Transport and Infrastructure Net Zero Consultation Roadmap

Take the survey

Department of Climate Change, Energy, Environment and Water

Response received at:
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Yes

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

3 Published name
Arup

4 Confirm that you have read and understand this declaration.
Yes

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9 Who are you answering on behalf of?

Organisation

10 Organisation name

Arup

11 What best describes you or your organisation?

Industry

12 What sector do you represent?

Infrastructure
Climate change/net zero
Energy
All transport

13 What state or territory do you live in?

New South Wales

14 Postcode

2016

15 What area best describes where you live?

City

16 1. Do you support the proposed guiding principles?

Not answered

17 1.1 Please add details to your response.

Not answered

18

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

Not answered

19 2.1 Please add details to your response.

Not answered

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

Not answered

21 3.1 Please add details to your response.

Not answered

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

Not answered

23 5. What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to ensure the movement of people contributes to transport emissions reduction?

Not answered

24 6.1 What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to ensure that the movement of goods contributes to transport emissions reduction?

Not answered

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

Not answered

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

Not answered

27 7.1 Please add details to your response.

Not answered

28 8. The Australian Government is currently developing an Australian New Vehicle Efficiency Standard and has already begun to implement actions in the National Electric Vehicle Strategy.8.1 What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to reduce light vehicle emissions?

Not answered

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

Not answered

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

Not answered

31 9.1 Please add details to your response

Not answered

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

Not answered

33 10.1 Please add details to your response. Why did you rank them in that

order?

Not answered

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

Not answered

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

Not answered

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

Not answered

37 13.1 Please add details to your response.

Not answered

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

Not answered

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

Not answered

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

Not answered

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

reduce rail emissions?

Not answered

42 16.1 How would these actions address the identified challenges and opportunities to reduce rail emissions?

Not answered

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

Not answered

44 17.1 Please add details to your response.

Not answered

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

Not answered

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

Not answered

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

Not answered

48 19.1 Please add details to your response.

Not answered

49 20. The Australian Government has already engaged in consultation on aviation decarbonisation through the development of the Aviation

White Paper and those consultations will also inform final Roadmap and Action Plan.

Not answered

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

Not answered

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

Not answered

52 21.1 Please add details to your response.

Not answered

53 22. What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to reduce transport infrastructure emissions and ensure that transport infrastructure is ready for and enables low-emission transport modes?

Not answered

54 22.1 How would these actions address the identified challenges and opportunities to reduce transport infrastructure emissions?

Not answered

55 23. What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to ensure the energy mix is ready to support transport emissions reduction?

Not answered

56 24. How should the use of low carbon liquid fuels (LCLFs) be prioritised

across different transport modes over time to achieve maximum abatement?

Not answered

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

Not answered

58 25.1 What are good domestic or international examples of partnership and collaboration on transport and transport infrastructure emissions reduction that could inform the final Roadmap and Action Plan?

Not answered

59 25.2 What opportunities can Government leverage to show leadership in Australia and internationally?

Not answered

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

Not answered

61 26.1 What other data and evidence could governments use and how could this offer further insights on the pace, scale and location of transport emissions reduction pathways?

Not answered

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

Not answered

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

Not answered

64 28.1 Is there anything missing? Are the sections appropriately integrated? Is the Roadmap appropriately ambitious?

Not answered

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

Not answered

66 Would you like to upload a document?

Yes

67 Have you removed any identifying information from your submission?

Yes

68 Upload a submission

Arup_roadmap_submission_final.d0fa8ff8_Redacted.pdf

69 Upload a submission

Not answered

70 Upload supporting file

Not answered

71 Upload supporting file

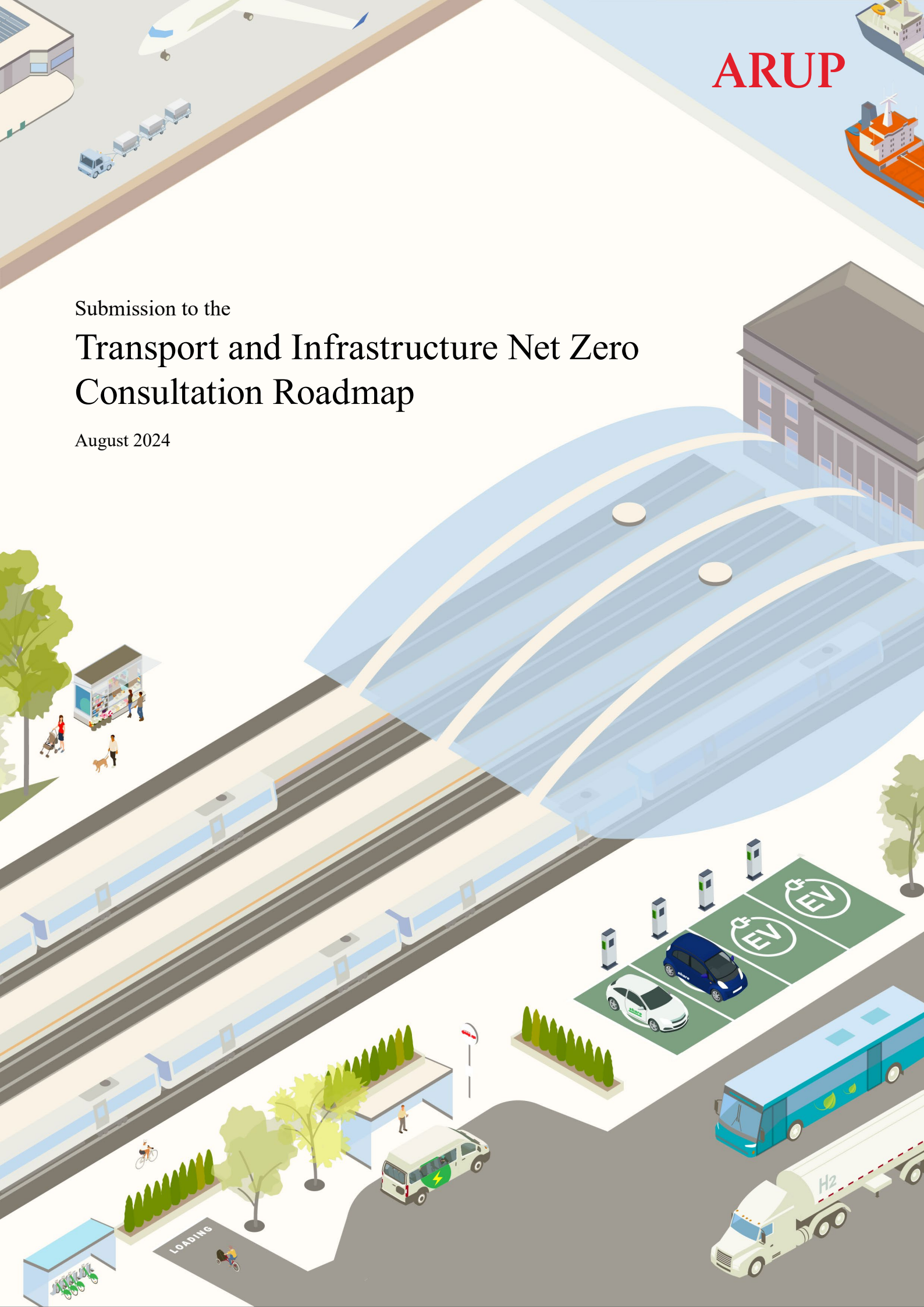
Not answered

ARUP

Submission to the

Transport and Infrastructure Net Zero Consultation Roadmap

August 2024



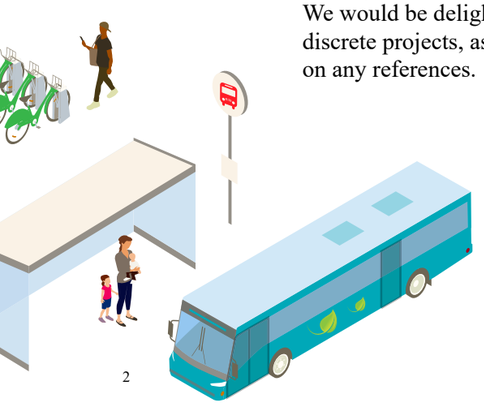
Arup has committed to net-zero carbon emissions across its entire worldwide operations and value chain by 2030. Our work with all clients entails decarbonisation and climate resilience objectives.

Dedicated to sustainable development, Arup is a collective of designers, consultants and experts working globally. Founded to be humane and excellent, we collaborate with our clients and partners using imagination, technology, and rigour to shape a better world.

Arup Australasia's 3,000 strong workforce works with clients and collaborators across Australia, New Zealand, Singapore, Indonesia, and Malaysia, using technical expertise to unlock solutions to some of society's most complex challenges, including facilitating the renewable energy transition, responding to the climate change emergency, decarbonisation of transport systems, planning resilient and inclusive future cities, and protection and restoration of the natural environment.

As an independent firm owned in trust by our members, we invest a percentage of profit into our research and innovation program each year to support our commitment to making a meaningful contribution to the UN's Sustainable Development Goals.

Throughout this submission, we provide references to our work. We would be delighted to provide further information on more discrete projects, associated research or any additional details on any references.



Oxenham Level Crossing Grade Separation Bridges
Adelaide, South Australia © Public Transport Projects Alliance

Arup welcomes the Government's commitment to a Transport and Infrastructure Net Zero Roadmap and Action Plan and its objectives of reducing greenhouse gas emissions to 43% below 2005 levels by 2030 and achieving net zero emissions by 2050.

With climate adaptation already at the core of our businesses' focus on infrastructure and built environments, decarbonising transport and energy systems, and planning resilient cities, **Arup supports the Government's intention to provide a clear strategy to reduce transport emissions.**

While the Roadmap and Action Plan examines potential pathways to reduce greenhouse gas emissions to net zero by 2050 across all transport modes (road, aviation, maritime and rail), freight and supply chains, active and public transport planning, and supporting infrastructure, this submission concentrates on the application of hydrogen fuel cells (HFC) and low carbon liquid fuels (LCLF) to support decarbonisation, specifically during the period of 2030-2040.

Our submission seeks to engage with the Government's policy framework and contribute constructively to its objectives.

We support government incentives to increase the domestic production of hydrogen and LCLFs to help mitigate the risks of supply interruptions and to diversify Australia's liquid fuel security.

Australia has an electric vehicle strategy and hydrogen strategy. The Australian Government is currently preparing the foundation for a LCLF strategy. The LCLF strategy should identify the role of LCLF for each transport activity. Consistent with Arup's recommendations in the National Hydrogen Strategy Refresh, these individual strategies/ plans should inform an integrated energy system plan, which accounts for the competing energy demands. In particular, the pathway for transport decarbonisation will adjust for the highest and best use of constrained electricity and hydrogen sources within transport and from other sectors.

Transport decarbonisation technology

We discuss achievability and desirability of the transport decarbonisation technology pathways for the 2030-2040 period below, and include some issues for consideration:

	2030 - 2040	Targets	Achievable	Issues
Heavy vehicles	Battery electric and hydrogen fuel cell adoption accelerates	Hydrogen fuel cell adoption	Yes	Cost of hydrogen; coordination; funding
	LCLFs support long distance, hard to electrify cases to transition	Deploy LCLFs	Challenging, continue to develop as a fallback measure	Integrating different types of fuel; infrastructure needs commercial support
	Synthetic LCLF R&D	Joint private-public funding partnerships	Yes	Cross-sector collaboration for pathways and supply chains
Light vehicles	Hydrogen fuel cell adoption	Not desirable	N/A	Sufficient hydrogen refueling stations; 100% battery electric should be target
Rail	Hybrid, battery electric and hydrogen fuel cell mass market adoption and efficiency improvements	Hybrid and battery electric adoption	Yes	Hydrogen fuel cell adoption
	LCLFs support long distance, hard to electrify cases to transition	Deploy LCLFs	Yes	Investment in infrastructure; government support for new local renewable diesel industry
Maritime	LCLFs deployed for long range vessels	Adopted by significant % of fleet	Yes	Ships that can take the fuel; ports that can supply the fuel
	Continued synthetic LCLF investment	Commercial viability	Yes	Incentives for privately owned ports to invest in new facilities
	Uptake of Onshore Power Supply at ports	Accelerate adoption	Yes	Government support & direction for upfront investment
Aviation	Battery and hydrogen fuel cell electric for short range flights demonstration	20% of state regional flights fully electric	Yes	Infrastructure needed for charging or fuel cell refuelling at airport
	LCLFs for short, medium and long haul flights deployed in the market	50% of all fuels burnt in an aircraft are LCLFs	Yes, with industry and government collaboration	Many other demands for LCLFs, ie. land transport
	Continued synthetic LCLF investment	10% of all fuels burnt in an aircraft are synthetic LCLFs	Need to prove the technology for production	Not yet energy efficient

Legend

Requires development to be feasible | Demonstrate scale and commercial viability | Deploy commercially ready technology | Used in limited tailored applications

Heavy vehicles

Deploy commercially ready technology for battery electric and hydrogen fuel cell adoption accelerates

Hydrogen fuel cell adoption achievable/desirable

- Charging network to support electric vehicle adoption is well formulated. Requires accelerated financing to install.
- Coordinate network rollout, either centrally or through market framework.
- New Vehicle Efficiency Standard Bill 2024 should keep penalties for higher polluting light and heavy vehicles. Prioritise Federal and state government funding for hydrogen fuel cell adoption by heavy vehicles. This includes retrofit and enhanced vehicle turnover. Hydrogen demand and economies of scale is held back by locked in vehicle fuel technologies of existing assets.

Deploy commercially ready technology for LCLFs to support long distance, hard to electrify cases to transition

Challenging to achieve, continue to develop as a fallback.

- Series of risks for some engine manufacturers and original equipment manufacturers OEMs in dealing with different types of fuel.
- Need to work with insurances, warranties to find solutions for integration of LCLFs.
- Infrastructure to develop LCLF needs commercial support as far behind other markets (such as aviation).

Synthetic LCLF R&D continues to require development to be feasible

Agree

- Joint private and public sector funding will be required and not just funding partnerships.
- Cross-sector collaboration to develop feasible pathways and supply chains for LCLFs.

Reference links

The Future of Energy: green hydrogen transport

Light vehicles

Hydrogen fuel cell adoption used in limited, tailored applications

Not achievable/not desirable

- Hydrogen fuel cells for light vehicles has larger infrastructure requirements due to the distribution of light vehicles. It may not be feasible to have sufficient hydrogen refuelling stations in assets and places light vehicles go.
- No need for hydrogen fuel cells for light vehicles where batteries are appropriate.

Reference links

Enabling the roll out of rapid electric vehicle charging stations at UK Motorway Services

The future of petrol stations in an EV world (Singapore)

Rail

Deploy commercially ready technology for hybrid, battery electric and hydrogen fuel cell mass market adoption and efficiency improvements

Hydrogen fuel cell mass market adoption has constraints

- Hybrid (diesel/electric) and battery electric technology is already being used for freight, while battery electric technology has been implemented elsewhere eg Ireland with Arup involvement.
- To transform towards hydrogen requires consideration of the rolling stock and the distribution of a hydrogen fuel network.

Deploy commercially ready technology for LCLFs support long distance, hard to electrify cases to transition

Desirable and achievable with Commonwealth support of new local renewable diesel industry

- Need investment in infrastructure.
- Support the development of a local renewable diesel industry.

Reference link

Exploring the viability of hydrogen in aiding rail decarbonisation (Scotland)

Towards net zero land transport

Maritime

Deploy commercially ready LCLF technology for long range vessels

Viable

- For green shipping corridors to be viable we need to have the ships that can take the fuel and the ports to supply the fuel. $2 trillion of global investment is required to decarbonise shipping, and around 85% of this cost is related to landside infrastructure and production facilities for future fuels.
- Australia needs to develop the framework and signals for ports to install port infrastructure for future fuels to maintain port competitiveness.

Demonstrate scale and commercial viability for continued synthetic LCLF R&D investment

Agree

- Pilot trials for ship owners to trial ammonia fuels for targeted ships to switch has already started in Singapore.
- There is limited incentive for privately owned ports to invest in new facilities.
- Private sector is expecting direction and coordination from government before off-take commercial agreements are locked in place. However these risks cause delays in port-side infrastructure supply chain readiness.

Encourage uptake of Onshore Power Supply (OPS) at ports

Viable

- OPS with clean electricity is a well-established technology that reduces the generation of carbon emissions when ships are at berth.
- Studies suggest OPS will still be viable in the maritime industry once shipping LCLFs are readily available because of fluctuating fuel costs and legislation.
- Government support and direction for upfront investment of OPS at ports needed to accelerate its adoption and decarbonisation impact.

Reference links

Navigating collaboration: Good governance for green shipping corridors

Port energy supply for green shipping corridors

Aviation

Demonstrate scale and commercial viability for battery electric and hydrogen fuel cell for short range flights

True opportunity for zero emission travel

- Electric propulsion aircraft including both hydrogen fuel and battery electric are medium to long term opportunities for Australian domestic air travel.
- Electric propulsion aircraft need further technology development and policy support.
- Electric propulsion aircraft offer a significant opportunity to decarbonise the regional airline sector in Australia.
- Electric propulsion air travel offers a material secondary benefit by being zero emission.

Deploy commercially ready technology in the market for LCLFs for short, medium and long haul flights

Big desirable and achievable opportunity

- There is a big opportunity for the local production of SAFs.
- Support Commonwealth investment in SAFs to improve Australia's fuel security.

Demonstrate scale and commercial viability for continued synthetic LCLF R&D investment

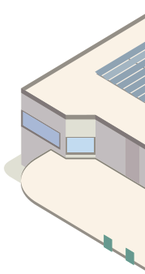
Agree

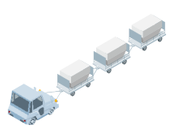
- Commercial incentives are driving private sector R&D.
- Recommend a specific strategy to achieve net zero in the aviation space.

Reference link

How can countries scale hydrogen and make aviation sustainable?

Importance of green hydrogen for pathway to sustainable aviation and shipping





ARUP

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arup.com