Mining and Automotive Skills Alliance

National Energy Workforce Strategy submission

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Jobs and Skills Councils
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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 is also responsible for ensuring that the wider workforce in our industries has the skills, training, and qualifications to meet current and future demands. This extends to dual occupations that fall within the responsibility of other JSCs (see clean energy occupations in Table 1).

As such, AUSMASA recognises the evolving demands of climate change and the transition to net zero as significant opportunities and challenges for our automotive and mining industries. This is why we prioritise responding to a range of public consultations that may affect our industries.

Overview of AUSMASA's submission on the National Energy Workforce Strategy

The Mining and Automotive Skills Alliance (AUSMASA) welcomes the opportunity to provide a submission on the Department of Climate Change, Energy, the Environment and Water National Energy Workforce Strategy (the Strategy). In line with our remit and the Strategy's focus on clean energy, our submission focuses on the automotive industry workforce as a key clean energy enabler and the mining industry's workforce as it decarbonises its operations. Our Strategic Workforce Advisory Panels (SWAPs), which bring together key industry stakeholders under our tripartite structure, have also endorsed this submission.

In the automotive industry, a critical workforce challenge is the skilling and upskilling of electric vehicle (EV) technicians across various sectors of the economy. This need is particularly pronounced in industries predicted to employ large numbers of these technicians, such as mining. As the transition to EVs accelerates, ensuring that technicians possess the necessary skills to service and maintain this advanced technology becomes essential. This issue extends beyond the automotive sector alone, impacting industries reliant on a skilled EV workforce to maintain their operational efficiency and drive sustainability initiatives.

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For the mining industry, which also employs a substantial number of workers in key clean energy occupations, maintaining a sufficient workforce to support ongoing operations is critical. This challenge is further compounded by the need to contribute to the sector's decarbonisation goals while simultaneously competing with the broader national clean energy workforce. Ensuring a steady pipeline of skilled workers who can meet the demands of both current production and future sustainability initiatives will be a pivotal focus.

Addressing all of these issues will require across industry strategic workforce planning, investment in training and development, and collaboration to attract and retain talent in an increasingly competitive labour market. Without this, competition could leave some industries or workers behind.

Automotive Industry

Pathways for light vehicles

As outlined in the recent Department of Infrastructure, Transport, Regional Development, Communications and the Art's, Transport and Infrastructure Net Zero Consultation Roadmap, light vehicles accounted for almost 60% of Australia's transport emissions in 2023, or approximately 60 Megatons of carbon dioxide equivalent (Mt CO_2-e) emissions.[1] This represents a 15% increase since 2005, when light vehicle emissions were closer to 50 Mt CO_2-e.[2] 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.

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.[3]

Some key features of the NVES include:

- Setting separate CO_2 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_2 targets for heavier light passenger and light commercial vehicles, alongside fully exempting heavy vehicles (over 4.5 tonnes).[4]

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[1] Department of Infrastructure, Transport, Regional Development, Communications and the Arts. Transport and Infrastructure Net Zero Consultation Roadmap. 2024.

[2] Department of Climate Change, Energy, the Environment and Water. Australia's emissions projections 2022. 2022.

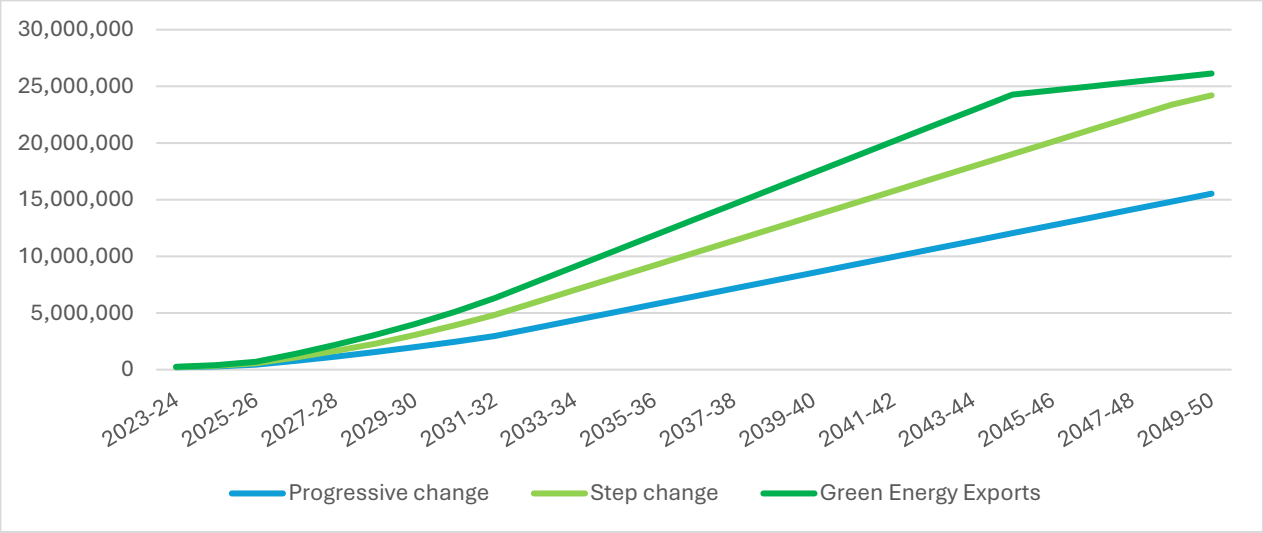
[3] Department of Infrastructure, Transport, Regional Development, Communications and the Arts. Cleaner, Cheaper to Run Cars: The Australian New Vehicle Efficiency Standard Consultation Impact Analysis February 2024. 2024.

[4] Ibid.

The CO_2 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_2 emissions across each supplier's fleet of new vehicles they can sell each year.[5] Although some changes were made post-consultation in early 2024, these targets are now finalised and will apply from 1 January 2025.[6]

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.[7] 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.[8] Noting that EV fleet numbers will not change 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).[9]

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

5 Parliament of the Commonwealth of Australia. New Vehicle Efficiency Standard Bill 2024. 2024.

6 Department of Infrastructure, Transport, Regional Development, Communications and the Arts. New Vehicle Efficiency Standard Fact Sheet March 2024. 2024.

7 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.

8 Graham, P. Electric vehicle projections 2023: update to the 2022 projections report Commissioned for AEMO's draft 2024 Forecasting Assumptions Update. 2023, December.

9 Graham, P. Electric vehicle projections 2023: update to the 2022 projections report Commissioned for AEMO's draft 2024 Forecasting Assumptions Update. 2023, December.

technicians and support staff in 2020.[10] 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 for both servicing and repairs, and that actual Motor Mechanic (or technician) numbers were higher in 2020.[11] Therefore, a key industry skills and workforce challenge will be servicing both EVs and the existing fleet of ICE vehicles with enough qualified technicians.

This is already a challenge for EVs – with only 41% of advertised EV technician roles filled in 2023,[12] which is reportedly causing premature write-offs.[13] With approximately 180,000 EVs in 2023,[14] with projections to reach 200,000–250,000 this year,[15] 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.[16] 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 for new mechanics which we have little visibility of.

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.[17] In 2023, there were approximately 60,000 technicians across the industry, with 46,000 in the repair and maintenance sector.[18] While the sector is already reportedly short of almost 40,000 technicians and 12% of its workforce is approaching retirement age, there is reasonable scope to upskill this workforce[19] – thereby improving wages and working conditions and, ultimately, helping to alleviate shortages.[20] However, upskilling in the 2 available EV skill sets has been low since 2021 (4 enrolments in one skill set), which also suggests the sector is likely reliant on EV manufacturers for bespoke, unaccredited and potentially inconsistent training.[21]

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10 Australian Automotive Aftermarket Association. Critical Industry Trends 2021. 2021

11 Australian Bureau of Statistics. EQ08 - Employed persons by Occupation unit group of main job (ANZSCO), Sex, State and Territory, August 1986 onwards. 2024, June.

12 Deloitte Access Economics with Motor Traders Association of Australia. Skills shortages in the Australian automotive industry. 2024.

13 Insurance Business. Mechanic shortage sparks electric vehicle insurance dilemma. 2024, April 27.

14 Electric Vehicle Council. Australian Electric Vehicle Industry Recap 2023. 2023.

15 Graham, P. Electric vehicle projections 2023: update to the 2022 projections report Commissioned for AEMO's draft 2024 Forecasting Assumptions Update. 2023, December.

16 Australia's Mining and Automotive Skills Alliance. Industry Workforce Plan - Moving Ahead Together. 2024.

17 Graham, P. Electric vehicle projections 2023: update to the 2022 projections report Commissioned for AEMO's draft 2024 Forecasting Assumptions Update. 2023, December.

18 Australia's Mining and Automotive Skills Alliance. Industry Workforce Plan - Moving Ahead Together. 2024.

19 Ibid.

20 TÜV SÜD. Switching Gears: Why Now Is the Perfect Time to Become an EV Mechanic. 2023, August 08.

21 Australia's Mining and Automotive Skills Alliance. Industry Workforce Plan - Moving Ahead Together. 2024.

Unless or until there is clearer visibility of technician training and upskilling in EVs, using VET data or data from the Australian Bureau of Statistics (ABS), it is not possible to understand the true scale of the challenge the sector faces from servicing both EVs and the existing fleet of ICE vehicles.[22] At the same time, the Australian Government's New Energy Apprenticeships Program creates an added impetus to better understand this, since it will likely increase EV apprentice numbers through payments on commencement, at the end of each year of study, and again at course completion.[23] The wider Program also supports apprenticeships across a range of other automotive courses covering automotive electricians, diesel technicians, and a range of other technician specialisations – all of which are important to overall and wider skills shortages in the automotive industry.

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_2-e.[24] This represents a 45% increase since 2005, when heavy vehicle emissions were closer to 15 Mt CO_2-e.[25] 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.[26] 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.[27] At the same time, such EVs and a range of alternative fuel technologies are not yet available or cost-effective in many cases.[28]

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[29]

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22 Ibid.

23 Department of Employment and Workplace Relations. Australian Apprenticeships Priority List. 2024.

24 Department of Infrastructure, Transport, Regional Development, Communications and the Arts. Transport and Infrastructure Net Zero Consultation Strategy. 2024.

25 Department of Climate Change, Energy, the Environment and Water. Australia's emissions projections 2022. 2022.

26 Department of Infrastructure, Transport, Regional Development, Communications and the Arts. Transport and Infrastructure Net Zero Consultation Strategy. 2024.

27 Turner, P. & Neagoe, M. Hybrid Futures: Emissions Reduction Pathways for Australia's Logistics. 2024.

28 Ibid.

29 Australia's Mining and Automotive Skills Alliance. Industry Workforce Plan - Moving Ahead Together. 2024.

- 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[30]

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.[31] However, as the wider hydrogen and low-carbon fuel industries are still developing and this technology (in particular) is unproven, we believe that electrification will remain the best use case in many cases in the near term at least.[32]

Challenges and opportunities

Compared to light vehicles, the pathway for heavy vehicles is less clear because 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 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.[33] 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.[34] 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.[35] 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.

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30 The Australia Institute. Next stop: Zero emissions buses by 2030. 2022.

31 Commonwealth of Australia. Budget 2024–2025 Budget Measures, Budget Paper No. 2. 2024.

32 Department of Infrastructure, Transport, Regional Development, Communications and the Arts. Transport and Infrastructure Net Zero Consultation Strategy. 2024.

33 Liebherr. Groundbreaking 2 | 2023. 2023.

34 Ibid.

35 Australia's Mining and Automotive Skills Alliance. Industry Workforce Plan - Moving Ahead Together. 2024.

However, at present there is no accredited EV training available for these workers in the VET system, with some training providers offering unaccredited training.[36] 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).

Mining Industry

Pathways for the industry

Australia's mining industry is a significant contributor to our total emissions due to fugitive emissions and the energy-intensive nature of its operations. Based on the most recent and detailed available data, the resources sector produced 98 Mt CO_2-e in 2021 – which includes direct emissions from mining, oil and gas extraction, associated electricity generation and fuel combustion.[37]

Direct emissions are a major factor, with fugitive emissions from coal mining and oil and gas extraction being the largest contributor.[38] These emissions, particularly methane, are released during the extraction and processing of fossil fuels. In addition, on-site combustion of diesel and other fossil fuels to power machinery, vehicles, and equipment further adds to the industry's carbon footprint, contributing significantly to the overall emissions profile.[39]

A reasonable proportion of these emissions also stems from off-grid electricity generation from sources such as coal and natural gas.[40] This reliance on carbon-intensive energy sources exacerbates the industry's environmental impact. Furthermore, emissions associated with the supply chain and transportation, alongside reliance on the power grid in regions heavily dependent on fossil fuel-fired power plants, contribute to the industry's indirect emissions[41] – highlighting the extensive and multifaceted nature of the mining sector's contribution to greenhouse gases.

Policy initiatives

The mining industry in Australia has recognised the need to reduce its carbon footprint and has embarked on several initiatives to decarbonise operations. One of the primary approaches is the integration of renewable energy into mining operations. Many mines have started adopting renewable energy sources, such as solar and wind, to power their activities.[42] In addition, the use of battery storage systems is becoming more common to ensure a stable and reliable power supply, particularly when different sources of renewable energy generation are intermittent.

Another significant effort in decarbonising the industry the electrification of equipment. The transition from diesel-powered machinery to electric vehicles (EVs) and equipment is well underway. This

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36 Ibid.
37 Climate Change Authority. Issues paper: Targets, Pathways and Progress. 2024.
38 Ibid.
39 Ibid.
40 Ibid.
41 Ibid.
42 Mine Australia. Going off-grid: the state of on-site power at Australian mines. 2024.

includes the introduction of electric haul trucks and loaders, which help to reduce emissions associated with fuel combustion.[43] Moreover, the development and deployment of hydrogen fuel cells are being explored as an alternative power source for heavy machinery, offering a cleaner and more sustainable option compared to traditional fuels.

The industry can also address methane emissions, a potent greenhouse gas from coal mining, by implementing technologies to capture and utilize methane to reduce its environmental impact.[44] Additionally, sustainable mining practices are being adopted, including waste reduction, water recycling, and site rehabilitation, alongside the use of advanced technologies like autonomous equipment and AI to optimise operations and reduce energy consumption.[45]

Challenges and opportunities

Decarbonisation presents both challenges and opportunities for the mining workforce. On the one hand, the industry faces the challenge of attracting and retaining workers who possess the skills needed to drive decarbonisation while competing with the broader clean energy sector. On the other hand, the shift towards more sustainable practices creates opportunities for workers to contribute directly (e.g., electricians) or indirectly (e.g. drillers) to reducing the mining industry's environmental impact, based on an analysis of clean energy occupations from Jobs and Skills Australia.

Based on our analysis of data from Jobs and Skills Australia and the Australian Bureau of Statistics, the mining sector already employs a substantial number of workers in key clean energy occupations, making the maintenance of a sufficient and skilled workforce critical to the sector's ongoing operations. Many of these workers are involved in roles that straddle both traditional mining functions and emerging clean energy initiatives, illustrating the dual occupations that are becoming increasingly prevalent in the industry. Ensuring a steady pipeline of skilled workers who can meet the demands of both current operations and future sustainability initiatives will be a pivotal focus.

Table 1 - Jobs and Skills Australia Clean Energy Jobs and percentage employed in the mining industry

Clean energy occupations (ANZSCO 4-digit)[46]	**Mining Workforce[47]**	**National Workforce[48]**	**% Mining Workforce**
Metal Fitters and Machinists	20297	80714	25.15%
Other Building and Engineering Technicians	11172	24850	44.96%
Electricians	8279	126800	6.53%
Production Managers	7780	53811	14.46%
Mining Engineers	5218	8169	63.88%

[43] Australia's Mining and Automotive Skills Alliance. Industry Workforce Plan - Moving Ahead Together. 2024.
[44] Australian Government. Methane abatement technology projects receive $4.35 million. 2023.
[45] Australia's Mining and Automotive Skills Alliance. Industry Workforce Plan - Moving Ahead Together. 2024.
[46] Jobs and Skills Australia. The Clean Energy Generation - Workforce Mapping. 2023.
[47] Australian Bureau of Statistics. *2021 Census - counting persons, 15 years and over by 4-digit Occupation level and 1-digit level Industry of Employment*. 2021.
[48] Ibid.

Geologists, Geophysicists and Hydrogeologists	5016	8179	61.33%
Structural Steel and Welding Trades Workers	4898	56273	8.70%
Electrical Engineers	3622	20722	17.48%
Industrial, Mechanical and Production Engineers	3043	29738	10.23%
Chemical, Gas, Petroleum and Power Generation Plant Operators	1987	7354	27.02%
Motor Mechanics	1748	85428	2.05%
Engineering Managers	1338	21549	6.21%
Structural Steel Construction Workers	1327	19233	6.90%
Civil Engineering Professionals	1276	48100	2.65%
Electrical Engineering Draftspersons and Technicians	722	8513	8.48%
Chemists, and Food and Wine Scientists	140	6663	2.10%

For instance, almost 17.5% of electrical engineers are employed in the mining sector where they traditionally focused on maintaining and optimising the electrical systems used in mining operations. However, with the industry's shift towards renewable energy, these engineers will also be involved in the integration and maintenance of new solar and wind energy systems.[49] Their expertise in electrical systems is critical in ensuring that renewable energy sources are effectively harnessed and integrated into mining operations, making them essential to both traditional and clean energy roles.

Similarly, just over 10% of industrial, mechanical, and production engineers are employed in the mining industry. These roles, which have traditionally worked on the design, operation, and maintenance of mining equipment, are now increasingly involved in the development and deployment of EVs and machinery powered by hydrogen fuel cells.[50] These engineers may be tasked with retrofitting existing diesel-powered equipment with electric drivetrains or designing new machinery that is more energy-efficient and sustainable.[51] Their role in bridging the gap between conventional mining practices and emerging clean energy technologies highlights the importance of dual occupations within the sector.

Finally, the mining industry employs approximately 6.5% of Australia's electricians. Electricians are pivotal for installing, maintaining, and ensuring the safety of electrical systems used in mining operations. With the advancement of mining technology, electricians also handle automation and control systems like programmable logic controllers and sensors, which enhance the efficiency and safety of mining operations.[52] Additionally, they are involved in the installation of energy-efficient solutions and emergency systems, ensuring reliable communication and safety, especially in underground operations.

[49] Mine Australia. Going off-grid: the state of on-site power at Australian mines. 2024.
[50] Liebherr. Groundbreaking 2 | 2023. 2023.
[51] Ibid.
[52] Australia's Mining and Automotive Skills Alliance. Industry Workforce Plan - Moving Ahead Together. 2024.

Automation and AI specialists who were initially brought into the mining sector to improve operational efficiency and safety using autonomous vehicles and equipment are now also contributing to the industry's sustainability efforts. By optimising energy usage and reducing waste through advanced data analytics and machine learning, these specialists are helping to lower the carbon footprint of mining operations.[53] Their dual expertise in both automation and sustainability initiatives underscores the growing need for workers who can navigate the intersection of traditional mining practices and clean energy solutions.

Summary

The primary challenge for both the automotive and mining sectors is the need to sustain their current business operations while simultaneously transitioning to a clean energy future. This dual focus creates a complex balancing act, as each industry must navigate the demands of the present while preparing for the future.

For the automotive industry, this challenge is particularly pronounced. The industry must continue to service and maintain the existing fleet of traditional vehicles, which remains a significant portion of their business, even as they shift toward EVs and other clean energy technologies. This requires not only keeping the current workforce skilled and engaged but also investing in training programs that equip workers with the expertise needed for the evolving automotive landscape. An additional challenge is preventing the loss of skilled workers to other industries that are also aggressively pursuing clean energy goals and value automotive-specific clean energy skills. To address these risks, the automotive industry must strike a balance between supporting its current operations and fostering a future-ready workforce that can thrive in a rapidly changing market.

The mining sector faces a similar set of challenges, albeit with its own unique complexities. The sector must maintain its existing workforce, many of whom are already engaged in occupations critical to clean energy. At the same time, the mining industry is under pressure to attract new talent to the industry, while also trying to attract talent with specialised skills in clean energy technologies to support its ambitious decarbonisation plans. This includes the integration of renewable energy sources and the electrification of mining equipment. As the industry transitions, there is also the risk of workforce attrition, as skilled workers may be lured away by other sectors that are more advanced in their clean energy initiatives.

To successfully navigate these challenges, both sectors must focus on workforce development strategies that prioritise upskilling and reskilling. For the automotive industry, this means creating robust training programs that not only address the needs of current vehicle technologies but also prepare workers for the clean energy future. Similarly, the mining sector must invest in education and training initiatives that equip workers with the knowledge and skills needed to operate in a decarbonised environment.

[53] Australia's Mining and Automotive Skills Alliance. Industry Workforce Plan - Moving Ahead Together. 2024.

In addition to workforce development, both industries must foster strong partnerships with educational institutions, government bodies, and other stakeholders to ensure a steady pipeline of talent. This includes collaborating on research and development efforts that drive innovation in clean energy technologies, as well as advocating for policies that support workforce retention and mobility.

Ultimately, the success of both the automotive and mining sectors in transitioning to a clean energy future will depend on their ability to maintain a skilled and adaptable workforce. By balancing the needs of the present with the demands of the future, these industries can continue to thrive while contributing to global decarbonisation efforts.

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Appendix 1: Consultation question responses

Questions	Responses
Attract and Retain	
1. What do you consider to be the main barriers to growing the clean energy workforce? What actions can be taken to overcome these barriers and attract more workers to the sector?	The main barriers to growing the clean energy workforce include a shortage of skilled workers, competition with other sectors for talent, limited access to training in regional areas while many of the clean energy jobs are in the regions (especially for mining), and a lack of awareness about clean energy career opportunities. To attract more workers, the sector can expand education and training programs to align with industry needs, particularly in regional areas. Increased investment in apprenticeship and reskilling programs can help workers from traditional sectors transition into clean energy roles. Raising awareness about the long-term career prospects and environmental benefits of clean energy jobs through targeted outreach campaigns can also attract new talent. Collaboration between industry, government, and educational institutions is crucial to creating a steady pipeline of skilled workers.
2. What could be done to attract more First Nations people as well as underrepresented groups, such as women, Culturally and Linguistically Diverse (CALD) people and people with a disability to the sector and address barriers to greater participation?	The sector should implement targeted recruitment initiatives and culturally sensitive training programs to attract more First Nations people, women, culturally and linguistically diverse (CALD) individuals, and people with disabilities. Providing scholarships, mentorship opportunities, and pathways for underrepresented groups can also help bridge the gap. Ensuring that workplaces are inclusive and supportive through diversity and inclusion training for all employees is essential. Establishing partnerships with community organisations and creating role models within the sector can further encourage participation from these groups.

Questions	Responses
3. What skills or qualifications are most in demand for clean energy roles, and how can education and training programs better align with these needs?	Specifically for automotive, skills or qualifications associated with the repair and maintenance of EVs
4. What actions are needed to ensure the clean energy workforce has appropriate skills, competencies and qualifications relating to safety?	Integrating safety training into all levels of education and training programs is crucial to ensuring the workforce has appropriate safety skills. It is also important to regularly update safety protocols to reflect the unique risks associated with clean energy technologies. Certification programs that emphasise safety competencies and ongoing professional development in this area will help maintain high safety standards across the sector. For example, EVs present unique safety challenges due to their high-voltage batteries and electrical systems. Technicians, first responders and other workers who handle these vehicles need specialised training to safely work with high-voltage cables.
5. What actions are needed to ensure the clean energy jobs offer attractive pay and conditions, security and safety.	AUSMASA does not have any comments
6. What remaining barriers are there to increasing training capacity for clean energy occupations, particularly in regional areas that are not being addressed, or require more intervention?	AUSMASA does not have any comments
7. Do you consider worker retention in the clean energy sector to be a concern? If yes, what would help to retain more workers, particularly women?	AUSMASA does not have any comments
8. What actions could help to reduce the risk of bias and harassment in the workplace?	Workplace cultural reform, particularly as it relates to sexual harassment, bullying and racism, continues to spark intense conversations across a broad range of industries. There is a need to develop an accredited training program with supporting resources for developing safe and respectful workplaces.

Questions	Responses
	This program would be made available across multiple training packages. AUSMASA has proposed in its 2024 Workforce Plan to work with other JSC to bring about this training program.
9. Do you think there is a need to improve ease of mobility of workers between states or from overseas? If yes, what could be done to improve mobility?	AUSMASA does not have any comments
10. Does skilled migration help address workforce or expertise shortfalls? If Yes, what are the barriers to engaging overseas workers that need to be addressed?	AUSMASA does not have any comments
Data and information	
1. How far ahead of time are businesses able to anticipate the workforce needed for a clean energy project/development? Is this type of data something that could be provided to government for planning purposes?	AUSMASA does not have any comments
2. What work has been undertaken by industry and unions to project/estimate clean energy worker/skill demands ahead of time, particularly for local study/training/recruitment purposes?	AUSMASA does not have any comments
3. What qualitative and quantitative data have you collected/do you plan to collect relating to the clean energy workforce? Are there data sources available that are new or underutilised?	AUSMASA has relied on JSA date to date, supplemented by industry data.
4. Are there any data limitations that restrain the planning and/or progression of clean energy projects or precincts?	AUSMASA does not have any comments

Questions	Responses
5. What data or information would help with workforce planning? Why is this data needed? This could include more detailed data on the current workforce and/or analysis of future workforce needs.	Clean energy projects must consider existing workforces and industries and other project developments because they often compete for the same workforce. A national public database of industrial projects down to SA1 or 2 levels with projected construction and operational workforces across all sectors would be an invaluable workforce planning tool (and regional development tool more broadly). The data and information should ideally be categorised by occupation numbers and types to enable better planning.
Coordination	
1. What clean energy workforce policy/planning coordination do you think is needed nationally and what governance and other arrangements are needed to facilitate necessary coordination?	AUSMASA does not have any comments
2. What type of coordination role should the Commonwealth Government play?	A key barrier to understanding workforces is a lack of transparency from proponents on construction and operational workforces. Given much is commercial in confidence the Government could provide the reporting compliance and privacy protections to collate such a database.
3. What resources or information would make it easier to navigate? – including resources for industry, unions, government, and the general public in particular job seekers and students?	Clean energy projects must consider existing workforces and industries, and other project developments because they are often competing for the same workforce. A national public database of industrial projects down to SA1 or 2 levels with projected construction and operational workforces across all sectors would be an invaluable workforce planning tool (and regional development more broadly)

Appendix 2: AUSMASA's Workforce Backbone: ANZSIC Data