to promote sustainable practice and protect ancient sites and culture with equitable access to the benefits of clean energy. Sovereignty has never been ceded. We acknowledge Elders, past and present, and their continuing culture and connection to Country.





Introduction

Australia is undergoing a major transformation in its transition to a new energy economy. Work required to deliver this transformation is accelerating.

The Australian Energy Market Operator (AEMO) has said the most likely scenario for Australia is that 90% of the current 21 gigawatts of coal capacity would retire by 2034 – 35 and all by 2038.¹

The workforce requirements for construction and ongoing maintenance of renewable energy projects are yet to be clearly quantified, with job creation estimates ranging from some tens of thousands to hundreds of thousands of new jobs nationally. Construction jobs are typically estimated to be five times the number of ongoing maintenance jobs.

Australia's rural, remote, and regional areas will drive this transition, with major new energy developments and Renewable Energy Zones located outside urban and built-up areas in regions such as Gippsland (Victoria), Upper Spencer Gulf (South Australia), Hunter Valley (NSW), Townsville (Queensland) and Collie (Western Australia). Licenses have been granted for developments in numerous other regional areas, such as Middle Arm (Darwin) and Tennant Creek (Northern Territory).²

Whilst workers from traditional coal-fired power stations and oil and gas installations are expected to transition to new energy projects, this transition will not be evenly distributed nor be close to sufficient to address workforce demand.³ Mobilising the right people with the right skills in the right place and at the right time to optimise the economic and social benefits of the new energy revolution will be one of Australia's biggest opportunities and challenges over the coming decade.

1. Australian Energy Market Operator

<https://interactivemap.renewablesacademy.com.au/>

2. The Australian Renewable Academy Renewables Map identifies the multitude of renewable energy projects planned for Australia.

3. https://www.jobsandskills.gov.au/system/files/2023-10/the_clean_energy_generation.pdf



The Australian Renewables Academy (ARA) Pty Ltd is at the forefront of driving collaborative action nationally between regional and rural communities, renewable energy industries, supply chains and all levels of government by bringing stakeholders together to identify key themes and actions relating to Australia's future new energy workforce.

In November 2023, key stakeholders convened at Lardner Park in Victoria's West Gippsland for ARA's *Empower Australia National Forum*. Participants considered opportunities and challenges, exchanged information on initiatives underway across Australia, shared ideas and identified opportunities to take action to deliver on the renewables workforce challenge whilst optimising regional and local benefits.

This National Action Plan is an outcome of both the Forum and broader strategic consultations undertaken by ARA throughout 2023, with input from over 800 stakeholders.

It recognises the substantial work being undertaken across Australia to prepare for the new energy revolution and the required workforce.

This Plan also contributes to an industry and community-led approach to workforce development and mobilisation in regional communities at the forefront of the new energy revolution.

Key Themes

1. Attracting, mobilising and supporting a new energy workforce

A preferred new energy future for Australia will feature:

- Three levels of government and industry working together to optimise workforce attraction and retention through the provision of regional infrastructure (roads and transport, hospitals, schools, housing), services (childcare, health, education, justice, sport and recreation, arts and entertainment) and learning and development opportunities.
- Clarity on the quantum of, and skills and timing for jobs in each region. Real-time skills mapping is available and sufficiently granular to support local pathways and careers for transition into new energy jobs.
- Coordinated developments that provide greater continuity and alignment in jobs for local people. Individuals and families will come, settle and reside in areas hosting new energy projects, including during construction periods.
- Communities are engaged in creating a preferred future for their local area and in directing community benefit scheme (CBS) resources to address priorities and issues.
- Australia's visa system aligning with local, new energy and supply chain workforce needs and gaps and enabling a migration process from places that face the impacts of climate change first.

2. Work nationally and locally to build skills, expertise and capabilities for the new energy economy

A preferred new energy future for Australia will feature:

- Education and skills development aligned to project timeframes to ensure the right skills are available at the right time. Professionals are available to provide quality training and assistance.
- Schools, TAFEs, RTOs, universities and industry collaborating to develop and review, revise and improve new energy sector curricula.
- School transition and careers pathways supported to enable workers to progress from labouring jobs to apprenticeships to trades to team leaders to professional and technical roles and to executive leadership.
- New models of skilling, certification, and standardisation across Australia trialled to address shortages and ensure sufficient professional, technical and trades-qualified persons and labourers are available.
- National initiatives that translate into local opportunities and solutions.



3. Optimise social and economic futures by engaging an inclusive and diverse local workforce

A preferred new energy future for Australia will feature:

- A diverse, inclusive workforce successfully supported, including through scholarships, internships, industry placements and guarantees of employment, with a particular focus on local diversity and improving workforce participation rates.
- Businesses recognising, understanding and applying the 'return on investment' argument for a more inclusive and diverse workforce.
- First Nations peoples benefiting directly from sustainable employment and career opportunities and outcomes in local areas.
- People currently locked out of the labour market gaining the qualifications, essential skills and experience necessary to enter the renewable energy and supply chain workforce.



Taking Action

ARA and its partners will take action over the coming decade to contribute to a shared preferred future, including through:

Leadership – by promoting the development of a skilled inclusive workforce for new energy projects across Australia, to ensure benefits accrue to local communities and workers, including people who are currently excluded from the labour market.

Advocacy and influencing – to assist local and regional stakeholders in securing the necessary infrastructure, resources and skills to enable equitable access to new energy, supply chain and multiplier jobs.

Delivery – working together, understanding and supporting existing initiatives, identifying areas where there are gaps, and harnessing the right resources and approaches to fill those gaps.

Facilitation – growing and nurturing partnerships, collaborations and relationships critical to optimising the use of resources in delivering workforce and community imperatives.

Innovation – supporting innovative responses to emerging learning and skills development needs through research, action learning, smart use of technologies and piloting new ways of learning and working.

Inclusivity – promoting access and equity to learning and employment, monitoring uptake, and fostering opportunities to deepen learner engagement.

Highlighting Progress – measuring and celebrating the work done in rural, remote and regional areas to facilitate the new energy revolution.



Action Plan 2024 – 2028

Add your name to actions you wish to be involved in supporting.

[Respond using this form](#)

Key Theme	Actions	2024	2025 - 2028
1. Attract, mobilise and support local new energy workforce	1.1 Raise awareness of opportunities and challenges in building local and regional workforce.	In partnership with local stakeholders, host regional forums across Australia. Conduct an annual National Forum to share updates, information, actions and issues.	Ongoing regional forums inform actions.
	1.2 Understand opportunities and advocate for government, industry and communities to work together on solving workforce-related problems.	Advocate for the right level of childcare provision in local and regional areas – early years, preschool and afterschool care and school holiday programs.	Review advocacy priorities such as health and education provision and liveability through the arts, sport and recreation.
	1.3 Explore models of industry coordination to provide for optimisation of local resources and benefit.	Investigate ROI on industry coordination models to develop a compelling coordination argument.	Trial coordination in selected regions where there are diverse proponent.
	1.4 Promote opportunities for regions to develop vision and goals for Community Benefit Schemes (CBS).	Explore and promulgate CBS Models.	Support trialling and embedding of CBS model. Measure and promote local social and economic impact.
2. Work nationally to build skills, expertise and capabilities	2.1 New energy careers embedded into post-school and school curricula.	Advocate for opportunities to develop new energy curricula, including in primary and secondary schools, VET and universities.	Scale Changemaker and STEM initiatives that focus on young women in schools.

	2.2 Skills mapping for new energy jobs with education and capability development supported locally to deliver on required skills in required timeframes.	Investigate current initiatives focussed on mapping, aggregating and updating information. Scope for real-time skills mapping for local areas.	Support trials with Schools, VET and Universities delivering on local skills plans.
	2.3 Pursue opportunities for standardisation of licenses, certification and qualifications across Australia.	Map state-by-state requirements and identify opportunities for harmonisation.	Advocate for standardisation
3. Engaging an inclusive and diverse local workforce	3.1 Grow the capability of local, regional, national and international businesses to support a diverse, inclusive workforce successfully.	Identify and share success strategies for engaging vulnerable cohorts in employment. Identify ROI for industry and community.	Evaluate and support the scaling of success strategies
	3.2 Support First Nations and Traditional Owner organisations to engage with new energy transformation.	Engage with First Nations organisations on workforce and supply chain opportunities.	Support ongoing initiatives to grow sustainable employment for First Nations people.
	3.3 Support initiatives to target girls and women with skills, learning and opportunities for new energy careers.	Year 1: Support Changemakers Programs where young women in rural and regional schools lead the discussion on new energy career opportunities.	Year 2 and beyond: Support ongoing initiatives to grow uptake of women in new energy careers.
4.0 Measuring Success	4.1 Implement evaluation framework and data collection across all actions,	Year 1: Establish evaluation framework and process for gathering meaningful measures of success	Year 2 and beyond – Reports on progress and learnings.

The following individuals and organisations have committed to working with the Australian Renewables Academy on progressing action:

Luke Arber, Employment Facilitator, Department of Employment and Workplace Relations	<ul style="list-style-type: none"> Actions 1.1, 1.2, 1.3, 1.4 Actions 2.1, 2.2, 2.3 Actions 3.1, 3.2, 3.3
Angela Hewitt, Employment Facilitator, Workforce Australia Local Jobs	<ul style="list-style-type: none"> Actions 1.1, 1.2, 1.3, 1.4 Actions 2.1, 2.2 Actions 3.1, 3.2, 3.3
Natalie McArlein, Support Officer, Workforce Australia, Local Jobs	<ul style="list-style-type: none"> Actions 1.1, 1.2, 1.4 Actions 2.2, 2.3 Actions 3.1, 3.2, 3.3
Lucy Geraghty, Senior Manager, Industry Engagement, Powering Skills Organisation	<ul style="list-style-type: none"> Actions 1.1, 1.2, 1.3 Actions 2.1, 2.2, 2.3 Actions 3.1, 3.2, 3.3
Darren McCubbin, CEO, Gippsland Climate Change Network (GCCN)	<ul style="list-style-type: none"> Actions 1.1, 1.4 Actions 3.1
Lou Conway, Director, University of New England	<ul style="list-style-type: none"> Actions 1.1, 1.2, 1.3, 1.4 Actions 2.2, 2.2, 2.3 Actions 3.1, 3.2, 3.3 Actions 2.1
Saad Mekhilef, Distinguished Professor, Swinburne University of Technology	<ul style="list-style-type: none"> Actions 1.2, 1.3, 1.4 Actions 1.1, 2.2
Jen Perkins, Director Skills Excellence Network - Construction & Energy, TAFE NSW	<ul style="list-style-type: none"> Actions 1.1, 1.2 Actions 2.1, 2.2, 2.3 Actions 3.2, 3.3

Bill Mundy, Associate Director Partnerships and Growth, Federation University	<ul style="list-style-type: none"> Actions 1.1, 1.2, 1.3, 1.4 Actions 2.1, 2.2, 2.3 Actions 3.1, 3.2, 3.3
Jess O'Farrell, Producer of video, animation, VR, & interactive websites, Studio Kettle	<ul style="list-style-type: none"> Actions 1.1, 1.2 Actions 2.1, 2.2 Actions 3.1, 3.2, 3.3
Georgina Legoe, Partner, Icenl	<ul style="list-style-type: none"> Actions 1.1, 1.3, 1.4 Actions 2.1, 2.2 Actions 3.1, 3.2, 3.3
Jonathon Jones, Senior Workforce and Skills Officer, Industry Skills Advisory Council NT	<ul style="list-style-type: none"> Actions 1.1, 1.2 Actions 2.1, 2.2
Jules Cole, Director Regional Strengths and Stakeholder Engagement, Latrobe Valley Authority	<ul style="list-style-type: none"> Actions 1.1 Actions 2.1 Actions 3.1, 3.2, 3.3
Shannon Egan, Business Partner New Energy, TAFE Gippsland	<ul style="list-style-type: none"> Actions 1.1 Actions 2.1, 2.2,
Erin Lord, Stakeholder Engagement Lead, Flotation Energy	<ul style="list-style-type: none"> Actions 1.1, 1.2, 1.3, 1.4 Actions 2.1 Actions 3.1, 3.2, 3.3
Adam Fletcher, Hycel Program Manager, Deakin University	<ul style="list-style-type: none"> Actions 1.1 Actions 2.2, 2.2, 2.3 Actions 3.2, 3.3
Brett Millsom, Communications and Engagement Lead, Ausnet Services	<ul style="list-style-type: none"> Actions 1.1, 1.2, 1.3, 1.4 Actions 2.1, 2.2, 2.3 Actions 3.1, 3.2, 3.3
Jessica Piesse, Partnerships Operations Manager, Australian Catholic University	<ul style="list-style-type: none"> Actions 1.2, 1.4 Actions 2.1, 2.2
Tracy Jefferies, Employment Facilitator, Workforce Australia	<ul style="list-style-type: none"> Actions 1.1, 1.2 Actions 2.2 Actions 3.1
Bernadette O'Connor, Executive Director, Management Governance Australia Group	<ul style="list-style-type: none"> Actions 1.1, 1.2, 1.3 Actions 2.1, 2.2, 2.3 Actions 3.1, 3.2, 3.3 Actions 4.1



Response to the Transport and Infrastructure Net Zero Road Map Discussion Paper

Introduction to the Australian Renewables Academy (ARA)

ARA's response to the Discussion Paper is informed by our extensive engagement with regional and rural communities, clean energy industries, and governmental bodies at all levels and our commitment to driving a skilled, inclusive, and sustainable workforce in the clean energy sector.

In this submission, ARA makes recommendations and responses consistent with our focus on thinking globally and working locally, drawing on ARA's New Energy Workforce National Action Plan 2024-28, attached with this submission, engagement with governments at all levels, and key regional clean energy stakeholders in Renewable Energy Zones (REZs) around Australia.

Introducing the Australian Renewables Academy

The Australian Renewables Academy (ARA) Pty Ltd is at the forefront of driving collaborative action nationally between regional and rural communities, renewable energy industries, supply chains and all levels of government by bringing stakeholders together to identify key themes and actions.

ARA works with local stakeholders around Australia to:

- Identify and promote careers in the renewable energy industry and provide a direct skills and workforce development channel for people looking to enter the industry;
- Develop and deliver skills training for employees transitioning into the renewable energy industry;
- Provide advice to individual job seekers on translating their skills and qualifications to available jobs within the industry;
- Connect job seekers to relevant education and training providers and direct jobs within the renewable energy sector;
- Engage schools, higher and tertiary education providers, employment services and the community in the growth and development of the renewable energy industry in regional Australia and
- Facilitate industry-led action research to foster innovation and strengthen local economies and communities.

In December 2021, ARA hosted the inaugural Activating Gippsland's Renewable Energy Workforce Forum in Sale, Victoria. The Forum's purpose was two-fold: firstly, to explore opportunities emerging from the rapid scale-up of the clean energy sector in Gippsland, and secondly, to agree on actions that industry, businesses and community stakeholders can take together, with the support of governments, to grow a local clean energy workforce for the Gippsland region.



At this first ARA Forum, participants identified themes, opportunities, and challenges critical for consideration in activating Gippsland's renewable energy workforce. They were reflected in ARA's Activating Gippsland's Renewable Energy Workforce Action Plan 2022 – 2025, attached with this submission.

In November 2022, ARA held its second Forum in Sale, Victoria. The Forum's purpose was to provide an opportunity for key stakeholders to review the key agreed actions, share information on workforce initiatives, identify gaps and opportunities and harness commitment and resources so that together, the Gippsland community can take a coordinated approach to activating the clean energy industry and supply chain workforce in Gippsland and the Latrobe Valley.

In November 2023, key stakeholders met at Lardner Park in West Gippsland for ARA's *Empower Australia National Forum*. At this forum, delegates from around Australia considered opportunities and challenges, exchanged information on initiatives across Australia, shared ideas and identified opportunities to address the renewables workforce challenge quickly whilst optimising regional and local benefits.

ARA's New Energy Workforce National Action Plan 2024 – 2028 (the National Action Plan) was one of the Forum's outcomes and is attached to this submission.

ARA's New Energy Workforce National Action Plan 2024 – 2028

ARA's National Action Plan, developed in consultation with more than 800 stakeholders from around Australia, identifies **three key themes** supported by actions relating to Australia's future clean energy workforce:

1. Attracting, mobilising and supporting a clean energy workforce through providing infrastructure, services, professional development opportunities, local career pathways, and a visa scheme aligned with Australia's clean energy needs.
2. Working nationally and locally to build workforce skills and capacities by developing real-time skills mapping, clean energy curricula, career pathways, local solutions, and new training models.
3. Optimising social and economic futures by engaging an inclusive, diverse workforce, which includes understanding and supportive businesses, local people, First Nations people, women, and individuals currently locked out of employment.

ARA's response to the Discussion Paper reflects insights from our ongoing engagement with regional communities in Renewable Energy Zones (REZs) around Australia. This engagement includes 'Dinner and Dialogue' events with key clean energy stakeholders in Traralgon, Warrnambool, Whyalla and Darwin, all of which have underscored the role of easily accessible transport in fostering and growing the clean energy sector in remote and regional areas. Other Dinner and Dialogue Events will be held in Mount Gambier, Newcastle, Townsville and Geelong, followed by ARA's national Empower Australia Forum, to be held in Melbourne in November 2024.



The Australian Government has recently funded ARA to deliver the New Energy Apprentices Mentoring Program. This program aims to support the next generation of skilled workers in the renewable energy sector, providing them with the necessary guidance and resources to thrive in their careers.¹

Guiding Principles and Policy Positions

1. Maximise Emissions Reduction

ARA strongly supports the emphasis on emissions reduction as the core of the Government's net zero plan. Effective policies should be implemented at the earliest opportunity to achieve the largest reductions in emissions, consistent with the government's targets.

ARA considers that the following elements should figure in a national policy framework for achieving significant emissions reductions:

a) Comprehensive electrification strategy

Transport Electrification: Implement policies to accelerate the transition to electric vehicles (EVs) across all transport modes. This may include providing incentives for EV purchases, expanding charging infrastructure, and setting ambitious targets for phasing out internal combustion engines.

Renewable Energy Integration: Ensure that the increased demand for electricity from EVs is met with renewable energy sources. Invest in grid upgrades and storage solutions to support the integration of wind, solar, and other renewable energies.

b) Promotion of Sustainable Fuels

Hydrogen Fuel Development: Invest in developing and deploying green hydrogen as a sustainable fuel for heavy transport, maritime, and aviation sectors. Provide incentives for hydrogen production and establish refuelling infrastructure.

Sustainable Aviation Fuel (SAF): Support research, development, and deployment of SAF to reduce emissions from the aviation sector. Implement policies to encourage airlines to adopt SAF and develop supply chains.

c) Enhanced Public and Active Transport

Public Transport Investments: Expand and modernise public transport networks to provide efficient and low-emission alternatives to private car use. Implement policies that prioritise public transport in urban planning and development.

Active Transport Infrastructure: Promote walking and cycling by investing in safe and accessible infrastructure. Encourage local governments to develop active transport plans that integrate with public transport systems.

¹ <https://www.renewablesacademy.com.au/new-energy-apprenticeships-mentoring-program>



d) Stringent Emission Standards and Regulations

Vehicle Emission Standards: Implement stricter emission standards for all new vehicles, ensuring a rapid reduction in pollutants from road transport. Set clear timelines for the transition to zero-emission vehicles.

Industrial Emission Regulations: Enforce stringent regulations on industrial emissions, particularly in the transport infrastructure sector. Encourage the adoption of low-emission construction practices and materials.

e) Research, Development, and Innovation

R&D Investment: Increase funding for research and development in clean transport technologies, including battery advancements, hydrogen fuel cells, and low-carbon fuels. Encourage public-private partnerships to drive innovation.

Pilot Projects and Demonstrations: Support pilot projects and demonstration programs to test and validate new technologies. Provide platforms for knowledge sharing and collaboration across sectors.

f) Economic and Financial Incentives

Subsidies and Tax Breaks: Provide subsidies and tax incentives for businesses and individuals investing in low-emission technologies and practices. Ensure that these incentives are targeted to maximise emissions reductions.

Carbon Pricing: Implement or strengthen carbon pricing mechanisms to internalise the environmental cost of emissions. Use the revenue generated to fund further emissions reduction initiatives.

g) Stakeholder Engagement and Collaboration

Inclusive Policy Development: Engage a broad range of stakeholders, including industry, communities, and environmental groups, in the policy development process. Ensure that diverse perspectives inform policies and address the needs of all Australians.

Regional Partnerships: Partner with regional and local governments to tailor policies addressing specific regional challenges and opportunities. Support capacity-building initiatives to enable effective local implementation.

h) Monitoring, Reporting, and Evaluation

Transparent Reporting: Establish robust systems for monitoring and reporting emissions reductions across all sectors. Ensure transparency and accountability in tracking progress towards targets.

Continuous Improvement: Implement a framework for regular policy review and adjustment based on performance data and stakeholder feedback. Foster a culture of continuous improvement to adapt to evolving challenges and opportunities.



By incorporating these elements into the policy framework, the Australian Government can achieve substantial and sustained reductions in emissions, aligning with its net-zero targets.

Value for Money

Cost-effective measures to achieve maximum abatement potential are crucial. ARA advocates incentivising the private sector to leverage its capital, innovation and effort to achieve net zero.

ARA considers that in determining the issue of 'value for money', the following criteria could be relied upon:

Economic Efficiency

Cost-Benefit Analysis: All measures should be evaluated based on their potential to deliver the highest emissions reductions at the lowest cost. This includes considering both direct and indirect costs and benefits.

Leverage Private Investment: Policies should be designed to attract private sector investment, leveraging public funds to maximise the overall capital available for decarbonisation projects.

Long-term Economic Benefits: Beyond immediate costs, consider the long-term economic benefits, including job creation, industry growth, and energy cost savings.

Social Impact

Job Creation: Investments should prioritise projects that create sustainable, high-quality jobs, particularly in regional and rural areas hosting or near clean energy projects and infrastructure. This approach aligns with ARA's focus on developing a skilled and inclusive clean energy workforce and our mantra: 'local jobs for local people'.

Community Benefits: Evaluate how projects contribute to community development, including improved infrastructure, services, and overall quality of life. Community engagement and support are crucial for the success of these projects.

Equity and Inclusivity: Ensure benefits are distributed fairly, supporting vulnerable and marginalised communities. Projects should promote inclusivity and provide opportunities for underrepresented groups, including women and First Nations people.

Environmental Sustainability

Maximise Emissions Reductions: Prioritise measures offering the greatest potential for reducing greenhouse gas emissions. This should include both immediate and long-term reductions.

Sustainable Practices: Projects should employ sustainable practices, minimising environmental impacts beyond emissions, such as resource use, habitat conservation, and pollution control.



Resilience and Adaptation: Ensure investments contribute to the resilience and adaptation of transport infrastructure to climate change impacts.

Innovation and Technological Advancement

Encourage Innovation: Support projects that incorporate innovative technologies and practices. This includes investing in research and development to drive technological advancements in the transport and renewable energy sectors.

Scalability and Replicability: Prioritise solutions that can be scaled and replicated across different regions and sectors, ensuring broader and more impactful implementation.

Stakeholder Collaboration

Multi-Stakeholder Engagement: Foster collaboration between governments, industry, and communities. Effective partnerships are essential for pooling resources expertise, and achieving collective goals.

Transparent Decision-Making: Ensure transparency in decision-making processes, with clear criteria and rationale for project selection. Stakeholder input should be actively sought and incorporated.

2. Maximise Economic Opportunity

The transformation to a net zero economy presents significant economic opportunities for Australia, particularly its regions. ARA believes in supporting the decarbonisation of the transport sector to create new job opportunities and facilitate the transition of workers from emissions-intensive industries.

3. Inclusive and Equitable

Inclusivity and equity, including intergenerational equity, must underpin the policy mix. All Australians should benefit from decarbonisation efforts, particularly those living in regional areas hosting clean energy infrastructure and delivering projects. Government support, training and close collaboration with industry are necessary to ensure a workforce ready for net zero transition.

4. Evidence-Based

Policies should be developed based on expert analysis and experience. A mix of technologies, policies and planning should be pursued and tailored to different transport modes.



ARA's response to consultation questions

1. Do you agree with the proposed guiding principles?

Yes, ARA agrees with the guiding principles as they align with our own values and objectives. Emissions reduction, economic opportunity and inclusivity are crucial for a sustainable transition.

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

Yes, the avoid-shift-improve framework is an effective tool for identifying opportunities for abatement. It provides a structured approach to reducing emissions by prioritising the avoidance of unnecessary travel, shifting to more sustainable modes, and improving the efficiency of transport systems.

Examples of the framework's application may be seen in the following scenarios:

Avoid: In Melbourne, the implementation of integrated land-use planning has effectively reduced the need for travel. The city's strategy focuses on developing high-density residential areas near employment hubs and essential services. This urban planning model encourages residents to live closer to their workplaces, significantly decreasing daily commute distances and reducing the overall demand for transport.²

Shift: Brisbane's investment in its public transport network exemplifies shifting to more sustainable transport modes. Expanding the city's bus and train networks and introducing more frequent services during peak times has encouraged a significant shift from private car use to public transport. This shift has reduced traffic congestion and lowered emissions per passenger kilometre compared to private vehicle use.³

Improve: Sydney has focused on improving the efficiency of existing transport systems by upgrading its rail network signalling technology. By adopting more advanced and efficient signalling systems, Sydney Trains has increased the frequency and reliability of services. This improvement has enhanced the overall efficiency of the rail network, leading to higher ridership and lower emissions per journey.⁴

These examples illustrate the effectiveness of the avoid-shift-improve framework in reducing transportation emissions across different regions in Australia. By adopting this structured

² <https://www.planning.vic.gov.au/guides-and-resources/strategies-and-initiatives/melbournes-future-planning-framework>

³ <https://statements.qld.gov.au/statements/100778>

⁴ <https://www.transport.nsw.gov.au/industry/independent-reviews/rail-infrastructure-and-systems-review>



approach, cities can systematically address the key factors contributing to high transport emissions and make significant progress towards achieving their abatement goals.

3. Do you agree the development of a national policy framework for active and public transport will support emissions reduction?

Yes, a national policy framework for active and public transport is essential for supporting emissions reduction. Such a framework should include infrastructure investments, incentives for public transport use, and policies promoting active transport options like walking and cycling.

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

The framework should include:

- Investment in public transport infrastructure.
- Incentives for using public and active transport.
- Policies promoting urban planning that supports active transport.
- Collaboration with local governments and communities to ensure the framework meets local needs.

These framework elements could be achieved through measures such as the following:

Investment in Public Transport Infrastructure

Funding Allocation: Governments at all levels should allocate significant funding for expanding and modernising public transport systems. This funding should be applied to building new rail lines, upgrading bus fleets to electric or hybrid models, and enhancing stations and terminals.

Integrated Transport Systems: Develop and enhance integrated multimodal transport systems that allow seamless transitions between different forms of transport, such as from trains to buses to pedestrian pathways.

Incentives for Using Public and Active Transport

Reduced Fares for Regular Users: Implement fare reduction schemes for regular commuters, such as monthly passes that offer unlimited travel at a fixed cost.

Rewards Programs: Create rewards programs that offer benefits like discounts or promotional offers from partner businesses to regular public transport users.

Employer-Sponsored Programs: Encourage employers to offer transit benefits, such as subsidised passes or flexible work hours for those who commute using public or active transport.



Policies Promoting Urban Planning that Supports Active Transport

Zoning Laws: Modify zoning laws to encourage the development of mixed-use neighbourhoods where residential, commercial, and recreational areas are within walking or cycling distance.

Infrastructure Development: Invest in developing safe and extensive cycling lanes and pedestrian path networks. Ensure these pathways are well-connected, well-lit, and secure.

Traffic Calming Measures: Implement traffic calming measures in urban areas to improve safety for pedestrians and cyclists, with community support. This may include lowering speed limits, installing speed bumps, and creating pedestrian-only zones.

Collaboration with Local Governments and Communities to Ensure the Framework Meets Local Needs

Community Engagement Initiatives: Engage regularly with local communities through town hall meetings, workshops and online forums to gather input on transport needs and preferences.

Partnerships with Local Authorities: Form partnerships with local government bodies to ensure that the planning and implementation of transport projects are closely aligned with local development plans and community needs.

Pilot Projects: Collaborate on pilot projects in selected areas to test and refine approaches before wider implementation. Feedback from these projects can help tailor solutions that effectively address specific local challenges.

These strategies require a coordinated approach involving multiple stakeholders, including government agencies, transport providers, urban planners, businesses, and the public. By implementing these actions, cities and regions can develop a more sustainable, efficient, and user-friendly transportation framework that encourages public and active transport options, reducing traffic congestion, lowering emissions, and improving urban liveability.

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?

Actions may include:

- Increasing investments in public transport infrastructure.
 - Implementing policies that encourage the use of electric and low-emission vehicles.
 - Promoting active transport through improved infrastructure and incentives.
 - Engaging communities in planning processes to ensure local needs are met.
6. 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?



Actions may include:

- Investing in rail and other low-emission freight transport options.
- Encouraging the use of electric and hydrogen fuel cell technologies in heavy transport.
- Developing policies that support the transition of freight fleets to low-emission alternatives.
- Collaborating with industry to promote innovation in sustainable logistics.

7. Do you agree with the proposed net zero pathway for light road vehicles?

Yes, ARA agrees with the proposed net zero pathway for light road vehicles. However, additional support for infrastructure and incentives for consumers to adopt electric vehicles is essential.

To effectively support the proposed net zero pathway for light road vehicles, additional support measures that could be provided may include the following:

Enhanced Charging Infrastructure

Government Funding for Public Charging Stations: Increase the availability of public EV charging stations through government grants or subsidies. This could include fast-charging stations along major highways and more charging options in urban and rural areas.

Support for Private Charging Solutions: Offer incentives for installing home charging stations to reduce the initial cost barrier for consumers who purchase electric vehicles.

Financial Incentives for Consumers

Rebates and Tax Credits: Provide direct rebates or tax credits to consumers who purchase electric vehicles, making EVs more financially accessible.

Reduced Registration and Stamp Duty Fees: Offer reductions in vehicle registration and stamp duty fees for electric vehicle owners.

Subsidies for Vehicle Trade-ins

Scrappage Schemes: Implement scrappage schemes where consumers receive financial incentives for trading in older, less efficient vehicles for new electric vehicles.

Trade-in Credits: Provide additional support through trade-in credits, enhancing the value offered when older vehicles are exchanged for electric models.

Expansion of Renewable Energy Integration

Green Energy for EV Charging: Promote using renewable energy sources for electric vehicle charging stations to minimise environmental impact.

Incentives for Solar-Powered Charging Stations: Offer incentives for developing and using solar-powered charging stations, providing a sustainable and cost-effective charging option.



Policy and Regulatory Support

Mandatory EV Quotas for Automakers: Introduce regulations that require automakers to sell a certain percentage of electric vehicles among their total vehicle sales.

Support for Local Manufacturing of EVs and Components: Provide subsidies or tax breaks for companies in Australia that manufacture electric vehicles or related components, such as batteries.

Public Awareness and Educational Campaigns

Information and Education: Conduct public awareness campaigns to educate consumers on the benefits of electric vehicles, including environmental impacts, cost savings, and available incentives.

Partnerships with Industry: Collaborate with automotive manufacturers and dealerships to promote electric vehicles through co-funded marketing campaigns and informational events.

Research and Development Investments

Funding for EV Technology Innovations: Invest in research and development focused on improving electric vehicle technologies, such as battery life, charging speed, and vehicle efficiency.

Collaborations with Universities and Research Institutes: Partner with academic institutions and research organisations to spearhead innovations in electric vehicle technology and infrastructure solutions.

Implementing these measures will help accelerate the transition to electric vehicles, making them a more viable and attractive option for consumers, thereby supporting the broader goals of achieving net zero emissions in the transport sector.

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

Governments, communities, industry and other stakeholders must collaborate on strategic actions to reduce light vehicle emissions effectively. These actions could be implemented in the following ways:

Expanding Charging Infrastructure for Electric Vehicles

Public-Private Partnerships: Governments can partner with private companies to expand the network of EV charging stations. This could involve financial incentives for businesses that install charging stations and zoning adjustments to facilitate installations in key locations like shopping centres, workplaces, and multi-unit dwellings.

Community-Based Initiatives: Local councils can support community-led initiatives to establish charging infrastructure in residential areas and communal spaces.



Providing Incentives for the Purchase of Electric Vehicles

Financial Incentives: Governments can offer tax rebates, reduced registration fees, and direct subsidies to lower the upfront cost of electric vehicles. These incentives could be tiered based on the environmental performance of the vehicle.

Non-Financial Incentives: Offer benefits such as access to carpool lanes, reduced tolls, or preferred parking for electric vehicle owners.

Implementing Stricter Emissions Standards for New Vehicles

Legislative Measures: Implement and enforce stricter emissions standards for all new light vehicles, requiring manufacturers to meet higher environmental performance criteria. This could align with or exceed standards set by leading global markets.

Phasing Out High-Emission Vehicles: Set clear timelines for phasing out the sale of new internal combustion engine vehicles, providing a transition period for manufacturers and consumers.

Promoting the Benefits of Electric Vehicles to Consumers

Awareness Campaigns: Launch comprehensive public education campaigns that highlight the benefits of electric vehicles, including lower running costs, reduced environmental impact, and improved vehicle technology.

Experience and Test Drive Programs: Facilitate opportunities for consumers to experience electric vehicles firsthand through test drives and showcases at community events and shopping centres.

Future Actions

Continuous Improvement of Battery Technology: Support research and development into more efficient battery technologies that offer longer ranges and shorter charging times. This could involve funding university research programs and partnerships with tech companies.

Building a Circular Economy for EVs: Develop recycling programs for electric vehicle batteries and advocate for the design of vehicles that are easier to recycle, reducing the overall environmental footprint.

Integration with Renewable Energy: Encourage the use of renewable energy sources to power electric vehicle charging stations through incentives for solar-powered charging infrastructure and integration with smart grid technologies.

Strengthening Grid Infrastructure: Invest in strengthening the electrical grid to handle increased demand from electric vehicles, ensuring the grid remains stable and capable of supporting widespread EV adoption without reliability issues.



9. Do you agree with the proposed net zero pathway for heavy road vehicles?

Yes, ARA supports the proposed net zero pathway for heavy road vehicles, which includes a mix of battery electric, hydrogen fuel cell, and low-carbon liquid fuels, for several reasons aligned with ARA's broader objectives and actions outlined in its National Action Plan:

Diversified Energy Options

Comprehensive Coverage: The mix of technologies addresses various operational needs and infrastructure limitations. For heavy vehicles, where long ranges and high energy demands can limit the viability of a single technology solution, having multiple options like battery electric for shorter routes and hydrogen or low-carbon liquid fuels for longer or heavier hauls is pragmatic and efficient.

Infrastructure Development

Scalable Implementation: ARA's focus on mobilising infrastructure and resources aligns with the need for a robust charging and fuelling infrastructure to support diverse fuel technologies. This approach aids in overcoming one of the significant barriers to adopting new energy vehicles by ensuring the necessary infrastructure is developed concurrently with vehicle rollout.

Sustainable Workforce Transition

Skill Development and Job Creation: Transitioning to new energy technologies in the transport sector requires a skilled workforce. ARA's emphasis on workforce development through training and certification programs supports the growth of a labour force capable of manufacturing, maintaining, and operating a new fleet of low-emission vehicles.

Community and Industry Engagement

Stakeholder Collaboration: By advocating for a mixed-technology approach, ARA fosters collaboration across various sectors of the industry, from vehicle manufacturers and energy providers to infrastructure developers. This integrated approach is crucial for creating cohesive and sustainable energy solutions that benefit all stakeholders.

Environmental and Economic Benefits

Maximising Emissions Reduction: Utilising a combination of technologies allows for optimising emissions reductions across different types of heavy vehicle operations. It also positions the heavy vehicle sector to adapt more rapidly to evolving technologies and market conditions, potentially leading to significant environmental benefits and cost savings over time.

Innovation and Technological Advancement

Driving Research and Development: Supporting various technologies encourages ongoing innovation in the automotive and energy sectors. ARA's commitment to innovation and learning aligns with this strategy, as it helps catalyse technological advancements that can



further reduce costs and improve the efficiency and viability of electric and hydrogen fuel cell vehicles.

10. Rank from 1 to 3 the order in which these should be prioritised for emissions reduction for heavy road vehicles:

1. Hydrogen fuel cell
2. Battery electric
3. Low-carbon liquid fuels

The prioritisation of technologies for emissions reduction in heavy road vehicles—hydrogen fuel cells, battery electric, and low-carbon liquid fuels—requires a nuanced understanding of each technology's capabilities, infrastructure needs, and specific suitability for heavy-duty transport. Here's an expanded rationale for the proposed ranking:

Hydrogen Fuel Cells (Rank 1):

Range and Refuelling Efficiency: Hydrogen fuel cells are particularly suitable for heavy-duty vehicles like trucks and buses that require longer ranges and rapid refuelling capabilities comparable to diesel. Hydrogen can provide a range similar to conventional fuels and can be refuelled in under 15 minutes, making it ideal for vehicles that operate over long distances or have tight operating schedules.

Energy Density and Weight Considerations: Hydrogen has a higher energy density by weight than batteries, making it more effective for heavy loads and long distances without significantly increasing vehicle weight. This is critical for maintaining payload efficiency in commercial transport.

Scalability and Future Potential: While hydrogen infrastructure is currently less developed than electric charging networks, the potential for scaling up hydrogen production using renewable energy sources offers significant long-term benefits for large-scale emissions reductions. This aligns with global moves toward green hydrogen economies.

Battery Electric (Rank 2):

Technological Maturity and Availability: Battery electric vehicles (BEVs) are technologically advanced and increasingly available for various applications. They are well-suited for shorter routes and urban delivery vehicles, where frequent stopping can leverage regenerative braking for energy efficiency.

Infrastructure Integration: Electric charging infrastructure is more widely established in urban and semi-urban areas, facilitating the adoption of BEVs in these settings. However, the weight and space required for batteries can limit the practical payload and range of heavy vehicles.



Environmental Impact: BEVs produce zero tailpipe emissions, crucial for improving air quality in urban environments. However, the overall environmental impact depends on the electricity grid's cleanliness when charging.

Low-Carbon Liquid Fuels (Rank 3):

Transitional Technology: Low-carbon liquid fuels, such as biodiesel or synthetic diesels, serve as transitional technologies that can be used with existing vehicle technologies and refuelling infrastructure. They offer immediate reductions in greenhouse gas emissions compared to traditional fossil fuels.

Compatibility and Ease of Implementation: These fuels can be used in existing internal combustion engine vehicles, reducing the need for new infrastructure and vehicle fleets. This makes them a practical short-term solution to reduce emissions while other more sustainable technologies are being developed.

Limitations in Long-Term Sustainability: Low-carbon liquid fuels can reduce emissions, but they often produce more greenhouse gases than electric or hydrogen options and may not be sustainable long-term solutions as global targets for net-zero emissions become more stringent.

This prioritisation reflects a strategic approach to adopting technologies that align with current capabilities and future sustainability goals, focusing on developing and enhancing solutions that provide the most significant benefits in emissions reduction, operational feasibility, and economic viability in the heavy vehicle sector.

12. What role should low-carbon liquid fuels play in heavy vehicle decarbonisation?

Low-carbon liquid fuels should serve as a transitional solution where electrification and hydrogen are not yet viable, particularly in remote and regional areas.

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

Actions may include:

- Investing in hydrogen production and refuelling infrastructure.
- Providing incentives for the adoption of low-emission heavy vehicles.
- Supporting research and development of advanced battery technologies.
- Collaborating with industry to accelerate the deployment of low-emission heavy vehicles.

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

Yes, ARA supports the proposed net zero pathway for rail, which includes electrification, hydrogen fuel cells, and low-carbon liquid fuels, for several reasons that align with ARA's strategic objectives and broader goals as outlined in the National Action Plan:



Alignment with Renewable Energy Goals

Electrification: Electrification of rail networks aligns directly with ARA's commitment to expanding renewable energy usage across various sectors. Electrified rail systems powered by renewable energy sources significantly reduce greenhouse gas emissions and depend less on fossil fuels. This transition supports the broader goal of increasing Australia's renewable energy capacity and reducing the carbon footprint of public transportation.

Innovation and Technology Advancement

Hydrogen Fuel Cells: Incorporating hydrogen fuel cells into the rail sector aligns with ARA's focus on supporting innovative and sustainable energy solutions. Hydrogen, particularly green hydrogen produced from renewable energy sources, presents a forward-looking solution that can cater to non-electrified tracks where rail electrification is not feasible or cost-effective.

Diverse Energy Mix

Low-Carbon Liquid Fuels: Using low-carbon liquid fuels as part of the rail sector's transition strategy is consistent with ARA's support for employing diverse energy solutions to meet varying operational needs and infrastructure realities. These fuels, which can serve as transitional solutions, help decarbonise segments of rail operations that might not immediately transition to electrification or hydrogen solutions due to technical or economic constraints.

Stakeholder Collaboration and Community Engagement

Partnerships and Local Involvement: ARA strongly supports collaboration with local governments and communities to ensure that the rail's net zero transition framework is responsive to local needs and benefits from local insights. Engaging stakeholders in the rail sector's transition process helps tailor effective and publicly supported solutions, facilitating smoother implementation and greater impact.

Economic and Social Benefits:

Job Creation and Economic Growth: Transitioning to a net zero rail network will stimulate job creation in new energy sectors, aligning with ARA's workforce development and economic revitalisation objectives, particularly in regional areas. Investments in rail electrification, hydrogen fuel infrastructure, and the production of low-carbon liquid fuels will drive growth in high-skill and technology-oriented sectors.

Sustainability and Long-Term Viability

Reducing Environmental Impact: Supporting a net zero pathway for rail incorporating electrification, hydrogen, and low-carbon liquid fuels aligns with ARA's commitment to sustainable practices that minimise environmental impact. This approach addresses immediate emissions reduction goals and builds a foundation for the long-term sustainability of the transportation sector.



Rank from 1 to 3 the order in which these should be prioritised for emissions reduction for rail:

1. Electrification
 2. Hydrogen fuel cell
 3. Low-carbon liquid fuels
- Electrification is prioritised due to its proven efficiency and lower operational costs over the long term.

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

- Low-carbon liquid fuels should be used where electrification and hydrogen are not feasible, particularly in regional and remote areas.

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

Actions include:

- Investing in rail electrification projects.
- Supporting the development and deployment of hydrogen-powered trains.
- Encouraging the shift of freight from road to rail.
- Enhancing the efficiency of existing rail infrastructure.

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

- Yes, ARA supports the proposed net zero pathway for maritime, which focuses on alternative fuels like sustainable aviation fuel (SAF) and low-carbon options for maritime.

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

Actions include:

- Promoting the use of sustainable fuels in maritime transport.
- Supporting research and development of low-emission maritime technologies.
- Implementing policies that incentivise the adoption of cleaner maritime practices.

Collaborating with international partners to develop and standardise sustainable maritime practices.

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

Yes, ARA agrees with the proposed net zero pathway for aviation, which focuses on sustainable aviation fuel and the development of low-emission technologies.



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

Actions include:

- Investing in research and development of sustainable aviation fuels.
- Providing incentives for the adoption of low-emission aviation technologies.
- Implementing policies that encourage airlines to reduce emissions.
- Collaborating with international partners to develop global standards for aviation emissions reduction.

21. Do you agree with the proposed net zero pathway for transport infrastructure?

Yes, ARA supports the proposed net zero pathway for transport infrastructure, which includes enhancing the sustainability of infrastructure and supporting low-emission transport modes.

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?

Actions include:

- Investing in sustainable infrastructure projects.
- Implementing policies that support the development of low-emission transport infrastructure.
- Encouraging the use of sustainable materials in infrastructure projects.
- Collaborating with industry to promote innovation in sustainable infrastructure.

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 the reduction of transport emissions?

Actions include:

- Expanding renewable energy generation capacity.
- Investing in energy storage solutions to support renewable energy.
- Implementing policies that encourage the use of renewable energy in transport.
- Collaborating with industry to develop integrated energy solutions for transport.

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

A strategic and phased approach is essential for prioritising using low-carbon liquid fuels (LCLFs) across different transport modes and achieving maximum abatement. The following are measures identified by ARA that could be implemented:



Identify and Prioritise High-Impact Sectors:

Immediate Focus on Hard-to-Electrify Sectors: As suggested, focus initially on sectors where electrification and hydrogen technologies are less feasible or cost-effective. Aviation and maritime transport, which face significant challenges in adopting these technologies due to range and energy density requirements, are ideal candidates for the early adoption of LCLFs.

Assessment of Readiness and Impact: Conduct comprehensive assessments to identify which transport modes can benefit most from LCLFs regarding emission reductions and technical feasibility.

Gradual Implementation Based on Technological Advancements:

Phase-Based Integration: Develop a phased plan for integrating LCLFs into different transport modes. Initially, target those sectors most reliant on liquid fuels and gradually expand to others as suitability and infrastructure develop.

Monitoring Technological Developments: Keep abreast of advances in battery technology, hydrogen fuel cells, and other renewable energy technologies that might later displace the need for LCLFs in certain sectors.

Develop Supportive Infrastructure and Policies:

Investment in Fuel Production and Distribution Infrastructure: Build or retrofit infrastructure to efficiently produce and distribute LCLFs, ensuring supply meets targeted transport sectors' demands.

Regulatory Frameworks and Incentives: Implement policies that encourage the use of LCLFs, such as subsidies for LCLF production, mandates for blending conventional fuels with LCLFs, or tax incentives for users of LCLFs.

Stakeholder Engagement and Collaboration:

Industry Partnerships: Collaborate with fuel producers, transport companies, and technology developers to align strategies for LCLF adoption and to ensure that the fuels produced meet the specific needs of different transport modes.

International Cooperation: Engage in international efforts to standardise and promote LCLFs, sharing best practices and technology transfer to accelerate global adoption.

Transition Strategy as Technology Evolves:

Flexible Policy Design: Ensure policies are adaptable to technological advancements and market dynamics shifts. For example, if battery technology significantly advances, policies might shift to support more rapid electrification.



Scheduled Reviews and Adjustments: Regularly review the impact of LCLFs on emissions reductions, economic implications, and technological developments to adjust the prioritisation and application across sectors.

Education and Public Awareness:

Promote Awareness and Benefits: Run educational campaigns to inform stakeholders and the public about the benefits of LCLFs and their role in achieving net-zero emissions, fostering broader acceptance and support.

By implementing these steps, the prioritisation of low-carbon liquid fuels can be dynamically managed to adapt to the evolving landscape of technology and sector-specific needs, ensuring optimal environmental benefit and strategic transition towards more sustainable energy sources across all transport modes.

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

To effectively implement the proposed pathways in the Transport and Infrastructure Net Zero Consultation Roadmap, the Australian Government can adopt several strategic approaches to enhance collaboration with industry, business, governments, and communities. Here's an expanded explanation of the strategies outlined:

Establish Public-Private Partnerships to Drive Innovation:

Joint Ventures for Research and Development: Create joint ventures between government agencies and private companies to develop new technologies in renewable energy and transportation sectors. This could mirror the success of initiatives like the Cooperative Research Centres (CRCs), which involve both public and private sector partners in research that aims to achieve industrial and public good outcomes.

Infrastructure Projects: Engage in public-private partnerships (PPPs) to build and manage sustainable transport infrastructure, such as electric vehicle charging stations and hydrogen fuel infrastructure, ensuring government oversight and private sector efficiency.

Provide Funding and Incentives for Low-Emission Projects:

Grants and Subsidies: Offer financial support for projects that reduce emissions in the transport sector, such as subsidies for adopting electric vehicles or retrofitting existing vehicles with cleaner technologies.

Tax Incentives: Implement tax breaks or enhanced capital allowances for businesses investing in low-emission technologies and infrastructure, encouraging more private sector investment in sustainable projects.



Facilitate Knowledge Sharing and Collaboration Between Stakeholders:

Industry Forums and Conferences: Organise regular forums and conferences where stakeholders from various sectors can meet, exchange ideas and collaborate on net-zero projects. In ARA's experience, including through our Empower Australia national forums, these events can be crucial for sharing best practices and innovations, particularly when they are interactive and allow attendees to collaborate in groups to share insights and information.

Digital Platforms for Collaboration: Develop online platforms that allow stakeholders to easily share data, research findings, and project updates, enhancing transparency and collaboration across different sectors.

Develop Clear and Consistent Policies That Support the Transition to Net Zero:

Regulatory Frameworks: Establish clear regulatory frameworks that define emission reduction standards and expectations across different sectors. For example, setting phased targets for emission reductions in transport, similar to the European Union's approach with its Fit for 55 programme.

Stable Long-term Policies: Provide long-term policy certainty to encourage investment in low-emission technologies. This can include defining long-term goals and the steps to achieve them, which helps businesses and local governments plan and invest confidently.

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

A detailed set of measures and metrics should be established to comprehensively evaluate the effectiveness of the final Transport and Infrastructure Net Zero Roadmap and Action Plan. These metrics should encompass not only environmental impact but also technological, economic, and social dimensions, ensuring a holistic assessment of the plan's outcomes:

Emissions Reductions Achieved in Each Transport Sector

Total Greenhouse Gas Emissions: Track and report each transport sector's total greenhouse gas emissions annually to assess progress against baseline levels and targeted reductions.

Sector-Specific Metrics: Use sector-specific emissions metrics, such as grams of CO₂ per passenger-kilometre for public transport or per tonne-kilometre for freight, to provide more granular insights into efficiency improvements.

Progress in the Adoption of Low-Emission Technologies

Adoption Rates: Measure the percentage of low-emission vehicles, such as electric hydrogen fuel cells and vehicles using low-carbon liquid fuels, within the total fleet across each sector.



Infrastructure Development: Track the development and availability of supporting infrastructure, such as charging stations and hydrogen refuelling stations, to gauge the accessibility and readiness of technology adoption.

Economic and Social Benefits Realised

Job Creation: Monitor the number of jobs created through new energy projects, infrastructure development, and technology manufacturing related to the transport sectors.

Economic Growth: Assess the transport sector's contribution to the national economy, measuring aspects like increased productivity from improved transport efficiency and the economic output of new industries.

Social Impact Metrics: Evaluate improvements in social equity and accessibility, including increased access to clean and affordable transport options in underserved or remote communities.

Stakeholder Engagement and Satisfaction

Stakeholder Surveys: Conduct regular surveys and feedback mechanisms with stakeholders, including industry partners, local governments, and community groups, to assess satisfaction with the roadmap's implementation and engagement processes.

Public Perception and Support: Measure public support and awareness of the net zero initiatives through surveys, social media analysis, and public participation in related programs.

Performance Benchmarks and International Comparisons

Benchmarking Against International Standards: Compare performance and progress against international benchmarks and targets from similar initiatives in other countries to determine competitive standing and areas for improvement.

Best Practice Adoption: Evaluate the integration of international best practices within the roadmap's strategies and actions.

Sustainability and Resilience Metrics

Resilience to Climate Impacts: Assess the resilience of new infrastructure and systems against climate impacts, such as extreme weather events, which is crucial for long-term sustainability.

Lifecycle Assessments: Include lifecycle assessments of technologies and infrastructure to ensure that the environmental impact is minimised across all stages of development and operation.

By establishing and tracking these measures and metrics, stakeholders can ensure that the Transport and Infrastructure Net Zero Roadmap and Action Plan effectively reduces



emissions and contributes positively to economic growth, social welfare, and sustainable development. This multi-dimensional evaluation framework will help identify successes, uncover improvement areas, and guide future policy adjustments.

27. Do you have any feedback on the proposed review process?

The process must be transparent, inclusive, and iterative. This approach should allow regular updates based on new data and stakeholder feedback, ensuring the roadmap remains relevant and effective. We expand on these comments as follows:

Transparency

Clarity of Methodology and Data Sources: The review process should clearly outline the methodologies and data sources. For instance, the Australian Government's approach to reviewing its carbon pricing mechanism involved publishing detailed methodologies and data sources, making it easier for stakeholders to understand the basis of policy decisions and to provide informed feedback.

Public Access to Review Findings: Ensuring that interim and final review findings are accessible to the public enhances transparency. An example is the annual transparency reports published by the Department of Climate Change, which detail Australia's emissions inventory and the effectiveness of emissions reduction strategies.

Inclusivity

Engaging a Wide Range of Stakeholders: The review process should involve various stakeholders, including industry experts, local governments, community groups, and **Indigenous communities**. The National Energy Guarantee (NEG) review process in Australia incorporated broad consultations with energy producers, consumers, and environmental groups to gather diverse perspectives on energy policy.

Feedback Mechanisms: Establishing structured feedback mechanisms such as public consultations, workshops, and online forums. The Australian Renewable Energy Agency (ARENA) often uses these tools to gather input on its projects and strategies, ensuring that they reflect the needs and opinions of a broad spectrum of the community.

Iterative Process

Regular Updates and Adjustments: The review process should not be static but adapt to new insights and changing circumstances. The ongoing management of the Murray-Darling Basin Plan is an example of how regular scientific reviews and community feedback have led to adjustments in water management policies to better meet environmental and agricultural needs.

Incorporation of Emerging Technologies and Practices: As new technologies and best practices emerge, particularly in renewable energy and transport technologies, the review process should incorporate these advancements to remain at the forefront of sustainable transport solutions.



These elements ensure that the review process is robust and forward-thinking, adaptable to new information, and inclusive of all stakeholder voices, thereby enhancing the legitimacy and efficacy of the Transport and Infrastructure Net Zero Roadmap.

Do you have any further feedback on the Consultation Roadmap and proposed pathways?

The roadmap should be balanced, considering regional and remote areas' unique needs. It should also emphasise the importance of workforce development and training to support the transition and make provision for ensuring that this training and support can be provided 'in place' so that regional workforce participants are not required to travel and access often expensive and unfamiliar accommodation options in capital cities to get the training and support they need.

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

Refer to ARA's *New Energy Workforce National Action Plan 2024-2028* ([attached](#)) for detailed insights into workforce development and training strategies that can support Australia's transition to a net zero transport sector.

ARA is committed to collaboration that leverages regional and national efforts

The Australian Renewables Academy (ARA) is committed to a collaborative approach that leverages regional and national efforts to meet Australia's renewable energy targets and support strong, sustainable communities.

ARA values the opportunity to engage further in the policy development process and is committed to working with all levels of government and key regional stakeholders to ensure the successful implementation of the Transport and Infrastructure Net Zero Roadmap.

Attachment:

- ARA's *New Energy Workforce National Action Plan 2024-2028*