Transport and Infrastructure Net Zero Consultation Roadmap

Take the survey

Department of Climate Change, Energy, Environment and Water

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Yes

5 First name
Brook

6 Last name
Hall

7 Email
[redacted]

8 Phone

[redacted]

9 Who are you answering on behalf of?

Organisation

10 Organisation name

National Transport Research Organisation

11 What best describes you or your organisation?

Not for profit

12 What sector do you represent?

Rail
Heavy road vehicles (trucks, buses etc.)
Light road vehicles (cars, utes etc.)
Active transport
Public transport
All transport
Infrastructure
Climate change/net zero

13 What state or territory do you live in?

Victoria

14 Postcode

[redacted]

15 What area best describes where you live?

City

16 1. Do you support the proposed guiding principles?

Yes

17 1.1 Please add details to your response.

The NTRO broadly agrees with the five key principles presented in the Net Zero Consultation Roadmap
We suggest including a further principle that supports working together, collaborations and national coordination. That is, a principal that supports certainty for industry investments and avoiding duplicating efforts and costs unnecessarily.
The National Sustainable Freight Centre is an important example of nationally coordinated collaboration mechanism.

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.

The ASI framework is wholistic and appropriate for identifying emissions abatement opportunities. Presently, the 'avoid' and 'shift' aspects have been under-appreciated and/or ineffectively applied. The ASI framework correctly lifts the importance of these pillars of abatement. The recent ClimateWorks paper applies the ASI framework to demonstrate how diverse approaches to emission reduction are more effective than reliance on 'big-ticket' technology solutions.

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.

A coordinated national policy framework for active and public transport is a useful step to avoid the duplication of efforts, sharing learnings and experience between jurisdictions and provide clear and consistent directions for industry engagement and investments.
A national policy framework for active and public transport must, however, be driven by the relevant responsible authorities (i.e. state and local governments and public transport operators and users) to ensure it addresses real operations and user-focussed issues. A national policy driven by the Commonwealth Government risks being overly broad, duplicating state activities, and lacking a clear direction to take real-world issues.

22 4. What should be included in a national policy framework for active

and public transport and how should it be developed?

A national policy framework should facilitate technological catch-up to advances occurring around the world. For example, Australia's public transport planners and operators would benefit from advanced movement data and analytics collected via a network of interconnected instrumented test-beds. Small, isolated examples currently exist with the Australian Integrated Multimodal EcoSystem (AIMES) in Melbourne and TMR's Ipswich Connected Vehicle Pilot.

The NTRO is facilitating a Smart Mobility Living Lab in Joondalup, WA. This will be a real-world test bed to trial next generation solutions to improve the urban mobility of citizens of the area. This will cover an entire suburb and be an exemplar demonstrator of urban mobility solutions that could be applied to the rest of Australia.

The national policy frameworks should support national integration of these critical test-bed demonstrators and the coordination of research and evaluation priorities.

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?

Government support for the National Sustainable Freight Sector will have direct and indirect benefits for the future movement of people and the reduction of people-movement emissions. Public transport services have many similarities to freight services and operations and will similarly benefit from the transference of international best knowledge and experiences in freight. In some cases, bus and light rail operations can be used as early deployment cases to demonstrate sustainable freight opportunities. Additionally, freight productivity, safety and emissions advancements support the optimal infrastructure utilisation, including greater access and safety movement opportunities for public transport and active travel.

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?

As a nation, we are severely lagging behind other developed countries in their push to net zero transport. One large reason for this is that we are not engaging in public trials that coordinate government, industry, and other stakeholders.

These trials will help bring all on the journey to net zero and bring the latest generation technologies and solutions to Australia. Without this, we risk falling even further behind. This is one of leading tasks for the NTRO's National Sustainable Freight Centre.

Governments, communities, industry and other stakeholders are encouraged to join to share and learn to ensure that the movement of goods contributes to transport emissions reduction.

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

See 6.1

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.

No response

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?

Governments, communities, industry and other stakeholders need to make use of all available levers to influence change. Road managers can, for example, specify smoother and longer-lasting roads to reduce vehicle emissions and on-going maintenance costs in new construction and maintenance contracts.

NTRO's Infrastructure Measurement service assesses the current condition of Australia's road network and our Asset Performance team advise on cost-effective, optimised asset management strategies.

Further vehicle movement data captures technologies and advanced analytics can be used to optimise network operations, reducing the impacts of congestion and facilitating smoother, safer and more efficient driving. Optimised infrastructure and network operations are underappreciated opportunities for light vehicle emission reductions. They are cost-effective fleet-wide solutions that can be adopted rapidly now and do not rely on technological development and/or market adoption.

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

See 8.1

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

The NTRO recognises the complexity of the challenges in decarbonising heavy road vehicles.

We note that treating heavy road vehicles as a single category is not the correct approach. Heavy vehicles come in a wide range of types and have different operations (line-haul vs back to-base-route-based tasks, urban vs rural, high quality vs degraded network operations, freight types, from livestock to parcels) and ownership models with vastly different challenges, opportunities and solutions. Additionally, the industry is diverse and fragmented, further demonstrating that a one-size-fits-all approach is not appropriate. Emerging technologies and industry trends also suggest greater fragmentation and specialisation in the coming years, which will require new and further specialised solutions.

To address this, the Roadmap should identify and target particular markets/segments and tailor approaches to suit each.

- The pathway should consider a greater emphasis on 'Avoid' and 'Shift' opportunities under the ASI framework
- Greater consideration of simple solutions that are available now, such as eco-driving, low rolling resistance tyres, aerodynamics, increasing vehicle loads, especially by volume.
- Government coordination and industry support, including with energy market operators and regulators, to address infrastructure challenge (e.g. public and private charging) through collaborative planning and investment.
- Focus short-term efforts on urban freight and deliveries, bus services and other routed heavy vehicle operations (e.g. waste collection) to begin the electrification transition and mitigate chicken/egg standoffs.
- Accelerate automation for hard to decarbonise freight tasks (e.g. interstate line-haul) and realise the productivity and safety benefits, and de-risk automated driving tasks in urban and congested areas.

32 ## 10. The proposed pathway for heavy road vehicles relies on a mix of

battery electric, hydrogen fuel-cell and low carbon liquid fuels.Rank from 1 to 3, the order in which these should be prioritised for emissions reduction.

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

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

Globally, the economic and environmental cases for hydrogen fuel cell electric vehicles are increasingly being viewed as unviable – even in the medium to longer term. Battery electric heavy vehicles provide a far stronger business case and a realistic pathway for adoption, starting with smaller heavy vehicles and loads and shorter route-based tasks and progressing towards larger loads distances and more flexible tasks as battery technologies improve.

Low carbon liquid fuels will have a role, particularly for aviation, maritime and remote road and rail freight, operations that travel significantly long distances and with very heavy loads, but supply is a major global issue. Priorities will need to be determined to efficiently allocate the scarce resources.

The pathway also needs to be open to a wider set of technologies, including various hybrid power-trains and dynamic vehicle charging, such as electric road systems. These solutions are complementary to the vehicle fuel/powertrain and should be considered.

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

Internationally, low carbon liquid fuels are playing a role now as a transitional fuel before the widespread introduction of zero tailpipe emission vehicles.

The use case for low carbon liquid fuels may be different in Australia and could provide an alternative solution in some of the more challenging use cases that are difficult to electrify.

The supply of low carbon liquid fuels, and competition for its use in other sectors (namely, aviation and maritime) may limit the amount available for heavy vehicles.

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?

Governments, communities, industry and other stakeholders are encouraged to support collaborative learning, demonstration and deployment. This includes adopting international experiences such as what is happening in the US, Europe, China, etc. and applying to the Australian context. The National Sustainable Freight Centre is firmly focussed on delivering this service towards meeting Australia's emissions reduction goals, in a cost-effective manner, at national scale.

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

Not answered

37 13.1 Please add details to your response.

No response.

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.

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

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

Refer to Q 10 response

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

Refer to Q 11 response

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?

The NTRO is firmly focussed on delivering practical research and solutions to all transport modes, including rail. It welcomes the rail sector to the National Sustainable Freight Centre.

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

Rail is an integral part of the sustainable freight solution and must be part of the collaborative action to decarbonise transport.

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

Not answered

44 17.1 Please add details to your response.

No response.

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?

No response.

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

No response.

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

No response.

48 19.1 Please add details to your response.

No response.

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.

No response.

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?

No response.

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.

The NTRO supports the acknowledgement of infrastructure as an enabler of transport emissions and emission reductions and the broad directions of the proposed net zero pathway for transport infrastructure.

NTRO a long and strong history of advising government and industry on innovative, recycled transport infrastructure materials and their best-value applications, new construction processes and maintenance treatment and strategies to achieve lower carbon outcomes. We also provide advice and tools on measuring to manage emissions through life cycle assessment and the Sustainability Assessment Tool for Pavement (SAT4P).

The NTRO has previously advised the Commonwealth Government, through ITMM, on the critical need to advance embodied carbon estimation and management data and approaches to ensure accuracy, relevance and rigour. In the coming months, the NTRO will provide further advice on the necessary steps.

Whilst understanding of embodied carbon management is improving, Australia must not lose sight of enabled carbon management and the role infrastructure plays. Infrastructure planners, designers and procurers make choices that have longstanding and major impacts on transport emissions. For example, road surface condition (i.e. smoothness) can influence vehicle emissions by around 2-3%. This aspect alone can outweigh the entire embodied carbon savings of using best in class infrastructure materials. Other important infrastructure design factors include: alignment, gradient and asset performance/ longevity.

Perhaps even more critically, infrastructure that supports efficient traffic flows and network operations must be within the solutions mix. ITS and connected infrastructure can effectively assist traffic flow, which reduce stop-start vehicle operations draw on vehicle-energy demand, increasing fuel consumption and emissions. Regardless of the

transition to electric vehicles, optimally managed networks and traffic also reduces battery drain, increasing vehicle coverage per charge, so it's a no regrets, future proofed strategy.
On NTRO's 2024 study tour in China, participants were blown away by the technological advancements in network operations and connected infrastructure already in use. The National Sustainable Freight Centre will bring these technologies and experiences to Australia.

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?

The NTRO is currently working with Austroads, and various state road network managers to quantify the cost impact of heavier steer-axle loads associated with battery electric heavy vehicles on the road network. This assessment is critical to help network managers understand risks and impacts in order to adequately plan for battery electric vehicles operations. This analysis will allow informed, evidence-based decision making on access, network investment and policy pathways to decarbonise transport.

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

See 22.

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?

The future of transport is the confluence of transport, energy and technology. Transport planners need to engage with energy suppliers and distributors to optimise connections, transport and logistics operators, warehousing etc. need to collaborate with energy infrastructure providers and suppliers to ensure energy is available when and where it is needed to drive the freight task.
Similarly private (light) vehicle owners need to better understand the transformational needs and opportunities to ease the switch to electric vehicles.

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

across different transport modes over time to achieve maximum abatement?

national LCLF strategy needs to consider the available supply (likely to be limited) of different fuels and appropriately prioritise their use where alternatives (such as electrification or mode shift) are unfeasible. Aviation and maritime will likely require large quantities of LCLF, and there may be some heavy vehicles and rail requiring LCLF where electrification is not possible through infrastructure or on-board energy storage.
The fleet life of vehicles will also indicate the demand for LCLFs – vehicles that have a long service life and aren't/ can't be replaced in time will have to utilise LCLFs.
Next generation hybrid-electric vehicles may be part of the solution to help get more out of limited LCLF supplies.

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?

The NTRO will establish and operate the National Sustainable Freight Centre to foster collaboration between industry, governments and researchers in the advancement of deploying world-leading knowledge, technologies and practices in the sustainable freight task for Australian conditions and operations.
The Centre will be directly linked to leading global international efforts such as the UK Centre for Sustainable Road Freight and the Smart Freight Centre based in the Netherlands. Through these relationships, we will have access to the best minds and partnership networks across Europe, Asia, and the Americas.
The National Sustainable Freight Centre will bring world leading knowledge, technologies and practices to meet our nation's challenges and connect with Australian leaders in public offices, industry and research institutions.
The Centre will provide coordination across the country on the freight challenge, delivering impact in themes including:
• Decarbonisation solutions – developing adoption pathways for future vehicles, fuels and infrastructure based on the different use cases
• Advanced data analytics and modelling to improve productivity and resource efficiency
• Trials and deployment, including independent evaluation and shared experiential learning
• Audit and measurement of freight performance and emissions
• Workforce skills to ensure a secure, sustainable, and skilled workforce, with commensurate rewards
• Bringing international best practice to Australia and deploying it.
The NTRO is driven to make this work. We are emboldened in our ambition through the

success of the Centre for Connected and Automated Transport (CCAT) which was set up by the NTRO in 2022. CCAT is the public champion for the transition to connected and automated transport in Australia and New Zealand and has established the strategic vision for the required supporting physical and digital infrastructure.
The Centre will only be successful with the collective support of the Australian Government, state and territory governments, transport and energy sectors and industry leaders, and a network of connected national and international researchers. The NTRO will engage the Australian Government on how it can best support the Centre.

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?

See response to Q 25

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

The NTRO welcomes the Commonwealth Government and its stakeholders to join the journey towards a sustainable freight future.

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

The National Sustainable Freight Centre will specifically explore measures and metrics of freight performance and emissions to ensure progress and allow for dynamic solutions for challenging problems.

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?

A range of data is needed for freight including vehicle level, operational, and strategic data – to monitor and baseline performance, and plan for the future.
Freight data is of national importance for productivity and sustainability reporting. It is vital to measure and monitor the freight sector's emissions in a coordinated and transparent approach. The Smart Freight Centre in the Netherlands has developed the GLEC framework for logistics GHG emissions and is now an ISO standard (ISO14083). Understanding and supporting a standardised framework and reporting is needed for independent auditing/measurement to ensure robustness and accuracy.

Larger scale operations data (e.g. fleet movements and freight flows) is also necessary to understand the current performance of freight movements and is vital to support the transition and resiliency of the future freight network.

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

No response.

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

Decarbonising transport is multifaceted and cannot be addressed with a single action or in one go. Success is dependent on on-going and sustained, committed efforts to apply world-leading technology, knowledge and experiences and learning from our own experiences. Australia must collaborate deeply to accelerate actions and deploy diverse solutions. Governments need to support bold ambition and initiatives and provide a safety-net for innovation and experimental, where failures are learnings, not obstacles for continued effort.

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?

Yes. Refer to the main submission letter.

66 Would you like to upload a document?

Yes

67 Have you removed any identifying information from your submission?

Yes

68 Upload a submission

NTRO Net Zero Consultation Roadmap Submission_Final_30072024.pdf

69 Upload a submission

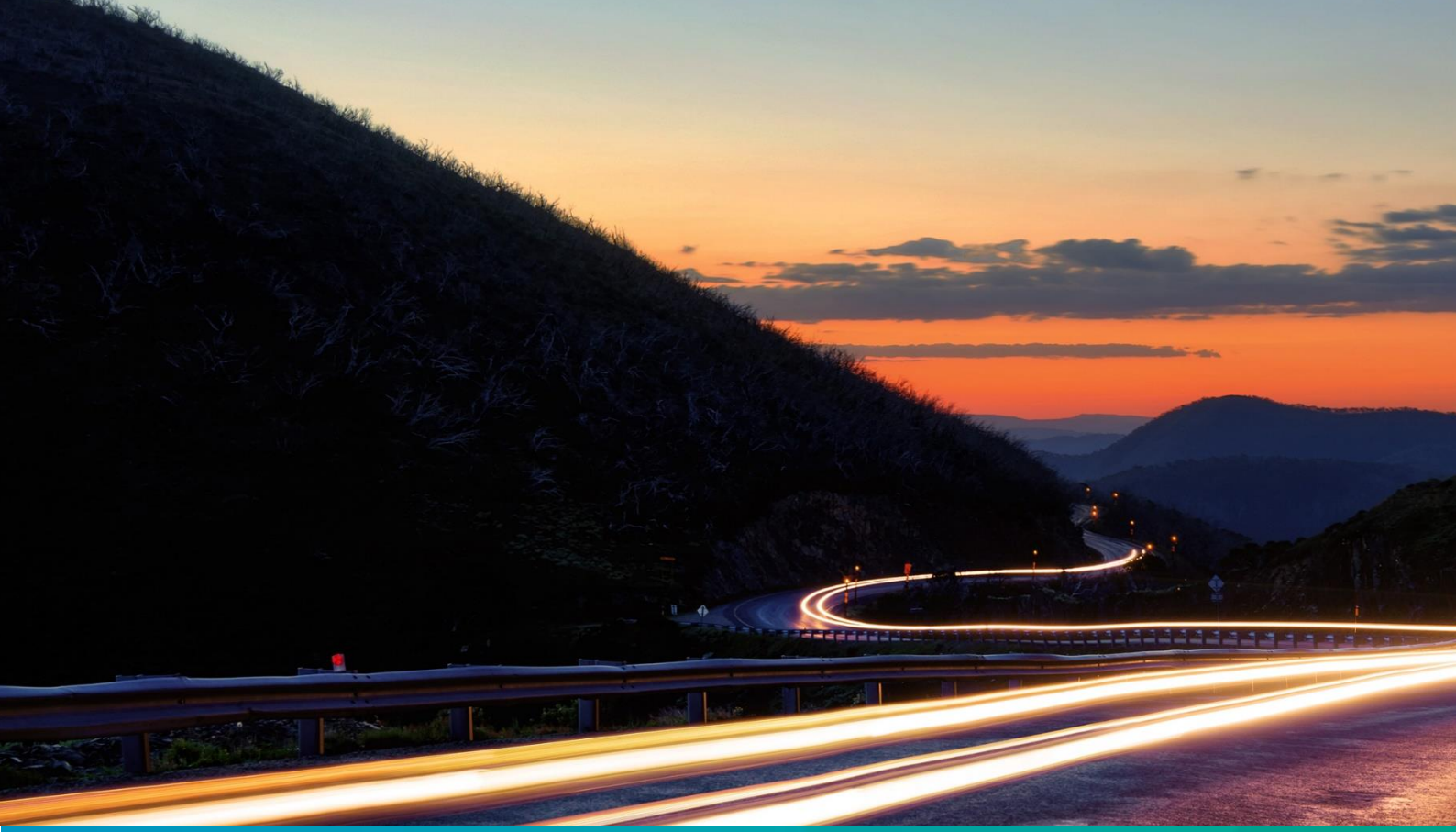
Not answered

70 Upload supporting file

Not answered

71 Upload supporting file

Not answered



Submission: Transport and Infrastructure Net Zero Consultation Roadmap

Prepared for:
Department of Climate Change, Energy, the Environment and Water (DCCEEW)

30 July 2024

Offices Located:
ADELAIDE, BRISBANE, CANBERRA, LAUNCESTON, MELBOURNE, PERTH, SYDNEY, WELLINGTON

National Transport Research Centre – Head Office:
80A TURNER STREET, PORT MELBOURNE, VIC 3207

NTRO.ORG.AU

NTRO
NATIONAL TRANSPORT RESEARCH ORGANISATION

We are driving towards a better world, a more connected world

The National Transport Research Organisation's purpose is to be the enabler of safer, more resilient and prosperous communities and our vision is "to lead the world in innovative transport solutions". We are owned by the State, Territory and Commonwealth Governments.

At NTRO, we're driven by passion

WE ARE DRIVEN BY OUR EXPERIENCE – For over 60 years, we have developed innovative transport solutions that combine ground-breaking research and practical approaches to integrate planning, operations, and infrastructure solutions across roads, rail, ports and airports. This extensive knowledge base provides a powerful, trusted platform from which to approach the challenges and opportunities that will present themselves in the coming years.

WE ARE DRIVEN BY RELATIONSHIPS – We continue to collaborate with the world's smartest companies and leading-edge thinkers to provide the best solutions possible. In this way we can pre-empt or address complex challenges, and craft practical, sustainable, and actionable evidence-based solutions.

WE ARE DRIVEN BY OUR PEOPLE – We engage the sharpest minds and most creative solution providers globally. Individuals who provide diverse thought, varied points of view and challenging ideas collectively have a rich combination of skillsets to be perfectly placed to foresee the future of transport.

WE ARE DRIVEN BY PRACTICAL SOLUTIONS – We have been deliberately designed to incorporate the world's best research brains with the world's best solutions designers, ensuring academic capability, technical expertise and deep thinking combine to create smart and actionable solutions. The future requirements of transport demand evidence-based thinking to create impactful, practical, viable solutions.

WE ARE DRIVEN BY VALUES – We are a values-based organisation, dedicated to creating the most connected organisation possible for Australia and New Zealand. As such, we will never cut corners or tell clients what we think they want to hear instead of what they need to hear – integrity is key to everything we do. We will always collaborate with clients by respecting their own knowledge and acting with the energy and passion that innovation and transformation require.

WE ARE DRIVEN BY HUMANITY – A better world is a more sustainable one. Not just for the planet, but importantly for people. Sustainable connections to community, sustainable businesses and government institutions, sustainable links to educational resources, recreational opportunities, health services and family and friends. The transportation solutions we create will sustain a world where all humanity can flourish.

WE ARE DRIVEN BY INNOVATION – By utilising cutting-edge approaches and creative problem-solving, NTRO has a proven track record in delivering world firsts. This future thinking mindset and skillsets continue to be essential tools in driving towards a more efficient, effective, and engaging world. As such, innovation will continue to underpin everything we do.

WE ARE DRIVEN BY PURPOSE – We are inspired to deliver a future in which all humanity thrives, and connection and sustainability is treasured above all else, so we can live, learn, work, and play in community, not isolation.

NTRO's Transport and Infrastructure Net Zero Roadmap Submission

The NTRO welcomes the consultation opportunity for Transport and Infrastructure Net Zero Roadmap and looks forward to future involvement in defining the Action Plan. We recognise the scale and complexity of challenges in front of us now and those that lie ahead. These are challenges that demand innovative solutions that cross jurisdictional borders, transport modes, technologies, and individuals and organisations. No single solution will get us to our goals. No single organisation can achieve the changes needed. No single sector will deliver the goods.

Australia has unique strengths and opportunities, and we lead the world in certain innovations, such as higher productivity vehicles (in road and rail), infrastructure condition assessment, transport safety, and accessible and affordable transportation. Our net zero aspirations are complemented by our opportunity to access vast renewable energy resources and a population that is technologically savvy, open to change and committed to a sustainable future.

In many other areas, however, Australia is a middling adopter at best and lags the world.

The National Transport Commission's research shows that Australia's new light vehicle fleet has a higher emissions intensity than almost every single country in Europe[1] and most other comparable nations around the world. A key reason is a lack of an emissions standard for vehicles, which are present in virtually every developed or developing country, except Russia. Australian policymakers started debating whether to introduce a carbon emissions standard in 2007. In 2024,17 years later, the proposed New Vehicle Efficiency Standard is a belated, yet welcome, step to help lift Australia off the bottom rung of the new vehicle market and incentivise Australian consumers to buy cleaner vehicles.

Similarly, the recent amendment to the ADR[2] increasing heavy vehicle widths to align with international standards is a step forward to enhance model availability, improve access to the latest safety and environmental technologies, and reduce unnecessary costs. A simple solution that has taken years to achieve.

We are making progress, but the speed of progress is too slow and there's too much reliance on governments to drive the solutions. A fundamental change is needed.

Beyond policy and regulatory mechanisms, there is a clear need to help industry not only meet our state and national decarbonisation targets, but also to operate more efficiently and productively, ensure financial sustainability and have a safer, engaged and skilled workforce.

We also need to address deaths and injuries that occur on our roads, once and for all. Ending the carnage on our roads is an absolute imperative for humanity. The pain and suffering of road trauma is clear. The impact of crashes on congestion, productivity and vehicle emissions, however, is underappreciated. A wholistic approach to net zero emissions planning and action, must also deliver transformative results on road safety.

[1] National Transport Commission (2023), *Carbon Dioxide Emissions Intensity for New Australian Light vehicles 2022: Information Paper,* https://www.ntc.gov.au/sites/default/files/assets/files/CO2%20Emissions%20Intensity%20for%20New%20Australian%20Light%20Vehicles%202022.pdf

[2] Australian Design Rules

Automation, electrification, digitalisation, and data analytics will drive the transformation of transport and logistics like never before. Australia must be at the forefront of the exploration and adoption of these opportunities, or we risk losing our competitiveness, worsen safety outcomes, reduces our quality of life and losing human connections.

All transport needs to fundamentally shift towards sustainable solutions, however, freight is the biggest and most pressing challenge. Decarbonising the freight system is not as simple as changing vehicle fuels/technologies – it is a wicked problem that requires a whole system approach and coordinated effort across the broad and fragmented stakeholder groups to manage the transition. The stakeholder group is also evolving due to automation and alternative fuels, making the challenge even greater. The stakeholder group that needs to be brought together includes vehicle and technology companies, operators and logistics companies, energy, electricity and infrastructure companies, researchers, digital/software companies, industry associations, and of course all levels of government.

The NTRO is owned by the State, Territory and Commonwealth Governments and is uniquely positioned as a globally-linked, nationally-focussed independent and trusted research organisation. We are a member of the international community of research organisations and progressive thinkers delivering evidence-based, applied research to solve our most challenging transport issues. The NTRO has been working for some time to link together our international colleagues to provide Australia with a best practice platform to transition our freight movements to become more sustainable and productive.

In the coming months, the team at the NTRO will be establishing and operating a National Sustainable Freight Centre hosted out of the NTRO offices in Melbourne. The Centre will be directly linked to leading global international efforts such as the UK Centre for Sustainable Road Freight[3] and the Smart Freight Centre[4] based in the Netherlands. Through these relationships, we will have access to the best minds and partnership networks across Europe, Asia, and the Americas. Further partnerships will be realised as the Centre evolves.

The Centre ensures that Australia has the intellectual grunt in the right place to move forward in a considered, deliberate and timely way that is not disconnected from the rest of the world.

The National Sustainable Freight Centre will bring world leading knowledge, technologies and practices to meet our nation's challenges and connect with Australian leaders in public offices, industry and research institutions. The Centre will be the forum to centralise knowledge sharing, engagement, and collaboration, finding and deploying practical solutions to immediate and emerging problems.

The Centre will provide coordination across the country on the freight challenge, delivering impact in themes including:

- Decarbonisation solutions – developing adoption pathways for future vehicles, fuels and infrastructure based on the different use cases
- Advanced data analytics and modelling to improve productivity and resource efficiency
- Trials and deployment, including independent evaluation and shared experiential learning
- Audit and measurement of freight performance and emissions
- Workforce skills to ensure a secure, sustainable, and skilled workforce, with commensurate rewards
- Bringing international best practice to Australia and deploying it

[3] https://www.csrf.ac.uk/

[4] https://www.smartfreightcentre.org/

The NTRO is driven to make this work. We are emboldened in our ambition through the success of the Centre for Connected and Automated Transport[5] (CCAT) which was set up by the NTRO in 2022. CCAT is the public champion for the transition to connected and automated transport in Australia and New Zealand and has established the strategic vision for the required supporting physical and digital infrastructure. CCAT has successfully brought a broad group of stakeholders together, including government transport agencies, innovative local councils, digital and physical technology/vehicle/infrastructure manufacturers and providers, industry participants, companies from the mining and agriculture sectors, and researchers.

CCAT provides national thought leadership (reports, submissions, and policy initiatives), fosters networking and collaboration (events, partnership opportunities, and informal networks), enables information sharing (sector events, study visits), and supports research (grant application partner). The CCAT model has proven to be very successful, providing a valuable role in advancing connected and automated transport in Australia and New Zealand.

The National Sustainable Freight Centre will adopt a complementary vision and an aligned operating model to CCAT. The two bodies will operate as siblings: separate and individually focused, delivering unique experiences and outcomes, but retain similarities in operations, members and partners, and engagement approaches. On touch-point challenges, the two Centres will join forces to collaborate and deliver truly enhanced automated and sustainable freight solutions, driven by innovation and passion.

There is a great transformation on the horizon – how the transformation plays out and the outcomes is in our hands.

The NTRO welcomes the Commonwealth Government and its stakeholders to join the journey towards a sustainable freight future.

Michael Caltabiano
Chief Executive Officer

[5] https://ccat.org.au/

Responses to Selected Questions

#	Consultation question	NTRO response
1	**Do you agree with the proposed guiding principles?**	The NTRO broadly agrees with the five key principles presented in the Net Zero Consultation Roadmap: • Maximise emissions reduction • Value for money • Maximise economic opportunity • Inclusive and equitable • Evidence-based We suggest including a further principle that supports working together, collaborations and national coordination. That is, a principal that supports certainty for industry investments and avoiding duplicating efforts and costs unnecessarily. The National Sustainable Freight Centre is an important example of nationally coordinated collaboration mechanism.
2	**Do you support the use of the avoid-shift-improve framework as a tool to identify opportunities for abatement?**	The ASI framework is wholistic and appropriate for identifying emissions abatement opportunities. Presently, the 'avoid' and 'shift' aspects have been under-appreciated and/or ineffectively applied. The ASI framework correctly lifts the importance of these pillars of abatement. The recent ClimateWorks paper[6] applies the ASI framework to demonstrate how diverse approaches to emission reduction are more effective than reliance on 'big-ticket' technology solutions.
3	**Do you agree the development of a national policy framework for active and public transport will support emissions reduction?**	A coordinated national policy framework for active and public transport is a useful step to avoid the duplication of efforts, sharing learnings and experience between jurisdictions and provide clear and consistent directions for industry engagement and investments. A national policy framework for active and public transport must, however, be driven by the relevant responsible authorities (i.e. state and local governments and public transport operators and users) to ensure it addresses real operations and user-focussed issues. A national policy driven by the Commonwealth Government risks being overly broad, duplicating state

[6] https://www.climateworkscentre.org/wp-content/uploads/2024/06/Decarbonising-Australias-transport-sector-Report-Climateworks-Centre-June-2024.pdf

#	Consultation question	NTRO response
		activities, and lacking a clear direction to take real-world issues.
4	**What should be included in a national policy framework for active and public transport and how should it be developed?**	A national policy framework should facilitate technological catch-up to advances occurring around the world. For example, Australia's public transport planners and operators would benefit from advanced movement data and analytics collected via a network of interconnected instrumented test-beds. Small, isolated examples currently exist with the Australian Integrated Multimodal EcoSystem (AIMES) in Melbourne and TMR's Ipswich Connected Vehicle Pilot. The NTRO is facilitating a Smart Mobility Living Lab in Joondalup, WA. This will be a real-world test bed to trial next generation solutions to improve the urban mobility of citizens of the area. This will cover an entire suburb and be an exemplar demonstrator of urban mobility solutions that could be applied to the rest of Australia. The national policy frameworks should support national integration of these critical test-bed demonstrators and the coordination of research and evaluation priorities.
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?**	Government support for the National Sustainable Freight Sector will have direct and indirect benefits for the future movement of people and the reduction of people-movement emissions. Public transport services have many similarities to freight services and operations and will similarly benefit from the transference of international best knowledge and experiences in freight. In some cases, bus and light rail operations can be used as early deployment cases to demonstrate sustainable freight opportunities. Additionally, freight productivity, safety and emissions advancements support the optimal infrastructure utilisation, including greater access and safety movement opportunities for public transport and active travel.
6	**The Australian Government has already engaged in consultation on the 2023 review of the National Freight and Supply Chain Strategy and those consultations will also inform the final Roadmap and Action Plan.** **What additional actions by governments, communities, industry and other stakeholders need to be**	As a nation, we are severely lagging behind other developed countries in their push to net zero transport. One large reason for this is that we are not engaging in public trials that coordinate government, industry, and other stakeholders. These trials will help bring all on the journey to net zero and bring the latest generation technologies and solutions to Australia. Without this, we risk falling even further behind.

#	Consultation question	NTRO response
	taken now and in the future to ensure that the movement of goods contributes to transport emissions reduction? **How would these actions address the identified challenges and opportunities for emissions reduction in the movement of goods?**	This is one of leading tasks for the NTRO's National Sustainable Freight Centre. Governments, communities, industry and other stakeholders are encouraged to join to share and learn to ensure that the movement of goods contributes to transport emissions reduction.
7	**Do you agree with the proposed net zero pathway for light road vehicles?**	No response
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.** **What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to reduce light vehicle emissions?** **How would these actions address the identified challenges and opportunities to reduce light vehicle emissions?**	Governments, communities, industry and other stakeholders need to make use of all available levers to influence change. Road managers can, for example, specify smoother and longer-lasting roads to reduce vehicle emissions and on-going maintenance costs in new construction and maintenance contracts. NTRO's Infrastructure Measurement service assesses the current condition of Australia's road network and our Asset Performance team advise on cost-effective, optimised asset management strategies. Further vehicle movement data captures technologies and advanced analytics can be used to optimise network operations, reducing the impacts of congestion and facilitating smoother, safer and more efficient driving. Optimised infrastructure and network operations are underappreciated opportunities for light vehicle emission reductions. They are cost-effective fleet-wide solutions that can be adopted rapidly now and do not rely on technological development and/or market adoption.
9	**Do you agree with the proposed net zero pathway for heavy road vehicles**	The NTRO recognises the complexity of the challenges in decarbonising heavy road vehicles. We note that treating heavy road vehicles as a single category is not the correct approach. Heavy vehicles come in a wide range of types and have different operations (line-haul vs back to-base-route-based tasks, urban vs rural, high quality vs degraded network operations, freight types, from livestock to parcels) and ownership models with vastly different challenges, opportunities and solutions. Additionally, the industry is diverse and fragmented, further demonstrating that a one-size-fits-all approach is not appropriate. Emerging technologies and industry trends also suggest greater fragmentation and specialisation in the coming years, which will require new and further specialised solutions.

#	Consultation question	NTRO response
		To address this, the Roadmap should identify and target particular markets/segments and tailor approaches to suit each. • The pathway should consider a greater emphasis on 'Avoid' and 'Shift' opportunities under the ASI framework • Greater consideration of simple solutions that are available now, such as eco-driving, low rolling resistance tyres, aerodynamics, increasing vehicle loads, especially by volume. • Government coordination and industry support, including with energy market operators and regulators, to address infrastructure challenge (e.g. public and private charging) through collaborative planning and investment. • Focus short-term efforts on urban freight and deliveries, bus services and other routed heavy vehicle operations (e.g. waste collection) to begin the electrification transition and mitigate chicken/egg standoffs. • Accelerate automation for hard to decarbonise freight tasks (e.g. interstate line-haul) and realise the productivity and safety benefits, and de-risk automated driving tasks in urban and congested areas.
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.** **10.1. Please add details to your response. Why did you rank them in that order?**	Globally, the economic and environmental cases for hydrogen fuel cell electric vehicles are increasingly being viewed as unviable – even in the medium to longer term. Battery electric heavy vehicles provide a far stronger business case and a realistic pathway for adoption, starting with smaller heavy vehicles and loads and shorter route-based tasks and progressing towards larger loads distances and more flexible tasks as battery technologies improve. Low carbon liquid fuels will have a role, particularly for aviation, maritime and remote road and rail freight, operations that travel significantly long distances and with very heavy loads, but supply is a major global issue. Priorities will need to be determined to efficiently allocate the scarce resources. The pathway also needs to be open to a wider set of technologies, including various hybrid power-trains and dynamic vehicle charging, such as electric road systems. These solutions are complementary to the vehicle fuel/powertrain and should be considered.

#	Consultation question	NTRO response
11	**What role should low carbon liquid fuels play in heavy vehicle decarbonisation?**	Internationally, low carbon liquid fuels are playing a role now as a transitional fuel before the widespread introduction of zero tailpipe emission vehicles. The use case for low carbon liquid fuels may be different in Australia and could provide an alternative solution in some of the more challenging use cases that are difficult to electrify. The supply of low carbon liquid fuels, and competition for its use in other sectors (namely, aviation and maritime) may limit the amount available for heavy vehicles.
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?** **How would these actions address the identified challenges and opportunities to reduce heavy vehicle emissions?**	Governments, communities, industry and other stakeholders are encouraged to support collaborative learning, demonstration and deployment. This includes adopting international experiences such as what is happening in the US, Europe, China, etc. and applying to the Australian context. The National Sustainable Freight Centre is firmly focussed on delivering this service towards meeting Australia's emissions reduction goals, in a cost-effective manner, at national scale.
13	**Do you agree with the proposed net zero pathway for rail?**	No response
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.**	Refer to Q 10 response
15	**What role should low carbon liquid fuels play in rail decarbonisation?**	Refer to Q 11 response
16	**What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to reduce rail emissions?** **How would these actions address the identified challenges and opportunities to reduce rail emissions?**	The NTRO is firmly focussed on delivering practical research and solutions to all transport modes, including rail. It welcomes the rail sector to the National Sustainable Freight Centre.
17	**Do you agree with the proposed net zero pathway for maritime?**	No response

#	Consultation question	NTRO response
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.** **What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to reduce maritime emissions?** **How would these actions address the identified challenges and opportunities to reduce maritime emissions?**	No response
19	**Do you agree with the proposed net zero pathway for aviation?**	No response
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.** **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?** **20.2. How would these actions address the identified challenges and opportunities to reduce aviation emissions?**	No response
21	**Do you agree with the proposed net zero pathway for transport infrastructure?**	The NTRO supports the acknowledgement of infrastructure as an enabler of transport emissions and emission reductions and the broad directions of the proposed net zero pathway for transport infrastructure. NTRO a long and strong history of advising government and industry on innovative, recycled transport infrastructure materials and their best-value applications, new construction processes and maintenance treatment and strategies to achieve lower carbon outcomes. We

#	Consultation question	NTRO response
		also provide advice and tools on measuring to manage emissions through life cycle assessment and the Sustainability Assessment Tool for Pavement (SAT4P). The NTRO has previously advised the Commonwealth Government, through ITMM, on the critical need to advance embodied carbon estimation and management data and approaches to ensure accuracy, relevance and rigour. In the coming months, the NTRO will provide further advice on the necessary steps. Whilst understanding of embodied carbon management is improving, Australia must not lose sight of enabled carbon management and the role infrastructure plays. Infrastructure planners, designers and procurers make choices that have longstanding and major impacts on transport emissions. For example, road surface condition (i.e. smoothness) can influence vehicle emissions by around 2-3%. This aspect alone can outweigh the entire embodied carbon savings of using best in class infrastructure materials. Other important infrastructure design factors include: alignment, gradient and asset performance/longevity. Perhaps even more critically, infrastructure that supports efficient traffic flows and network operations must be within the solutions mix. ITS and connected infrastructure can effectively assist traffic flow, which reduce stop-start vehicle operations draw on vehicle-energy demand, increasing fuel consumption and emissions. Regardless of the transition to electric vehicles, optimally managed networks and traffic also reduces battery drain, increasing vehicle coverage per charge, so it's a no regrets, future proofed strategy. On NTRO's 2024 study tour in China, participants were blown away by the technological advancements in network operations and connected infrastructure already in use. The National Sustainable Freight Centre will bring these technologies and experiences to Australia.
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?**	The NTRO is currently working with Austroads, and various state road network managers to quantify the cost impact of heavier steer-axle loads associated with battery electric heavy vehicles on the road network. This assessment is critical to help network managers understand risks and impacts in order to adequately plan for battery electric vehicles operations. This analysis will allow informed, evidence-based decision making on access, network investment and policy pathways to decarbonise transport.

#	Consultation question	NTRO response
	How would these actions address the identified challenges and opportunities to reduce transport infrastructure emissions?	
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?**	The future of transport is the confluence of transport, energy and technology. Transport planners need to engage with energy suppliers and distributors to optimise connections, transport and logistics operators, warehousing etc. need to collaborate with energy infrastructure providers and suppliers to ensure energy is available when and where it is needed to drive the freight task. Similarly private (light) vehicle owners need to better understand the transformational needs and opportunities to ease the switch to electric vehicles.
24	**How should the use of low carbon liquid fuels be prioritised across different transport modes over time to achieve maximum abatement?**	A national LCLF strategy needs to consider the available supply (likely to be limited) of different fuels and appropriately prioritise their use where alternatives (such as electrification or mode shift) are unfeasible. Aviation and maritime will likely require large quantities of LCLF, and there may be some heavy vehicles and rail requiring LCLF where electrification is not possible through infrastructure or on-board energy storage. The fleet life of vehicles will also indicate the demand for LCLFs – vehicles that have a long service life and aren't/ can't be replaced in time will have to utilise LCLFs. Next generation hybrid-electric vehicles may be part of the solution to help get more out of limited LCLF supplies.
25	**What are the best ways for the Australian Government to work collaboratively with industry, business, governments and communities to implement the proposed pathways?** **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**	The NTRO will establish and operate the National Sustainable Freight Centre to foster collaboration between industry, governments and researchers in the advancement of deploying world-leading knowledge, technologies and practices in the sustainable freight task for Australian conditions and operations. The Centre will be directly linked to leading global international efforts such as the UK Centre for Sustainable Road Freight and the Smart Freight Centre7 based in the Netherlands. Through these relationships,

[7] https://www.smartfreightcentre.org/

#	Consultation question	NTRO response
	What opportunities can the government leverage to show leadership in Australia and internationally?	we will have access to the best minds and partnership networks across Europe, Asia, and the Americas. The National Sustainable Freight Centre will bring world leading knowledge, technologies and practices to meet our nation's challenges and connect with Australian leaders in public offices, industry and research institutions. The Centre will provide coordination across the country on the freight challenge, delivering impact in themes including: • Decarbonisation solutions – developing adoption pathways for future vehicles, fuels and infrastructure based on the different use cases • Advanced data analytics and modelling to improve productivity and resource efficiency • Trials and deployment, including independent evaluation and shared experiential learning • Audit and measurement of freight performance and emissions • Workforce skills to ensure a secure, sustainable, and skilled workforce, with commensurate rewards • Bringing international best practice to Australia and deploying it The NTRO is driven to make this work. We are emboldened in our ambition through the success of the Centre for Connected and Automated Transport (CCAT) which was set up by the NTRO in 2022. CCAT is the public champion for the transition to connected and automated transport in Australia and New Zealand and has established the strategic vision for the required supporting physical and digital infrastructure. The Centre will only be successful with the collective support of the Australian Government, state and territory governments, transport and energy sectors and industry leaders, and a network of connected national and international researchers. The NTRO will engage the Australian Government on how it can best support the Centre.
26	**What measures and metrics should be used to evaluate the final Transport and Infrastructure Net Zero Roadmap and Action Plan?** **What other data and evidence could governments use and how could this**	The National Sustainable Freight Centre will specifically explore measures and metrics of freight performance and emissions to ensure progress and allow for dynamic solutions for challenging problems.

#	Consultation question	NTRO response
	offer further insights on the pace, scale and location of transport emissions reduction pathways?	A range of data is needed for freight including vehicle level, operational, and strategic data – to monitor and baseline performance, and plan for the future. Freight data is of national importance for productivity and sustainability reporting. It is vital to measure and monitor the freight sector's emissions in a coordinated and transparent approach. The Smart Freight Centre in the Netherlands has developed the GLEC framework for logistics GHG emissions and is now an ISO standard (ISO14083). Understanding and supporting a standardised framework and reporting is needed for independent auditing/measurement to ensure robustness and accuracy. Larger scale operations data (e.g. fleet movements and freight flows) is also necessary to understand the current performance of freight movements and is vital to support the transition and resiliency of the future freight network.
27	**Do you have any feedback on the proposed review process?**	No response.
28	**Do you have any further feedback on the Consultation Roadmap and proposed pathways?** **Is there anything missing? Are the sections appropriately integrated? Is the Roadmap appropriately ambitious?**	Decarbonising transport is multifaceted and cannot be addressed with a single action or in one go. Success is dependent on on-going and sustained, committed efforts to apply world-leading technology, knowledge and experiences and learning from our own experiences. Australia must collaborate deeply to accelerate actions and deploy diverse solutions. Governments need to support bold ambition and initiatives and provide a safety-net for innovation and experimental, where failures are learnings, not obstacles for continued effort.
29	**Is there any further information or documentation that you wish to be considered with your submission?**	Yes. Refer to the main submission letter.