

# Transport and Infrastructure Net Zero Consultation Roadmap

## Take the survey

Department of Climate Change, Energy, Environment and Water

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- 1 Confirm that you have read and understand this privacy notice.  
Yes
- 2 Please indicate how and if you want your submission published.  
Public
- 3 Published name  
Australia's Mining and Automotive Skills Alliance
- 4 Confirm that you have read and understand this declaration.  
Yes
- 5 First name  
Sam
- 6 Last name  
Hughes
- 7 Email  


8 Phone

[REDACTED]

9 Who are you answering on behalf of?

Organisation

10 Organisation name

Australia's Mining and Automotive Skills Alliance

11 What best describes you or your organisation?

Other: "Jobs and Skills Council"

12 What sector do you represent?

Light road vehicles (cars, utes etc.)

Heavy road vehicles (trucks, buses etc.)

13 What state or territory do you live in?

Victoria

14 Postcode

3000

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.

We note the 5 guiding principles are: maximise emissions reduction; value for money; maximise economic opportunity; inclusive and equitable; and being evidence-based.

While also noting the potential for trade-offs between certain principles, AUSMASA agrees they provide good guidance for the Roadmap.

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.

AUSAMASA supports avoid-shift-improve as an overall framework. However, as outlined in our Overview, we largely focused on the transition for light and heavy vehicles aligned to our remit, as opposed to wider transport issues. Insofar as 'shift' captures vehicular freight and public transport, we note regulatory issues and overlapping policies may complicate the 'shift' for heavy vehicles.

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.

AUSMASA supports this with one key caveat – states and territories are largely responsible for active and public transport, and various wider transport issues. For example, e-bikes and e-scooters discussed in the Roadmap are subject to different requirements in states and territories, which the Australian Government will need to be cognisant of, and factor in, for any national policy framework.

Nevertheless, we recognise that the Australian Government could play a useful leadership and coordinating role, provided it complements requirements and any related work at the state and territory level. For example, presumably any mode share or investment targets would account for electric buses, which are currently subject to a range of state and territory policies, targets and timeframes.

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

Further to above, any national policy framework for active and public transport should clearly differentiate the role(s) of the Australian Government, states and territories, and, importantly, the private sector – which will not always be as simple as fulfilling a leader or an investor role. For example, the striking down of Victoria's distance-based tax on EVs illustrated an issue with role clarity, which could have affected private-sector EV manufacturers, retailers, and wholesalers.

Targets for mode share, investment, road user pricing, and improved transport integration and incentives are all good options for a national framework, but the views of, and

increased demand on, the private sector also needs consideration.

- 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?

Building on our remit and the proposed national policy framework, the VET sector and industry will need skills and workforce solutions for electric buses. As a key mode of public transport now and in the future, electric buses have unique repair, maintenance, and safety requirements that need to be met. Otherwise we risk premature write-offs like those seen with EVs and other environmental issues (e.g. from battery disposal instead of recycling in the automotive sector).

- 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 AUSMASA was still in its establishment phase in 2023, we did not submit on the review of the National Freight and Supply Chain Strategy. However, we note that decarbonisation was included as a goal for the Strategy post-consultation, which we support on the basis that it complements the Roadmap, with clearly defined and agreed roles for governments, communities, industry and others.

For additional actions, a key role for governments will be clarifying regulatory inconsistencies, uncertainties, and policy overlaps we discussed. While the pathway for heavy vehicles is less clear, due in part to industry maturity and technical challenges, we believe regulatory issues and some policies may be adding to this complexity. Therefore, greater clarity and alignment is needed to increase certainty and avoid potential paralysis. However, it is also clear other parts of industry are and can innovate further (e.g. with mobile plant equipment).

- 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.

AUSMASA agrees with the pathway for light vehicles, while noting that under the NVES projected EV uptake between 2024–2030 will create additional demands for the repair and maintenance sector (discussed further below).

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?

Given no-one should be left behind under the Roadmap's inclusive and equitable guiding principle, we have concerns about the skills and workforce challenges servicing EVs and existing ICE vehicles pose for the sector. For EV technicians, uptake of the only accredited VET sector qualification and skillsets has been low, and it is difficult to quantify what proportion of the existing workforce is (re)training, or will do so, through other avenues (at least until better ABS data is available). Added to this are large existing shortages of ICE technicians that are almost certainly reducing the demand to also upskill in EVs. Therefore, the VET sector and industry clearly need to coordinate to increase the uptake and scalability of (re)training to meet demand from the NVES in the short term, and any additional demand from further actions in the medium to long term. Otherwise, we risk premature disposal of EVs – reducing fleet numbers and adding to emissions and environmental issues. Our work with the VET sector, EV manufacturers, and governments on the first TAFE EV Centre of Excellence is one example of an initiative that could be used to bolster training.

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

AUSMASA agrees with the heavy vehicle pathway, while noting the hydrogen and low-

carbon liquid fuels industries are still developing (discussed below).

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?

We would rank battery electric (1) low-carbon liquid fuels (2) and hydrogen fuel cell (3). While electrification is not suitable for all heavy vehicles, this technology is more advanced and better aligned to that for light vehicles. Low-carbon liquid fuels will make sense as an interim solution where electrification is not possible, with some benefits for utilising existing technology and skills. In contrast, hydrogen requires a new industry and technology, leading to later adoption.

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

Although low-carbon liquid fuels may have many uses, the potential need to retrofit existing diesel engines means their best use case may be heavy vehicles that travel long distances (e.g., heavy line haulage) prior to hydrogen's adoption.

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?

As outlined previously, a key role for governments will be clarifying regulatory inconsistencies, uncertainties, and policy overlaps we have discussed. Additional actions could include incentives for industries, including mining and automotive, to retrofit or repower existing heavy vehicle engines, or rebates for purchases of new vehicles if they are preferable (e.g., in some mining applications). These actions could assist in spurring demand for low-carbon liquid fuels, and later hydrogen, while these industries are still developing alongside electrification.

- 36 13. Do you agree with the proposed net zero pathway for rail?  
Not answered
- 37 13.1 Please add details to your response.  
These questions on the proposed net zero pathway for rail are not in AUSMASA's remit.  
The JSC responsible for rail is Industry Skills Australia.
- 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.

These questions on the proposed net zero pathway for the marine industry sit largely outside of AUSMASA's remit. Industry Skills Australia is the JSC responsible for maritime transport.

- 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?  
These questions on the proposed net zero pathway for aviation are not in AUSMASA's remit. Industry Skills Australia is the responsible JSC.

- 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.

These questions on the proposed net zero pathway for transport infrastructure are not in AUSMASA's remit. Build Skills Australia is the JSC responsible for this kind of civil infrastructure.

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?

While AUSMASA did not submit on this work, we note mining was highlighted as a key user of hydrocarbon fuels that could be shifted to low-carbon alternatives. However, it is important to note that many mine sites use diesel or natural gas to generate power in their off-grid locations, which present distinct challenges and opportunities (e.g., synergies with vehicle electrification). If natural gas is used, it is also important to differentiate this from higher emissions fuels. Nevertheless, given this and other industry-specific factors like faster asset use, we believe the mining industry can innovate and undertake demonstration projects, especially with certain supports (e.g., incentives and rebates for mobile plant equipment).

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

across different transport modes over time to achieve maximum abatement?

Although this question is partly outside of our remit, we suggest that heavy vehicles be prioritised for the use of low-carbon liquid fuels. This is because they are responsible for the second largest source of transport emissions (after light vehicles), and engine retrofits are likely easier than for other 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?

The concept of a 'just transition' has been central to several such international partnerships. This concept recognises the impacts of climate change and climate adaptations, including their benefits and burdens, must be shared equitably. As an example, the Scottish Government is partnering across agencies, research institutions and the transport sector on a just transition. After identifying strengths in batteries, on-road heavy-duty vehicles, greener railways and hydrogen, they proceeded to consult on workforce attraction and upskilling issues. We consider this lens was missing from the Roadmap and is needed to inform further work.

Given our mining industry's importance to Australia and abroad, and critical minerals' importance to net zero, we believe Australia could show leadership by partnering across businesses, governments, and communities on reducing the industry's emissions. As outlined (above), we believe a range of factors could allow the industry to deploy solutions that will reduce its emissions at-scale.

- 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?

We believe VET data (including from the National Centre for Vocational Education

Research) is a missing data source for the success measures. VET student commencement, enrolment and completion data will be important for some roles (e.g., EV technicians) and as a comparator to employment data. For example, our basic analysis of the NVES and VET data illustrates that the uptake of consistent and accredited EV technician training needs to increase.

Governments could also use linked education and employment data to better understand how education and employment are supporting the transition.

- 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?

We do not have further feedback on the review process' principles or success measures. However, we would like to reiterate our feedback (above) on data measures and options that would assist with evaluating the Roadmap's success.

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

Yes – a component is missing. While the Roadmap lists existing Australian Government policy and key state and territory actions, it does not discuss how they may (or may not) align or the policy levers that may be available. This could be problematic where investments, targets and timeframes do not align. Further, until or unless this analysis is done, it will be hard to conclude whether and how the Roadmap builds on existing policies and actions.

- 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 currently. We look forward to the next steps and further consultation (if any).

66 Would you like to upload a document?

Yes

67 Have you removed any identifying information from your submission?

Yes

68 Upload a submission

AUSMASA submission for Transport and Infrastructure Net Zero Roadmap.pdf

69 Upload a submission

Not answered

70 Upload supporting file

Not answered

71 Upload supporting file

Not answered

# Transport and Infrastructure Net Zero Consultation Roadmap submission

Submitted via [consult.dcceew.gov.au](https://consult.dcceew.gov.au)

Thursday, 25 July 2024

## Who we are and what we do

The [Mining and Automotive Skills Alliance \(AUSMASA\)](#) is the Jobs and Skills Council (JSC) responsible for Australia's mining and automotive industries. With a combined workforce of approximately 632,700 workers, our industry coverage spans the entire mining division (including oil and gas extraction) and several automotive divisions within the Australian and New Zealand Standard Industry Classification (ANZSIC) (see Appendix 2).

We bring together employers, unions and governments in a tripartite arrangement to find solutions to skills and workforce challenges in our industries, while also considering the needs of related ones. A key focus of this work involves ensuring that the vocational education and training (VET) system is fit for purpose for learners, employees, and employers. As part of this, we are responsible for these nationally recognised training packages:

- AUM - Automotive Manufacturing
- AUR - Automotive Retail, Service and Repair
- RII - Resources and Infrastructure Industry

AUSMASA also recognises the evolving demands of climate change and the transition to net zero as a significant opportunity and challenge for our automotive and mining industries. As such, we make it a priority to respond to public consultations on these and other issues that may affect our industries.

## Overview of AUSMASA's submission on the Transport and Infrastructure Net Zero Consultation Roadmap

The [Mining and Automotive Skills Alliance \(AUSMASA\)](#) welcomes the opportunity to provide a submission on the Department of Infrastructure, Transport, Regional Development, Communications and the Arts' Transport and Infrastructure Net Zero Consultation Roadmap (the Roadmap).

In line with our remit and the Roadmap's focus on net zero pathways for transport, our submission primarily focuses on light and heavy vehicles – capturing aspects of their lifecycle including manufacture, wholesaling, retailing, and maintenance and repair – and associated skills and workforce needs. While this allows us to consider some of the higher-level questions on transport infrastructure, planning, and networks raised in the Roadmap, our primary focus is on the net zero transition for the more established and higher emitting modes of transport that are in our remit.<sup>1</sup>

Further, our submission discusses the pathways, policies, challenges, and opportunities for reducing light and heavy vehicle emissions, before answering the consultation questions (see Appendix 2). For light vehicles that have a clearer path to lower emissions, we have provided a high-level analysis of the skills and workforce challenges posed by the New Vehicle Efficiency Standard (NVES) so they can be better understood. This work was endorsed by our Strategic Workforce Advisory Panels (SWAPs), which bring together a range of key industry stakeholders under our tripartite structure.

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<sup>1</sup> Department of Infrastructure, Transport, Regional Development, Communications and the Arts. [Transport and Infrastructure Net Zero Consultation Roadmap](#). 2024.

## Net zero pathways for light vehicles

As outlined in the Roadmap, light vehicles accounted for almost 60% of Australia's transport emissions in 2023, or approximately 60 Megatons of carbon dioxide equivalent (Mt CO<sub>2</sub>-e) emissions.<sup>2</sup> This represents a 15% increase since 2005, when light vehicle emissions were closer to 50 Mt CO<sub>2</sub>-e.<sup>3</sup> As a consequence of this and Australia's commitment under the United Nations Framework Convention on Climate Change to reduce its total emissions to 43% below 2005 levels by 2030, light vehicles have a key role to play in reducing Australia's overall emissions.

### Policy initiatives

All levels of government have pursued initiatives to reduce light vehicle emissions. At the centre of these is the Australian Government's NVES, finalised earlier this year. The NVES focuses on light passenger vehicles, which include sedans, hatchbacks, SUVs and most 4WDs, with separate requirements for light commercial vehicles like vans, utes, and some heavier SUVs and 4WDs.<sup>4</sup>

Some key features of the NVES include:

- Setting separate CO<sub>2</sub> targets for suppliers of new light passenger and commercial vehicles
- Gradually reducing the targets over five years from 1 January 2025 to 1 January 2029
- Recording credits and debits for supplier over/under-performance against the targets
- Allowing suppliers with credits to 'bank' or exchange them using a cap-and-trade-like scheme
- Providing weight-based concessions to the CO<sub>2</sub> targets for heavier light passenger and light commercial vehicles, alongside fully exempting heavy vehicles (over 4.5 tonnes).<sup>5</sup>

The CO<sub>2</sub> targets also reduce at an average annual rate of approximately 20% for light passenger vehicles and 15% for light commercial vehicles, reducing the permitted CO<sub>2</sub> emissions across each supplier's fleet of new vehicles they can sell each year.<sup>6</sup> Although some changes were made post-consultation in early 2024, these targets are now finalised and will apply from 1 January 2025.<sup>7</sup>

Due to the NVES, EVs market share and numbers are predicted to continue increasing. A baseline (or no intervention) scenario for the NVES projected that EVs would not reach 30% of light vehicle sales until after 2030, rising to 100% of sales from 2045.<sup>8</sup> However, following the introduction of the NVES, a new baseline scenario for 'Progressive Change' now predicts EVs will account for 35% of light vehicle sales in 2030, 50% under a faster 'Step Change' scenario, and 60% under the fastest and most optimistic 'Green Energy Exports' scenario.<sup>9</sup> Noting that EV fleet numbers will not change

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<sup>2</sup> Ibid.

<sup>3</sup> Department of Climate Change, Energy, the Environment and Water. [Australia's emissions projections 2022](#). 2022.

<sup>4</sup> Department of Infrastructure, Transport, Regional Development, Communications and the Arts. [Cleaner, Cheaper to Run Cars: The Australian New Vehicle Efficiency Standard Consultation Impact Analysis February 2024](#). 2024.

<sup>5</sup> Ibid.

<sup>6</sup> Parliament of the Commonwealth of Australia. [New Vehicle Efficiency Standard Bill 2024](#). 2024.

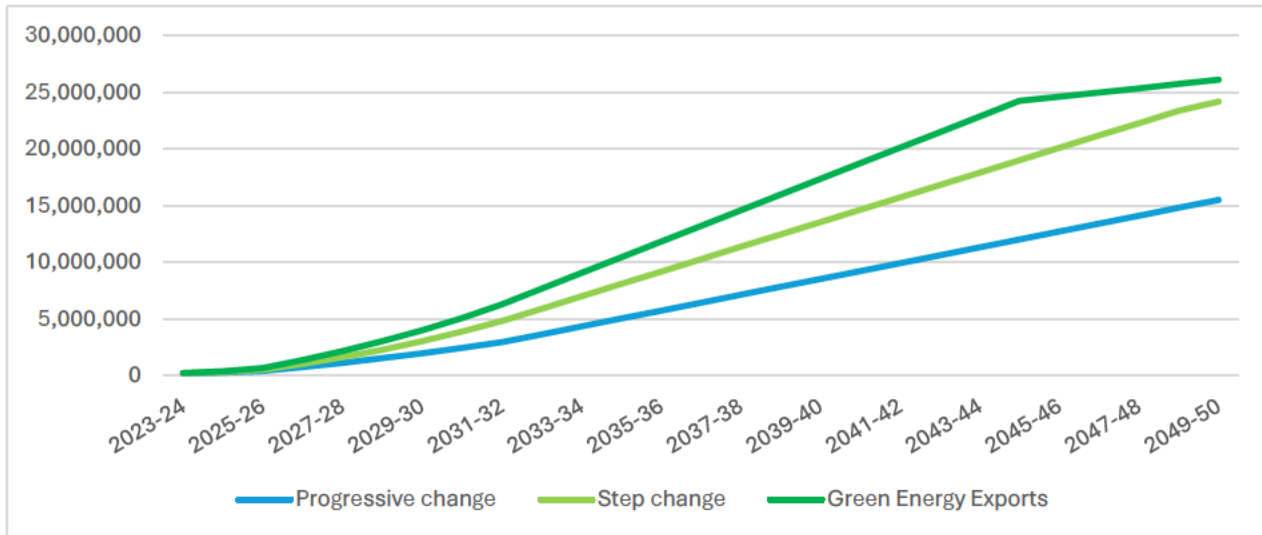
<sup>7</sup> Department of Infrastructure, Transport, Regional Development, Communications and the Arts. [New Vehicle Efficiency Standard Fact Sheet March 2024](#). 2024.

<sup>8</sup> Department of Infrastructure, Transport, Regional Development, Communications and the Arts. [Cleaner, Cheaper to Run Cars: The Australian New Vehicle Efficiency Standard Consultation Impact Analysis March 2024](#). 2024.

<sup>9</sup> Graham, P. [Electric vehicle projections 2023: update to the 2022 projections report Commissioned for AEMO's draft 2024 Forecasting Assumptions Update](#). 2023, December.

as rapidly as changes in sales figures, these scenarios would equate to between 2–4 million EVs of all types by 2029–2030 (see Figure 1 below).<sup>10</sup>

Figure 1: 2024 National Electricity Market projections of EV fleet size by scenario, 2020 to 2050



Using these figures, it is possible to approximate the potential service and repair needs of EVs following the introduction of the NVEs. Previous analysis by the Australian Automotive Aftermarket Association (AAAA) found that, for a fleet of 15.1 million light passenger and commercial vehicles, service and repair jobs averaged 1.66 per vehicle per annum across a workforce of at least 70,000 technicians and support staff in 2020.<sup>11</sup> If all EVs had similar service and repair needs, then the scenarios above would equate to 3.3–6.6 million service and repair jobs per annum by 2029–2030, requiring a workforce of at least 9,000–18,000 technicians and support staff.

## Challenges and opportunities

Although EVs require less servicing, it is important to note the above estimates represent baselines for projected staffing numbers and that actual Motor Mechanic (or technician) numbers were higher in 2020.<sup>12</sup> In addition, it is important to note that the Roadmap has sought advice on ‘additional actions’ that, if taken, could increase demands across the automotive industry and in the repair and maintenance sector in particular. Therefore, a key industry skills and workforce challenge will be servicing both EVs and the existing fleet of ICE vehicles with enough qualified technicians.

<sup>10</sup> Graham, P. [Electric vehicle projections 2023: update to the 2022 projections report Commissioned for AEMO's draft 2024 Forecasting Assumptions Update](#). 2023, December.

<sup>11</sup> Australian Automotive Aftermarket Association. [Critical Industry Trends 2021](#). 2021

<sup>12</sup> Australian Bureau of Statistics. [EQ08 - Employed persons by Occupation unit group of main job \(ANZSCO\), Sex, State and Territory, August 1986 onwards](#). 2024, June.

This is already a challenge for EVs – with only 41% of advertised EV technician roles filled in 2023,<sup>13</sup> which is reportedly causing premature write-offs.<sup>14</sup> With approximately 180,000 EVs in 2023,<sup>15</sup> with projections to reach 200,000–250,000 this year,<sup>16</sup> our analysis suggests a workforce of at least 900–1,200 qualified technicians and support staff is needed. However, the only EV-dedicated VET qualification, *Certificate III in Automotive Electric Vehicle Technology*, was launched in 2021 with only 4 enrolled students who will likely complete studying in 2023–2024.<sup>17</sup> While these students certainly do not represent the workforce as a whole, they and the premature write-offs of EVs point to a wider issue – that the repair and maintenance sector is likely reliant on EV manufacturers for bespoke, unaccredited and potentially inconsistent training which we have little visibility of. As such, the VET sector and industry clearly need to expand the uptake and scalability of training to better meet demand. Our work with the VET sector, EV manufacturers, and others on Australia's first TAFE EV Centre of Excellence is one example of a collaborative initiative that could bolster VET training.<sup>18</sup>

Existing technicians will also need to be dual-qualified to service and repair EVs and ICE vehicles – especially since the scenarios with higher EV numbers assume higher rates of scrapping and faster service withdrawal for ICE vehicles.<sup>19</sup> In 2023, there were approximately 60,000 technicians across the industry, with 46,000 in the repair and maintenance sector.<sup>20</sup> While the sector is already short of almost 40,000 technicians and 12% of its workforce is approaching retirement age, there is reasonable scope to upskill this workforce<sup>21</sup> – thereby improving wages, working conditions, and ultimately, helping to alleviate shortages.<sup>22</sup> However, retraining can cost as much as \$5,000–\$7,000 per technician,<sup>23</sup> which may explain why upskilling in the 2 available EV skillsets has been low since 2021 (4 enrolments in one skillset).<sup>24</sup> While these figures also do not represent the whole workforce, visibility of technician upskilling using them (and other avenues) will not be possible until the ABS adds EV technicians to ANZSCO, which acts to confound the existing issue with VET sector training.

By comparison, the data, skills and workforce challenges the automotive manufacturing, retail and wholesale sectors face are less pronounced. The key reasons for this are the decline of large-scale light vehicle manufacturing in Australia and online purchasing of EVs (e.g., Tesla and BYD), which is predicted to moderate the need for workers in the automotive retail and wholesale sector.<sup>25</sup> With this in mind, the VET sector and industry could explore opportunities for retraining and re-deployment in more in-demand automotive repair maintenance roles, both for EVs and (existing) ICE vehicles.

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<sup>13</sup> Deloitte Access Economics with Motor Traders Association of Australia. [Skills shortages in the Australian automotive industry](#). 2024.

<sup>14</sup> Insurance Business. [Mechanic shortage sparks electric vehicle insurance dilemma](#). 2024, April 27.

<sup>15</sup> Electric Vehicle Council. [Australian Electric Vehicle Industry Recap 2023](#). 2023.

<sup>16</sup> Graham, P. [Electric vehicle projections 2023: update to the 2022 projections report Commissioned for AEMO's draft 2024 Forecasting Assumptions Update](#). 2023, December.

<sup>17</sup> Australia's Mining and Automotive Skills Alliance. [Industry Workforce Plan - Moving Ahead Together](#). 2024.

<sup>18</sup> Australia's Mining and Automotive Skills Alliance. [We are set to work closely with Australia's first TAFE Electric Vehicle \(EV\) Centre of Excellence](#). 2024.

<sup>19</sup> Graham, P. [Electric vehicle projections 2023: update to the 2022 projections report Commissioned for AEMO's draft 2024 Forecasting Assumptions Update](#). 2023, December.

<sup>20</sup> Australia's Mining and Automotive Skills Alliance. [Industry Workforce Plan - Moving Ahead Together](#). 2024.

<sup>21</sup> Ibid.

<sup>22</sup> TÜV SÜD. [Switching Gears: Why Now Is the Perfect Time to Become an EV Mechanic](#). 2023, August 08.

<sup>23</sup> The Guardian. [Australia's skilled mechanics shortage forcing insurers to write off electric vehicles after minor accidents](#). 2024, April 26.

<sup>24</sup> Australia's Mining and Automotive Skills Alliance. [Industry Workforce Plan - Moving Ahead Together](#). 2024.

<sup>25</sup> Ibid.

## Net zero pathways for heavy vehicles

Heavy vehicles – including buses, rigid trucks (with a single chassis), articulated trucks (with a connection to a trailer) and other mobile plant equipment – accounted for almost 23% of Australia’s transport emissions in 2023, or approximately 23 Mt CO<sub>2</sub>-e.<sup>26</sup> This represents a 45% increase since 2005, when heavy vehicle emissions were closer to 15 Mt CO<sub>2</sub>-e.<sup>27</sup> Therefore, heavy vehicles have a key role to play in supporting Australia’s commitment under the United Nations Framework Convention on Climate Change to reduce its total emissions to 43% below 2005 levels by 2030.

### Policy initiatives

The Australian Government and most states and territories have pursued initiatives focused on reducing heavy vehicle emissions. However, as the NVES (appropriately) excluded heavy vehicles, the Australian Government is pursuing separate work with states and territories on supporting the introduction of Euro VI standards for heavy vehicles.<sup>28</sup> This work includes considering changes to heavy vehicle weight, width, and height requirements, which are not regulated consistently and currently impose limitations on heavy EVs due to road infrastructure.<sup>29</sup> At the same time, such EVs and a range of alternative fuel technologies are not yet available or cost-effective in many cases.<sup>30</sup>

From the perspective of providing consistency for skills and workforce needs, these issues and a lack of certainty on potential policy changes can pose challenges because:

- Heavy vehicle manufacturers, retailers, and wholesalers will require a degree of lead-time to conform to how Euro VI is implemented and any new state and territory requirements
- Heavy vehicle manufacturers, retailers, and wholesalers need to understand how hydrogen and low-carbon fuel policies align, as they may add/subtract from electrification’s use-case<sup>31</sup>
- Some heavy vehicle manufacturers, retailers, and wholesalers may need to understand how other bus electrification and/or EV policies align, given some differ on targets and timing<sup>32</sup>

We acknowledge that the Federal Government is also assisting the development of a domestic hydrogen and low-carbon fuels industry through its Guarantee of Origin Scheme, several hydrogen-specific programs, and its new Future Made in Australia initiative.<sup>33</sup> However, as the wider hydrogen and low-carbon fuel industries are still developing and this technology (in particular) is unproven, we agree that electrification will remain the best use-case in many cases in the near-term at least.<sup>34</sup>

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<sup>26</sup> Department of Infrastructure, Transport, Regional Development, Communications and the Arts. [Transport and Infrastructure Net Zero Consultation Roadmap](#). 2024.

<sup>27</sup> Department of Climate Change, Energy, the Environment and Water. [Australia’s emissions projections 2022](#). 2022.

<sup>28</sup> Department of Infrastructure, Transport, Regional Development, Communications and the Arts. [Transport and Infrastructure Net Zero Consultation Roadmap](#). 2024.

<sup>29</sup> Turner, P. & Neagoe, M. [Hybrid Futures: Emissions Reduction Pathways for Australia’s Logistics](#). 2024.

<sup>30</sup> Ibid.

<sup>31</sup> Australia’s Mining and Automotive Skills Alliance. Industry Workforce Plan - Moving Ahead Together. 2024.

<sup>32</sup> The Australia Institute. [Next stop: Zero emissions buses by 2030](#). 2022.

<sup>33</sup> Commonwealth of Australia. [Budget 2024–2025 Budget Measures, Budget Paper No. 2](#). 2024.

<sup>34</sup> Department of Infrastructure, Transport, Regional Development, Communications and the Arts. [Transport and Infrastructure Net Zero Consultation Roadmap](#). 2024.

## Challenges and opportunities

Compared to light vehicles, the pathway for heavy vehicles is less clear as a result of regulatory inconsistencies, uncertainties, and different and sometimes competing policies across government. However, while work on Euro VI and potential changes to state and territory requirements continues, the heavy vehicle repair and maintenance sector has more time to train and upskill its workforce before large numbers of heavy EVs come to market. This will be important in order to avoid the training, upskilling, and servicing issues that are already faced by light EVs.

Liebherr's recent 'repower' of its R 9400 excavator in Western Australia is one example of how part of the heavy vehicle (or mobile plant) repair and maintenance sector can retrain using a mix of new and existing technology. For this project, the excavator's conversion from diesel-drive to electric power was timed to coincide with other maintenance; reducing costs, downtime, and ultimately, the waste and embodied carbon emissions that might result from full replacement with a new electric system.<sup>35</sup> However, if a purchaser like a mine needed a new machine with a longer service life, the existing machine could still be on-sold and repowered, adding to the fleet or second-hand market of electric-powered mobile plant equipment. In addition, as many mines generate their own electrical power due to their off-grid locations, they could be at the forefront of this technology's adoption.

Liebherr has also developed innovative battery repowering solutions for articulated trucks and other mobile plant equipment in other jurisdictions, which may be promising if similar repowers can be achieved here in Australia.<sup>36</sup> However, this again points to one of the key skills and workforce challenges for the wider sector – that innovations from Liebherr and others will continue before the VET sector offers accredited or uniform training and upskilling solutions. Given the role of heavy vehicle technicians is already changing due to this, AUSMASA is seeking to better define where mechanical and/or electrical tasks should sit, both for heavy vehicle technicians and other roles as part of its Skills Mapping Project.<sup>37</sup> Where gaps are identified, this will also inform the potential development of new VET training packages for heavy vehicle technicians and others.

In addition, EVs can pose unique safety issues for heavy vehicle technicians and others who need to understand how to handle high-voltage cables based on fault levels and current carrying capacity. However, at present there is no accredited EV training available for these workers in the VET system, with some training providers offering unaccredited training.<sup>38</sup> AUSMASA initially plans to rectify this by collaborating with another JSC on the development of an accredited training program for EV safety and emergency response. To support this work, AUSMASA will also consult key stakeholders on relevant regulatory arrangements and other issues (as appropriate).

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<sup>35</sup> Liebherr. [Groundbreaking 2 | 2023](#). 2023.

<sup>36</sup> Ibid.

<sup>37</sup> Australia's Mining and Automotive Skills Alliance. Industry Workforce Plan - Moving Ahead Together. 2024.

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## Appendix 1: Consultation question responses

Questions	Responses
1. Do you agree with the proposed guiding principles?	We note the 5 guiding principles are: <i>maximise emissions reduction; value for money; maximise economic opportunity; inclusive and equitable; and being evidence-based</i> . While also noting the potential for trade-offs between certain principles, AUSMASA agrees they provide good guidance for the Roadmap.
2. Do you support the use of the avoid-shift-improve framework as a tool to identify opportunities for abatement?	AUSMASA supports <i>avoid-shift-improve</i> as an overall framework. However, as outlined in our Overview, we largely focused on the transition for light and heavy vehicles aligned to our remit, as opposed to wider transport issues. Insofar as 'shift' captures vehicular freight and public transport, we note regulatory issues and overlapping policies may complicate the 'shift' for heavy vehicles.
3. Do you agree the development of a national policy framework for active and public transport will support emissions reduction?	AUSMASA supports this with one key caveat – states and territories are largely responsible for active and public transport, and various wider transport issues. For example, e-bikes and e-scooters discussed in the Roadmap are subject to different requirements in states and territories, which the Australian Government will need to be cognisant of, and factor in, for any national policy framework.  Nevertheless, we recognise that the Australian Government could play a useful leadership and coordinating role, provided it complements requirements and any related work at the state and territory level. For example, presumably any mode share or investment targets would account for electric buses, which are currently subject to a range of state and territory policies, targets and timeframes.
4. What should be included in a national policy framework for active and public transport and how should it be developed?	Further to above, any national policy framework for active and public transport should clearly differentiate the role(s) of the Australian Government, states and territories, and, importantly, the private sector – which will not always be as simple as fulfilling a leader or an investor role. For example, the striking down of

Questions	Responses
	<p>Victoria's distance-based tax on EVs illustrated an issue with role clarity, which could have affected private-sector EV manufacturers, retailers, and wholesalers.</p> <p>Targets for mode share, investment, road user pricing, and improved transport integration and incentives are all good options for a national framework, but the views of, and increased demand on, the private sector also needs consideration.</p>
<p>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?</p>	<p>Building on our remit and the proposed national policy framework, the VET sector and industry will need skills and workforce solutions for electric buses. As a key mode of public transport now and in the future, electric buses have unique repair, maintenance, and safety requirements that need to be met. Otherwise we risk premature write-offs like those seen with EVs and other environmental issues (e.g. from battery disposal instead of recycling in the automotive sector).</p>
<p>6. Given 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:</p> <ol style="list-style-type: none"> <li>a. 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?</li> <li>b. How would these actions address the identified challenges and opportunities for emissions reduction in the movement of goods?</li> </ol>	<p>As AUSMASA was still in its establishment phase in 2023, we did not submit on the review of the National Freight and Supply Chain Strategy. However, we note that decarbonisation was included as a goal for the Strategy post-consultation, which we support on the basis that it complements the Roadmap, with clearly defined and agreed roles for governments, communities, industry and others.</p> <p>For additional actions, a key role for governments will be clarifying regulatory inconsistencies, uncertainties, and policy overlaps we discussed. While the pathway for heavy vehicles is less clear, due in part to industry maturity and technical challenges, we believe regulatory issues and some policies may be adding to this complexity. Therefore, greater clarity and alignment is needed to increase certainty and avoid potential paralysis. However, it is also clear other parts of industry are and can innovate further (e.g. with mobile plant equipment).</p>

Questions	Responses
7. Do you agree with the proposed net zero pathway for light road vehicles?	AUSMASA agrees with the pathway for light vehicles, while noting that under the NVES projected EV uptake between 2024–2030 will create additional demands for the repair and maintenance sector (discussed further below).
8. Given the Australian Government is has developed an Australian New Vehicle Efficiency Standard and has begun to implement actions in the National Electric Vehicle Strategy: <ol style="list-style-type: none"> <li>a. What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to reduce light vehicle emissions?</li> <li>b. How would these actions address the identified challenges and opportunities to reduce light vehicle emissions?</li> </ol>	<p>Given no-one should be left behind under the Roadmap’s <i>inclusive and equitable</i> guiding principle, we have concerns about the skills and workforce challenges servicing EVs and existing ICE vehicles pose for the sector. For EV technicians, uptake of the only accredited VET sector qualification and skillsets has been low, and it is difficult to quantify what proportion of the existing workforce is (re)training, or will do so, through other avenues (at least until better ABS data is available). Added to this are large existing shortages of ICE technicians that are almost certainly reducing the demand to also upskill in EVs.</p> <p>Therefore, the VET sector and industry clearly need to coordinate to increase the uptake and scalability of (re)training to meet demand from the NVES in the short term, and any additional demand from further actions in the medium to long term. Otherwise, we risk premature disposal of EVs – reducing fleet numbers and adding to emissions and environmental issues. Our work with the VET sector, EV manufacturers, and governments on the first TAFE EV Centre of Excellence is one example of an initiative that could be used to bolster training.</p>
9. Do you agree with the proposed net zero pathway for heavy road vehicles?	AUSMASA agrees with the heavy vehicle pathway, while noting the hydrogen and low-carbon liquid fuels industries are still developing (discussed below).
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. <ol style="list-style-type: none"> <li>a. Why did you rank them in that order?</li> </ol>	We would rank battery electric (1) low-carbon liquid fuels (2) and hydrogen fuel cell (3). While electrification is not suitable for all heavy vehicles, this technology is more advanced and better aligned to that for light vehicles. Low-carbon liquid fuels will make sense as an interim solution where electrification is not possible, with some benefits for utilising existing technology and skills. In contrast, hydrogen requires a new industry <i>and</i> technology, leading to later adoption.

Questions	Responses
11. What role should low carbon liquid fuels play in heavy vehicle decarbonisation?	Although low-carbon liquid fuels may have many uses, the potential need to retrofit existing diesel engines means their best use case may be heavy vehicles that travel long distances (e.g., heavy line haulage) prior to hydrogen's adoption.
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? a. How would these actions address the identified challenges and opportunities to reduce heavy vehicle emissions?	As outlined previously, a key role for governments will be clarifying regulatory inconsistencies, uncertainties, and policy overlaps we have discussed. Additional actions could include incentives for industries, including mining and automotive, to retrofit or repower existing heavy vehicle engines, or rebates for purchases of new vehicles if they are preferable (e.g., in some mining applications). These actions could assist in spurring demand for low-carbon liquid fuels, and later hydrogen, while these industries are still developing alongside electrification.
13–16. These questions on the proposed net zero pathway for rail are not in AUSMASA's remit. The JSC responsible for rail is Industry Skills Australia.	NA.
17–18. These questions on the proposed net zero pathway for the marine industry sit largely outside of AUSMASA's remit. Industry Skills Australia is the JSC responsible for maritime transport.	NA.
19–20. These questions on the proposed net zero pathway for aviation are not in AUSMASA's remit. Industry Skills Australia is the responsible JSC.	NA.
21–22. These questions on the proposed net zero pathway for transport infrastructure are not in AUSMASA's remit. Build Skills Australia is the JSC responsible for this kind of civil infrastructure.	NA.
23. Given the Australian Government previously consulted on opportunities for the electricity and energy sector transition in April 2024, what additional actions by governments,	While AUSMASA did not submit on this work, we note mining was highlighted as a key user of hydrocarbon fuels that could be shifted to low-carbon alternatives. However, it is important to note that many mine sites use diesel or natural gas to generate power in their off-grid locations, which present distinct challenges and

Questions	Responses
<p>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?</p>	<p>opportunities (e.g., synergies with vehicle electrification). If natural gas is used, it is also important to differentiate this from higher emissions fuels. Nevertheless, given this and other industry-specific factors like faster asset use, we believe the mining industry can innovate and undertake demonstration projects, especially with certain supports (e.g., incentives and rebates for mobile plant equipment).</p>
<p>24. How should the use of low carbon liquid fuels be prioritised across different transport modes over time to achieve maximum abatement?</p>	<p>Although this question is partly outside of our remit, we suggest that heavy vehicles be prioritised for the use of low-carbon liquid fuels. This is because they are responsible for the second largest source of transport emissions (after light vehicles), and engine retrofits are likely easier than for other transport modes.</p>
<p>25. What are the best ways for the Australian Government to work collaboratively with industry, business, governments and communities to implement (all of) the proposed pathways?</p> <ul style="list-style-type: none"> <li>a. 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?</li> <li>b. What opportunities can the government leverage to show leadership in Australia and internationally?</li> </ul>	<p>The concept of a 'just transition' has been central to several such international partnerships. This concept recognises the impacts of climate change and climate adaptations, including their benefits and burdens, must be shared equitably. As an example, the Scottish Government is partnering across agencies, research institutions and the transport sector on a just transition. After identifying strengths in batteries, on-road heavy-duty vehicles, greener railways and hydrogen, they proceeded to consult on workforce attraction and upskilling issues. We consider this lens was missing from the Roadmap and is needed to inform further work.</p> <p>Given our mining industry's importance to Australia and abroad, and critical minerals' importance to net zero, we believe Australia could show leadership by partnering across businesses, governments, and communities on reducing the industry's emissions. As outlined (above), we believe a range of factors could allow the industry to deploy solutions that will reduce its emissions at-scale.</p>
<p>26. What measures and metrics should be used to evaluate the final Transport and Infrastructure Net Zero Roadmap and Action Plan?</p>	<p>We believe VET data (including from the National Centre for Vocational Education Research) is a missing data source for the success measures. VET student commencement, enrolment and completion data will be important for some roles (e.g., EV technicians) and as a comparator to employment data. For</p>

Questions	Responses
<p>a. 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?</p>	<p>example, our basic analysis of the NVES and VET data illustrates that the uptake of consistent and accredited EV technician training needs to increase.</p> <p>Governments could also use linked education and employment data to better understand how education and employment are supporting the transition.</p>
<p>27. Do you have any feedback on the proposed review process?</p>	<p>We do not have further feedback on the review process' principles or success measures. However, we would like to reiterate our feedback (above) on data measures and options that would assist with evaluating the Roadmap's success.</p>
<p>28. Do you have any further feedback on the Consultation Roadmap and proposed pathways?</p> <p>a. Is there anything missing? Are the sections appropriately integrated? Is the Roadmap appropriately ambitious?</p>	<p>Yes – a component is missing. While the Roadmap lists existing Australian Government policy and key state and territory actions, it does not discuss how they may (or may not) align or the policy levers that may be available. This could be problematic where investments, targets and timeframes do not align. Further, until or unless this analysis is done, it will be hard to conclude whether and how the Roadmap builds on existing policies and actions.</p>
<p>29. Is there any further information or documentation that you wish to be considered with your submission?</p>	<p>Not currently. We look forward to the next steps and further consultation (if any).</p>

## Appendix 2: AUSMASA's Workforce Backbone: ANZSIC Data

