Mining and Automotive Skills Alliance

Insights for tomorrow

2025 Workforce Plan

Evolving together

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Acknowledgement of Country

We acknowledge the Traditional Custodians of the lands on which we live and work. We acknowledge Traditional Custodians of Country throughout Australia and their connections to land, sea and community.

We honour and respect their Elders, past and present, and extend that respect to all First Nations people.

2025 Workforce Plan – Evolving Together
Version 1.0
July 2025

CEO foreword

I am proud to present the Mining and Automotive Skills Alliance's (AUSMASA's) *2025 Workforce Plan – Evolving Together* (2025 Workforce Plan).

> This plan advances our mission to equip Australia's mining and automotive industries with an adaptable, future-ready workforce. The 2025 Workforce Plan sets out not just how AUSMASA responds, but how we lead. By partnering with industry, government, and education, our aim is to build a workforce ready for the challenges and opportunities ahead.

Building on our previous plans, our 2025 focus expands to workforce demographics at the subdivision level, examining new entrants, gender diversity, First Nations participation, and labour challenges in depth.

Our research identifies critical short-term challenges, including skills shortages, retention issues, and declining Vocational Education and Training (VET) enrolments, alongside long-term transformational shifts. These include driving decarbonisation and electrification, artificial intelligence (AI) integration, critical minerals demand, and the emerging electric vehicle (EV) ecosystem. Through rigorous research and industry consultation, we've developed targeted strategies to address these challenges.

This plan serves as the foundation for our actions across 5 key themes:

- education and pathways
- building inclusive, respectful, and diverse workplaces
- technological advancement and digitisation
- workforce attraction, retention, and wellbeing
- sustainability and industry transformation.

Our commitment to responsive action is demonstrated by our refined consultation process, bringing stakeholder insights earlier into our planning. Moving forward, we will deliver:

- intelligence-driven research and data analysis
- high-quality stakeholder-supported workforce projects
- expert tripartite engagement across industry, unions, and government
- timely education and pathway solutions
- enhanced VET outcomes and workforce development opportunities.

I extend my gratitude to our industry, union, government, and education partners. Your contributions are vital to our shared success. As we evolve together, this 2025 Workforce Plan will serve as a valuable resource in our collective efforts to strengthen Australia's mining and automotive workforces for a sustainable, innovative future. Workforce ready, future ready: evolving together.

Dr Gavin Lind

Chief Executive Officer

Executive summary

Mining

> The mining industry has evolved considerably in recent years, marked by changes in workforce size, diversity, and age, alongside fluctuations in labour turnover, job vacancies, and educational attainment. Ongoing challenges faced by the industry include electrification, net zero, skills shortages, and mine closures.

Australia's Coal, and Oil and Gas Extraction sectors have decreased in size in recent years, despite record high prices for some commodities. Others have grown, like Metal Ore Mining, Non-Metallic Mineral Mining and Quarrying, Exploration and Other Mining Support Services. At the same time, gender diversity has improved, with participation by females in the mining industry on the rise. Some of the largest improvements have been in the Coal and Non-Metallic Mineral Mining and Quarrying sectors. A growing workforce, and the oldest median age in the industry, indicates that the Non-Metallic Mineral Mining and Quarrying sector will need to continue diversifying.

Although the VET sector should be able to support high rates of growth in the Metal Ore Mining and Exploration and Other Mining Support Services sectors going forward, there were notable downturns in enrolments in various Resources and Infrastructure Industry (RII) qualifications. Combined with an ageing workforce and an increasing focus by the government and industry on greater onshore processing and beneficiation of critical minerals, this suggests that the Non-Metallic Mineral Mining and Quarrying sector may face greater workforce supply challenges in the future.

Stakeholder engagement reveals the following skills shortages:

- AI, cyber technology skills
- supervisor skill set
- water well licensing
- engineers
- mobile plant technology.

Industry anticipates the following future skills shortages:

- skills related to hydrogen safety
- critical minerals extraction and processing-related skills
- technological change-related skills
- electrical skills.

Industry believes the following are future disruptors that AUSMASA and the industry should be preparing to respond to:

- ageing workforce
- recruitment challenges
- autonomous operations.

For a detailed summary of findings from stakeholder consultations, please refer to the sections titled 'stakeholder comments' and the roundtable summary available on our website.[1]

1 Please find the summary here: https://ausmasa.org.au/news-and-events/roundtables-summaries-mining-february-2025/

Automotive

> The automotive industry has experienced notable shifts in workforce composition and employment trends over recent years. Key challenges include skills shortages, an ageing workforce, the shift to electrification, net zero, and stagnant and relatively low participation by females and First Nations people.

Broadly, the automotive industry has experienced limited female participation, with the need for greater mentoring, growth, and upskilling opportunities for female workers. The automotive workforce is also in a unique position with the ongoing electrification of the industry and the rise of EV sales. The transition of the economy towards EVs and net zero will inevitably continue to disrupt traditional occupations and create new and growing opportunities (like EV technicians or autonomous vehicle programmers). Identifying these emerging trends is vital if we are to respond to them efficiently, thereby providing new entrants with rewarding career pathways into the automotive industry.

Stakeholder engagement reveals the following skills shortages:

- EV – Repair and Maintenance
- Automotive Electricians
- electrical isolation and depowering
- communication skills.

Industry anticipates the following future skills shortages:

- systems administration
- autonomous operations
- data analytics.

Industry believes the following are future disruptors that AUSMASA and the industry should prepare to respond to:

- ageing workforce
- recruitment challenges
- cyber security.

For a detailed summary of findings from stakeholder consultations, please refer to the sections titled ‘stakeholder comments’ and the roundtable summary available on our website.[2]

2 Please find the summary here: https://ausmasa.org.au/news-and-events/roundtables-summaries-automotive-february-2025/

About AUSMASA

A key role of AUSMASA, the Jobs and Skills Council (JSC) for the Australian mining and automotive industries, is to identify current and future workforce requirements, and consider those of allied sectors.

This understanding forms the foundation of how we support both industries in ensuring the VET system is, and individual training packages are, responsive and tailored to their workforce skilling needs.

AUSMASA aims to empower both industries to develop essential workforce capabilities that are not only relevant for the present, but adaptable to the future. Recognising the rapidly evolving nature of both industries, AUSMASA acknowledges the need for a responsive VET system as a key contributor to this aim. AUSMASA notes that while it is the custodian of several vital VET training packages related to the mining and automotive industries, solutions to current and emerging industry needs will also require holistic input and support from the broader education sector. This includes non-accredited, school-based, and university-based programs, as well as other stakeholders, including governments, industry peak bodies, unions, Registered Training Organisations (RTOs), and State Training Authorities (STAs). By working closely with industry leaders, educational institutions, and key stakeholders, AUSMASA will help pave the way for a skilled and resilient workforce capable of meeting the challenges of today and tomorrow.

Another core function of AUSMASA is Industry Stewardship. By gathering valuable insights into workforce issues, and advising on policies for the national training system, AUSMASA acts as a key voice for the mining and automotive industries. This part of our work informs both the design and development of training packages and future policy development by the Australian Government. Our stewardship role emphasises the importance of promoting cooperation between training providers and industry in shaping a VET sector that effectively meets the needs of learners and employers alike. This function extends to ensuring training package development is impactful, innovative and meets ongoing and emerging industry skills needs.

Industry coverage

AUSMASA's coverage of the mining and automotive industries includes various sectors and segments in Australian and New Zealand Standard Industrial Classification (ANZSIC) 2006. While the mining industry is recognised in an entire division of ANZSIC (Division B), the automotive industry falls under a consolidation of industry classes across the following 4 different divisions: manufacturing, retail trade, wholesale trade, and other services.

Throughout this workforce plan, each of the 8 identified sub-industries (5 within mining and 3 within automotive) are explored individually, with key drivers for these sub-industries analysed. Where there are trends, drivers, challenges, and opportunities that affect multiple sub-industries, these are examined at the industry-wide level as appropriate.

The 2025 Workforce Plan draws on a large pool of government and industry-sourced data. The Appendix provides an overview of the methodology used to collect and interpret various data sources.

As part of its role as a JSC, AUSMASA is the custodian of the following VET training packages:

- AUM: Automotive Manufacturing
- AUR: Automotive Retail, Service, and Repair
- RII: Resources and Infrastructure (mining), excluding civil construction.

About workforce planning

For AUSMASA and all JSCs, workforce planning is a central strategic focus of their work. It informs all other functions by guiding the understanding of current and future workforce needs.

This approach ensures that both industries and workers remain agile and responsive to changing conditions. By leveraging data, research, stakeholder input, and other insights, workforce planning further helps to diagnose issues, anticipate trends, and identify opportunities for alignment and development across entire industries.

Workforce planning also provides a foundation for collaboration on workforce challenges and potential solutions that are robust, inclusive, and consistent with real-world dynamics. The ultimate goal is to improve education, employment, and industry outcomes, thereby enhancing productivity across our industries and sectors. Workforce Planning is a core pillar for JSC remit and a driver and contributor of our Industry Stewardship and Training Product Development functions.

AUSMASA shares workforce planning results in two ways: workforce plans and a monthly research bulletin. The bulletin, available on the AUSMASA website, discusses key topics in the automotive and mining sectors.

Purpose and obligations of Jobs and Skills Councils

JSCs were established to strengthen industry leadership and engagement, ensuring that the VET system can quickly respond to economic changes and cultivate a skilled and resilient national workforce. Their aim is to incorporate strategic industry perspectives into the national training system, addressing skills shortages, and tackling broader workforce challenges. Collaboration with employers, unions, governments, and other stakeholders is key to improving the responsiveness of the system, building stakeholder confidence, and driving high-quality outcomes for the VET sector, learners, businesses, and governments.

To support this, JSCs are further expected to identify the skills and workforce needs in their industries, map education and career pathways, and develop contemporary VET training products. This work is informed by advice from industry, which in AUSMASA's case includes our Strategic Workforce Advisory Panels (SWAPs).

A core function of JSCs is Workforce Planning. This involves identifying, forecasting, and responding to current, emerging, and future workforce challenges and opportunities faced by our industries and sectors. Other obligations include Training Product Development, based on rigorous research to ensure these products meet the requirements of RTOs, industry, and learners.

Implementation, Promotion, and Monitoring is another core function of JSCs. As part of this, JSCs collaborate with industry and RTOs to ensure that training delivery and assessment align with the needs of practitioners, employers, and learners, while promoting career pathways and monitoring the impact of training to drive continuous improvement. Furthermore, JSCs are tasked with providing strategic advice on skills and workforce needs by assessing the effectiveness of VET system policies and standards, as part of their Industry Stewardship function.

Strong governance arrangements are vital for JSCs, with requirements to establish and maintain tripartite representation, as well as gender balance, diversity, equity, and inclusion. Performance monitoring is also a key part of this. JSCs are held accountable under the grant agreements for delivering outcomes that align with the performance framework and its key deliverables and performance indicators.

Approach to consultation and key groups

Our 2025 Workforce Plan stakeholder consultation spanned 5 in-person roundtables in February 2025 in Melbourne, Sydney, Perth, Adelaide and Brisbane, and an online event in March 2025. This was followed by further consultations in March 2025 in Hobart and Darwin. Across these, we conducted 200 consultations and received 88 written submissions as feedback. This included input from industry stakeholders, government representatives, unions, industry groups, peak bodies and training providers, managers, directors, and operational and executive-level staff (Figure 1). The composition of the group of respondents was well-balanced (Figure 2).

Figure 1: Stakeholders consulted

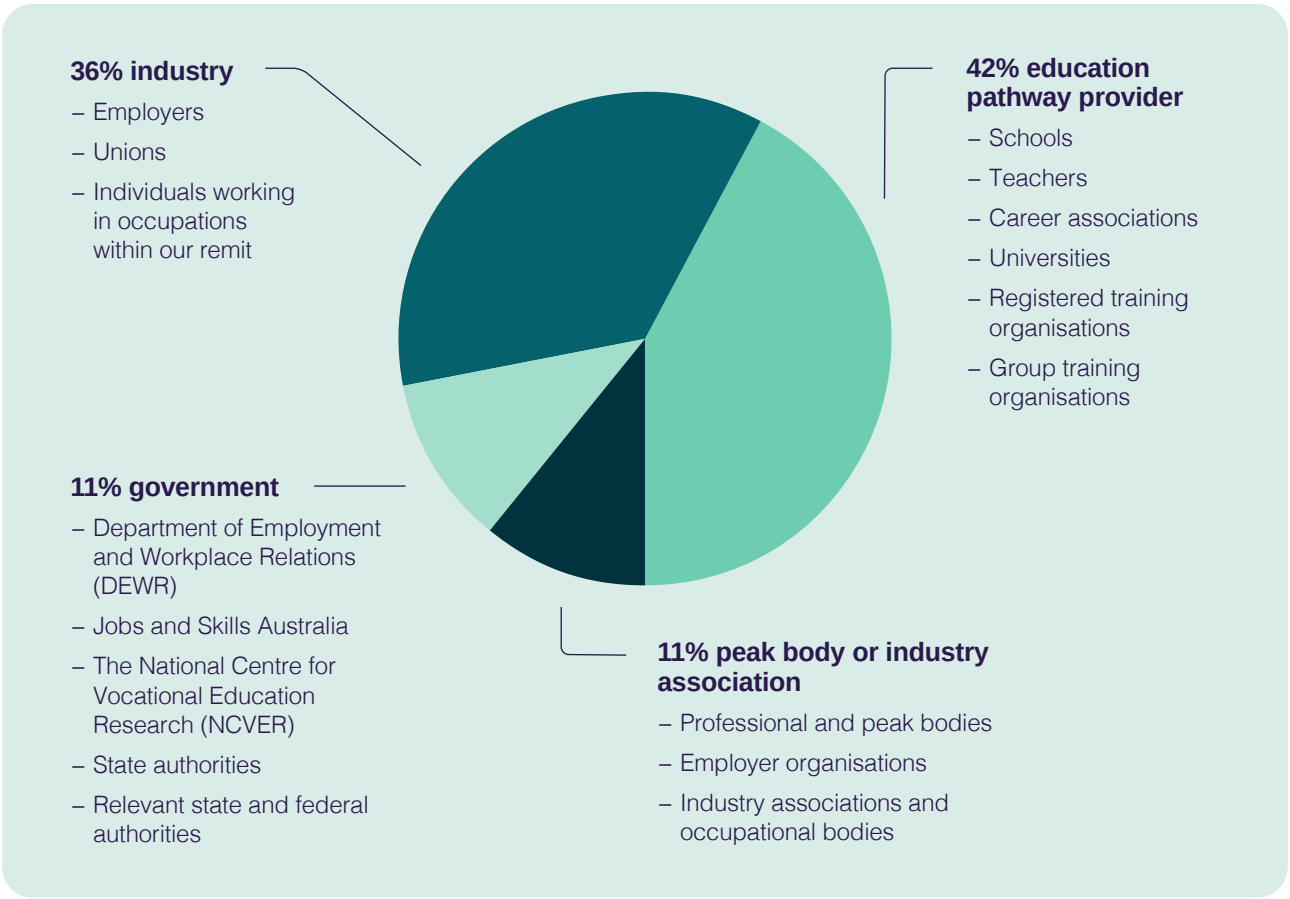
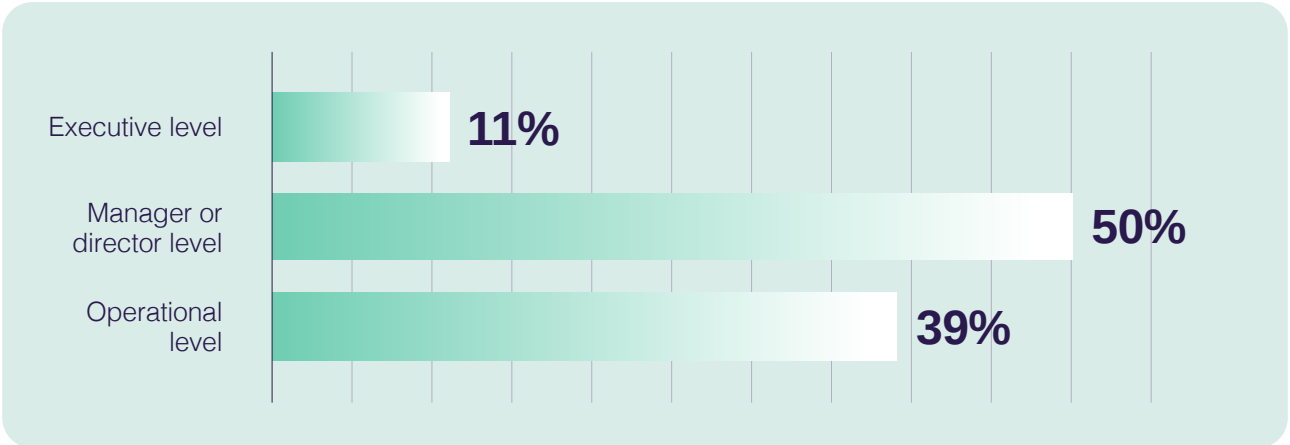


Figure 2: Who did we talk to in our consultations?



Sources: Mining and Automotive Skills Alliance, "AUSMASA Roundtable Survey", February 2025.

Workforce planning cycle

Our 2025 workforce planning cycle began in late 2024, starting with initial analyses of the available data and drafting, followed by consultations in February and March 2025. Further redrafting in response to consultation feedback was conducted from April. We plan to undertake workforce planning activities on an ongoing basis (supported by further research), prior to commencing initial consultation and drafting of our work for our 2026 Workforce Plan from September 2025. With this change in approach, we will also have a scope for further consultations in early 2026 (Figure 3).

> The workforce planning cycle involves several key phases designed to ensure comprehensive analysis, stakeholder engagement, and effective research.

Initially, data collection and analysis is undertaken based on recent releases, including key macroeconomic and industry insights, workforce demographics, and trends in education. This phase involves thematic analysis to identify key challenges and drivers, with consultation methods such as meetings, surveys, and work with our SWAPs to validate the findings.

Following the initial data collection and drafting, the next phase is our initial consultation. During this phase, AUSMASA prepares consultation papers outlining key challenges and drivers and shares these with stakeholders. This helps us to confirm identified issues and collect feedback, which is then analysed to refine the workforce plan.

Next comes the drafting and public consultation phases. This involves developing the first draft of the workforce plan, including research and proposed actions, and releasing it for public consultation. We gather broader input via online platforms, emails, social media, webinars, and regional roundtables and consultations. Once the draft is finalised, it is submitted to DEWR for approval. This final phase includes the integration of all prior feedback into a final draft, followed by publication and amplification back to our stakeholders and the public through various channels like social media, webinars, emails, meetings, and in-person and remote presentations.

Our Workforce Planning and Policy team, which drives our data, workforce planning, policy, research, and part of our stewardship functions, focuses its work on 3 core pillars: Research, Engagement, and Amplification. Engagement with stakeholders to inform and direct research, and amplification to promote and activate the rigorous research that has been done. All 3 pillars are activated and implemented throughout the year to continuously direct and tighten the focus and impact of these functions.

Figure 3: Workforce Planning Cycle for Workforce Plan 2026

Workforce planning cycle	Intelligence gathering and research	Initial consultation	Targeted consultations	Collating, submission, publications, and launch	Implementation and monitoring
Timeline	Ongoing	Ongoing	September 2025 - February 2026	February 2026 - June 2026	Ongoing
What it involves?	– Stakeholder engagement and intelligence gethering – Ascertaining overlap with other federal/state bodies and JSCs – Establishing stakeholder needs and pain-points – Input from SWAPs to direct research and engagement – Update analysis and data dashboards	– Prepare Consultation Papers for stakeholder input – Establish key workforce challenges and industry level trends – Establish Prioritisation matrix and systematic approach to alleviating roadblocks	– 1:1s with industry stakeholders and SWAPs – 1:1s with industry stakeholders as identified by SWAPs – In-depth exploration of industry level trends and industry level challenges – Detailed mapping of workforce and appropriate pathways and solutions that align with industry needs	– Internal Review for Workforce Plan – SWAP feedback on Workforce Plan – Final tweaks and design editing – Final 1:1s with SWAPs to tie off any pending action items – Submit Workforce Plan to DEWR and provide further information as needed	– Promotion, collaboration and coordination across stakeholders to communicate Workforce Plan findings – Develop suitable industry-led solutions – Engage stakeholders to monitor the success of the development and implementation phases – Close off feedback loop and report on the success of above initiatives
Who do we talk to?	SWAPs Employers Individuals	Industry Association and Peak Bodies Industry stakeholders Pathway Providers (VET and Higher Education)			Government JSCs Unions
How do we communicate?	Meetings Roundtables	Emails Summits	LinkedIn Website		Webinars Conferences

Ibid.

Insights for tomorrow

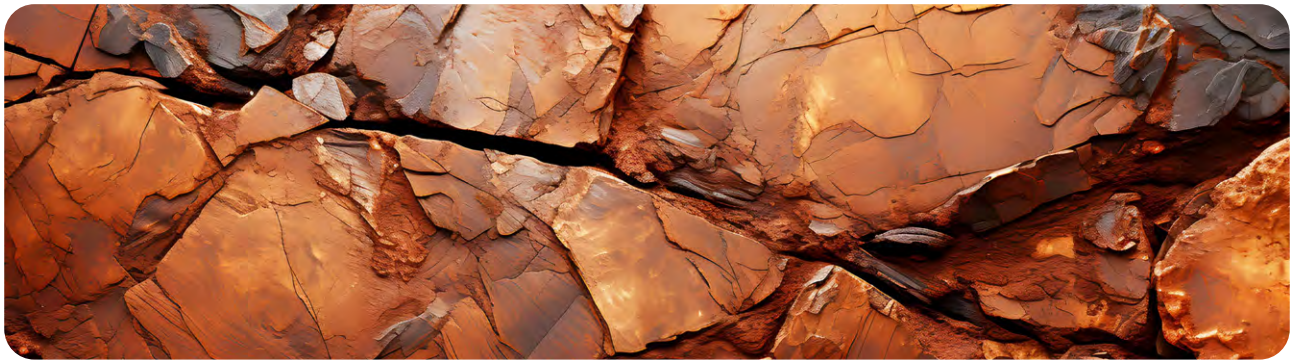
2025 Mining Workforce Plan

Mining

Australia's mining industry is a significant contributor to our economy, with revenue of over $400 billion[3] and a total operational workforce of more than 280,000. With approximately 70% of the industry's revenue sourced from exports, it has been affected by commodity price volatility, rising demand for coal, oil, and gas due to global geopolitical events, and reduced demand for iron ore used in steel production due to China's weakening property market.[4] As parts of the industry have responded with higher export volumes, new mines, and existing mine expansions, commodity prices are predicted to continue falling.[5] The coal, oil, and gas extraction workforce has experienced lower growth in recent years, while Exploration and Other Mining Support Services have expanded. Similarly, the Metal Ore Mining workforce has grown, partly in response to higher commodity prices and increasing demand for its broader base of commodities like critical minerals and strategic materials.

> Critical minerals and strategic materials are essential for the development of renewable energy infrastructure and advanced technologies, as illustrated by a range of federal and state initiatives designed to support critical minerals.

Yet iron ore still comprises the single largest source of revenue (30%) for both the sector and the wider industry, followed by coal (24%) and oil and gas (23%).[6] The industry is still working towards greater onshore processing and beneficiation of critical minerals in line with these initiatives. Established sectors for iron ore, coal, and gas will continue to play an important and dominant role in the near term despite recent commodity price falls and longer-term projections of decreased employment in the coal, oil, and gas sectors.[7] Other metal ores, like copper and gold, and critical minerals like nickel, are increasingly essential and represent the fourth largest source of revenue for the sector (16%) – with a range of new mines and mine expansions linked to these commodities.[8]



3 IBISWorld, and Ryan Tan. "Mining." November 2024.
4 Ibid.
5 Ibid.
6 Ibid.
7 Net Zero Australia. "Downscaling - Employment Impacts" 2023.
8 IBISWorld, and Ryan Tan. "Mining." November 2024.

Key strategic and workforce issues in the mining industry

Skills shortage

The mining industry has not seen a decline in job vacancies like other industries.[9] Vacancies remain at record levels, surpassing peaks from the 2011–2012 mining boom. Skills shortages are widespread, particularly in the top 20 occupations in each subdivision. AUSMASA is continuing research and stakeholder engagement to better understand the nature of these shortages and pathways to alleviate them. The subdivision-specific discussions provide further details, and we welcome stakeholder insights into the issue.[10]

Higher education and pathway opportunities

National enrolments in engineering-related degrees have been declining since 2019. Higher apprenticeships combining on-the-job training with formal study, leading to VET qualifications, are gaining attention to address skills shortages. These programs allow students to work within the industry while completing higher education courses, potentially attracting more students to the field.[11] AUSMASA plans to work with universities and other industry stakeholders to ensure tertiary degrees continue to meet industry needs, particularly with an eye to emerging and future skills requirements. AUSMASA has developed a project that will research vocational degrees and higher apprenticeships to address skills shortages in various industries. Industry views VET degrees, degree apprenticeships and cadetship models as a way to rapidly build workforce capability and engage early with new workforce entrants.

Vocational Education and Training

The national average completion rate for apprentices and trainees who commenced study in 2018 was 55.8% by 2022.[12] Concerns have been raised about the level of mentoring provided to apprentices. This problem is exacerbated for international students, as they cannot gain industry placement (therefore cannot do an apprenticeship or traineeship) during their study period (because of visa regulations). This leads to international graduates possessing lower skills and work experience than their domestic counterparts. As a result, employers often have to invest in training international students once they are hired. AUSMASA has received stakeholder feedback, calling for better aligned visa regulations that would enable international students to acquire training and education equivalent to that of domestic students.

Community perceptions

AUSMASA research shows that 56% of Generation Z would prefer the mining industry to decrease in size, and only 27% knew about lithium mining and its use in battery storage.[13] The industry must address these perceptions to facilitate workforce growth.

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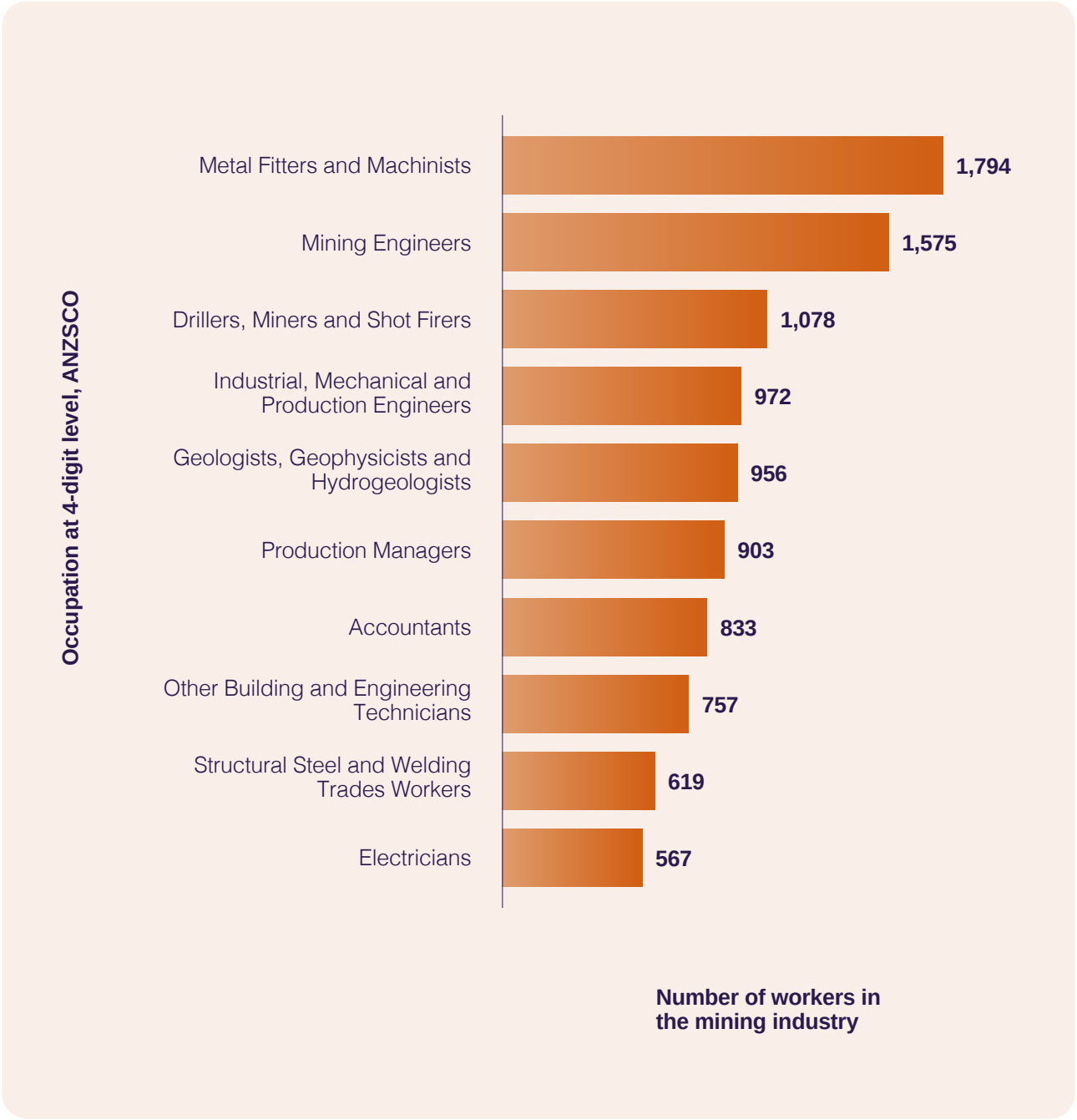
9 Australian Bureau of Statistics, November 2023 – Job Vacancies, Australia (Seasonally adjusted).
10 With the mining industry already providing tailored training outside of the VET system for specific, specialised roles and applications, we will continue to leverage such instances to better inform gaps in training products and further steps for action to alleviate acute skills shortages and empower the workforce to be the workforce of the future, so that the VET sector may become responsive to future skills needs in the industry.
11 Census of Population and Housing (HEAP Level of Highest Educational Attainment), TableBuilder, 2021.
12 NCVER, 'Completion and attrition rates for apprentices and trainees 2022: data tables,' November, 2024.
13 AUSMASA, Gen Z Perceptions of Mining, developed in partnership with Year13.

Skilled migration

The current skilled migration system's high costs and processing times, as well as Australia's housing shortage, are barriers to introducing skilled migrants.[14] The Australian Government aims to revamp the migration system to support national prosperity and security.[15] Skilled migrants are essential to the mining workforce (Figure M1). AUSMASA continues to work with the government to inform the delivery of a migration system that is better aligned with the needs of the mining industry.

Figure M1: Permanent skilled migrants in the mining industry, 2021



Source: Australian Bureau of Statistics, "Australian Census and Migrants, 2021, TableBuilder", 2021

14 For a more detailed discussion on the migration system and the mining industry, please see the AUSMASA February Research Bulletin.
15 Australian Government. Migration Review. 2024.

Table M1: International students in VET[16]

Year	RII enrolments	AUR enrolments
2016	341	3,605
2017	43	5,558
2018	10	7,761
2019	75	12,093
2020	21	15,560
2021	17	15,604
2022	31	15,913
2023	13	17,382

Source: VOCSTATS, 'Total VET students and courses 2023', 2024.

16 There are no international students enrolled in AUM; at the time of writing this, the government is reviewing caps on international students.

Female workforce, enrolments, and gender diversity

Females make up 27% of the overall mining industry workforce. This is below the national average of 48%.[17] Female enrolments in VET qualifications have increased by 29% since 2016, making up 15% of all RII enrolments in 2023. Despite improvements, the mining industry still has significant gender pay gaps, with 95% of employers having pay gaps in favour of men. AUSMASA continues to conduct research on gender diversity in the mining industry and will investigate pathways to improve both awareness of the wide breadth of careers and female participation in the industry.

Workplace cultural reform and mental wellbeing

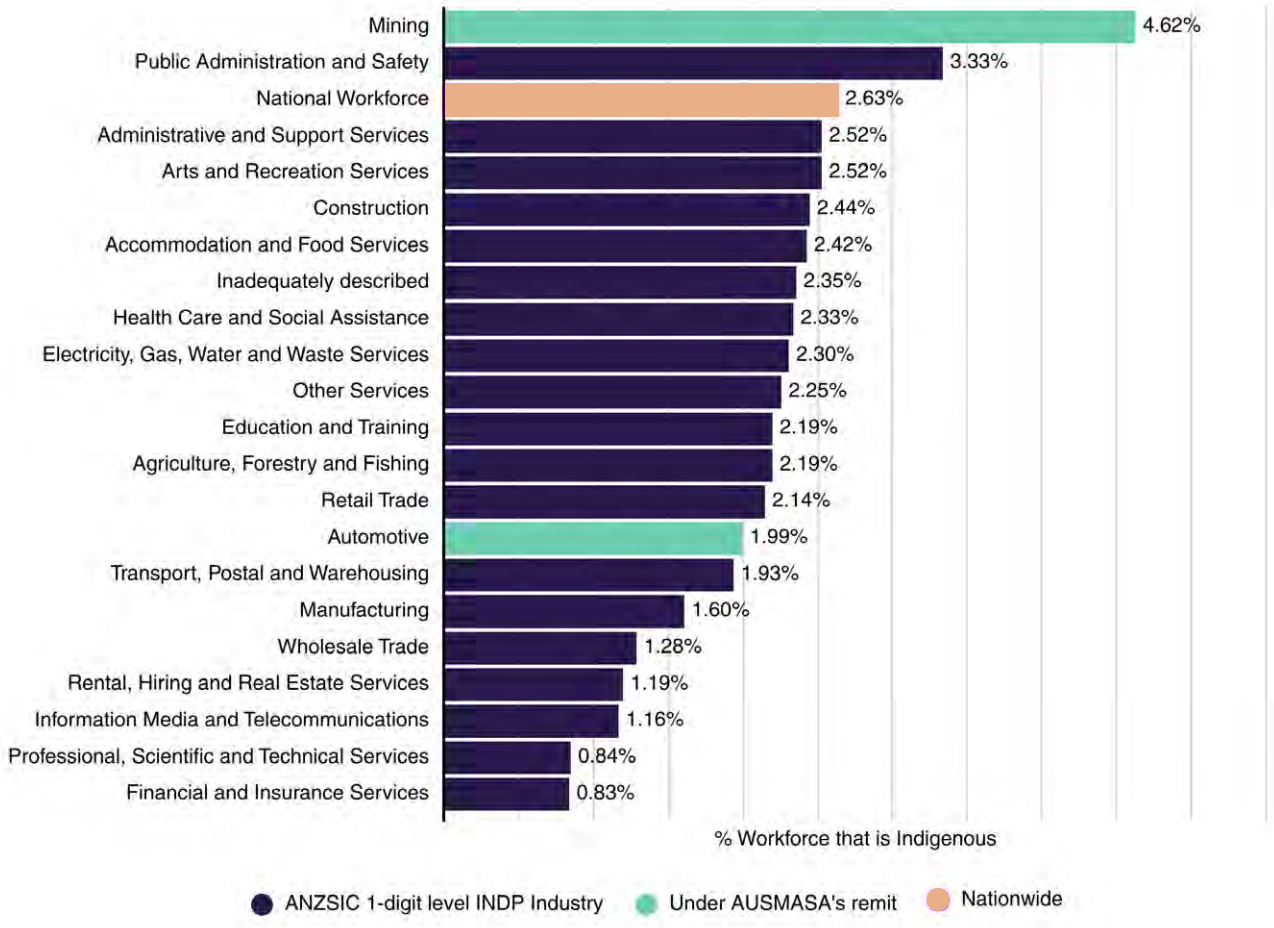
The mining industry has faced issues with workplace culture, including bullying, sexual harassment, and assault. Overall, 52% of stakeholders believe there have been moderate or significant improvements in workplace culture.[18] The Western Australian Government's Mental Awareness, Respect and Safety (MARS) Program addresses mental health, workplace culture, and safety issues. AUSMASA will enable and support the development of accredited training programs for safe and respectful workplaces. The mental health of mining workers is a critical concern due to remote locations, long shifts, and physically demanding work. Further research is needed to understand the impact of mental health issues on productivity and compensation claims. AUSMASA will continue investigating pathways to improve workplace culture and mental wellbeing in the industries we serve.

17 Australian Bureau of Statistics (ABS), Labour Force, Australia, Detailed, Oct 2024, Data trended by AUSMASA.
18 Edith Cowan University. Mental Awareness, Respect and Safety (MARS) Centre. 2024.

First Nations employment and engagement

First Nations people comprise 4.6% of the mining workforce, higher than the 2.6% average for all industries.[19] First Nations Australians represent 12.3% of mining apprentices and trainees, compared to the 6.1% average for all industries (Figure M2).[20] First Nations completion rates for trade apprenticeships are lower than non-indigenous students, indicating a need for additional mentoring and support.

Figure M2: Proportion of Indigenous workforce by industry, 2021



Source: ABS Table Builder 2021 Census - employment, income, and education. Note: the proportion of the Automotive Industry has been calculated by aggregating the 3-digit ANZSIC groups covering the industry and applying the INGP to derive the proportion.

AUSMASA is committed to advancing Indigenous employment by working with industry to support the design and implementation of pre-employment and training programs tailored to First Nations communities. These programs are essential for fostering participation and success in the year ahead. AUSMASA will continue to research this space to better understand the nuances around the opportunity.

19 Australian Bureau of Statistics, 2021 Census - DataBuilder - Indigenous Employment by Industry, 2023.
20 NCVER, Apprentices and trainees 2023 - March quarter DataBuilder, Contract status, Employer industry 2-digit by Indigenous status, 12, 2023.

Technological advancements in the mining industry

The mining industry continues to implement high-technology solutions and systems into its day-to-day operations. As autonomous and AI-supported technology continues to be deployed and advanced, there is potential for many workers in more traditional roles (for example, Drillers, Miners, Shot Firers, and Mobile Plant Operators) to be displaced. Given the industry's ongoing shortage of workers, however, any roles displaced by technology create opportunities for retraining and redeployment, increasing the retention of experienced employees in the process. With the shift to greater digital skills and literacy, AUSMASA will continue to work closely and collaboratively with the JSC responsible for digital skills – Future Skills Organisation – to support this and other work.

Electrifying the mining industry

Mining is transitioning to electric technology, which many mines can support with the off-grid electricity they already generate in their remote locations – creating synergies between existing infrastructure and the electrification of new vehicles and mobile plant equipment. Mining does, however, face challenges with transitioning its existing workforce of mobile plant technicians (Heavy Diesel Mechanics) to electric alternatives and from diversification. As female students only comprise 4.2% of enrolments in the automotive industry's Certificate III in Heavy Commercial Vehicle Mechanical Technology in 2023.[21] For these and other reasons, the role of mobile plant technicians (Heavy Diesel Mechanics) is being reviewed as part of AUSMASA's Career Mapping project. The results will be made available independently on the AUSMASA website.

21 VOCSTATS, 'Total VET students and courses 2023', 2024.

Drilling

Drillers play an important role in the mining industry, but accurate data on the number of Drillers employed in the industry is hard to access using the Australian and New Zealand Standard Classification of Occupations (ANZSCO). This is because occupation classifications might identify 'Drillers' (ANZSCO 712211) under the occupation classification of 'Drillers, Miners and Shot Firers' (ANZSCO 7122), among others. Drillers support exploration, underground, water well and geotechnical drilling.

Industry data indicates that the mining industry employs over 11,024 Drillers, with employment split across these sectors:[22]

- Exploration 4,775
- Coal 284
- Water well 2,188
- Underground 1,635
- Geo-technical 2,142.

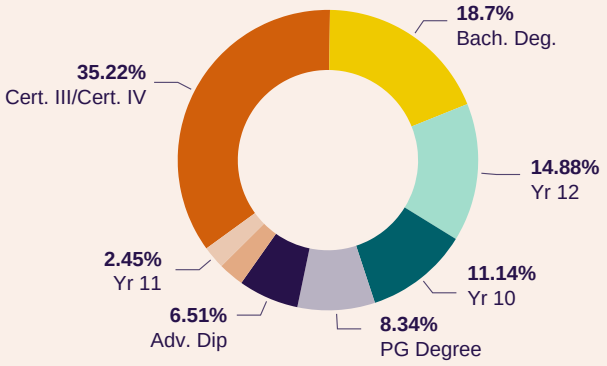
Industry has raised concerns regarding attrition of Drillers from commodity-price driven exploration towards other, more perennial sectors such as geotechnical and water well drilling. Some Drillers are deciding to leave the industry altogether for various reasons. Industry has identified that recognition of prior learning (RPL) could offer a potential solution, helping to ensure more qualified Drillers can obtain their qualification in Certificate III in Drilling Operations or similar. As this would create a training culture from the top down, it would enable the more experienced Drillers to be more actively involved in training future Drillers.

AUSMASA has also heard concerns from industry around water well licensing. Currently, each state and territory has its own water act that intersects with water well licences. Although, there is work being done by the National Uniform Drillers Licensing Committee (NUDLC) towards a harmonised national approach. New South Wales (NSW) retains its 6-class system, whereas all other states and territories have adopted a 3-tier class system. To obtain a water well licence, no qualification is required; applicants need only sit an open-book exam to obtain the licence. This, however, results in a knowledge and skills gap that employers need to fill before allowing Drillers to operate. As new licence holders lack the underpinning knowledge, industry stakeholders have suggested that an accredited training solution tied to the license as a prerequisite could address this.

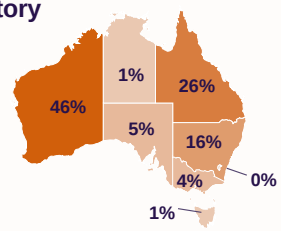
22 ADIA, "Economic Impact: Drilling of Australia 2025", Forthcoming.

Dashboard 1: Mining industry[23, 24]

Education level of the workforce



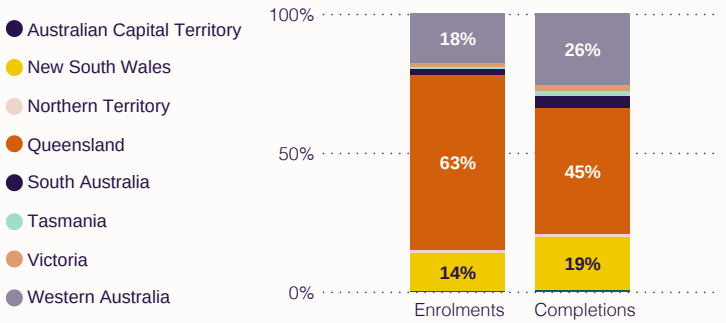
Total workforce by state/ territory



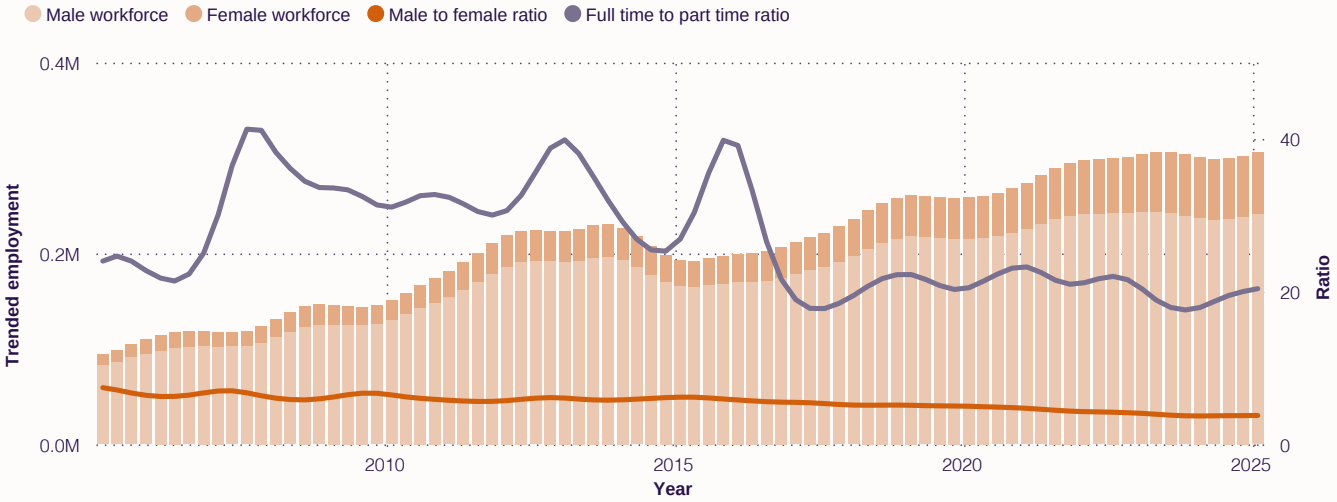
Projected growth over next decade	% female workforce
9%	21%

Median age	% workforce aged 24 or younger	% workforce aged 60 and above
41	6%	8%

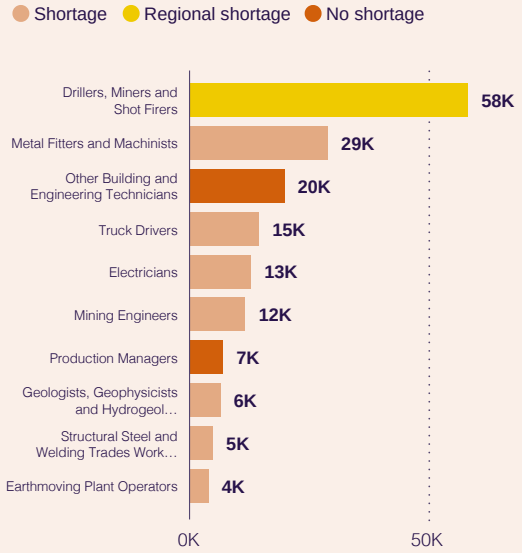
Training package status by state/territory of residence



Trends in employment by gender and work type



Top 10 ANZSCO occupations by workforce number

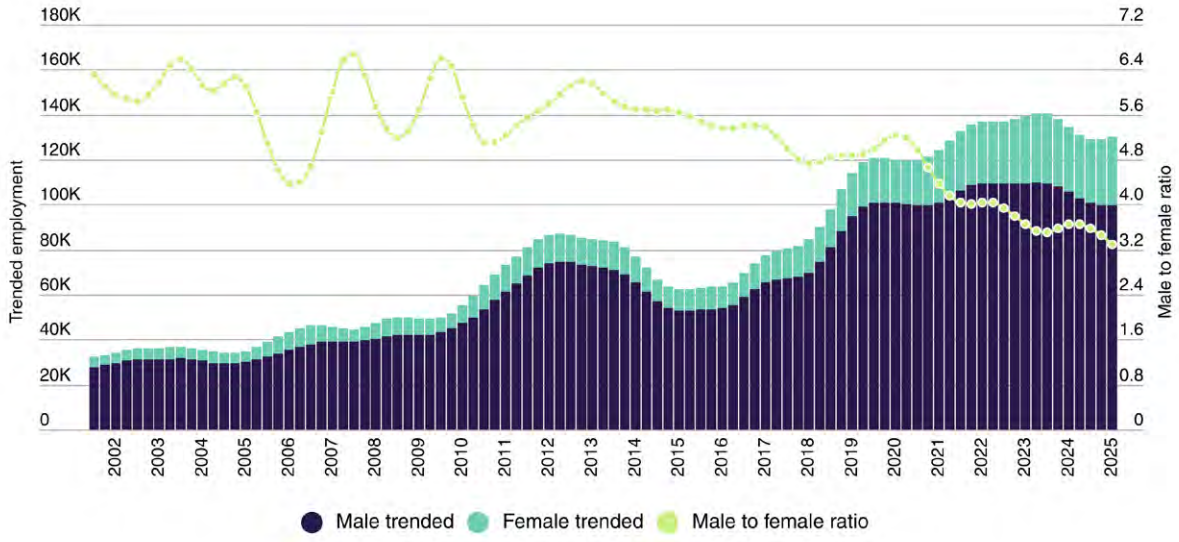


23 List of data source are in the Appendix 'Workforce Data Dashboard'.
24 Data related to the 'Mining nfd' (not further defined) sub-industry have been excluded from this analysis and are not represented in the dashboard.

Metal Ore Mining

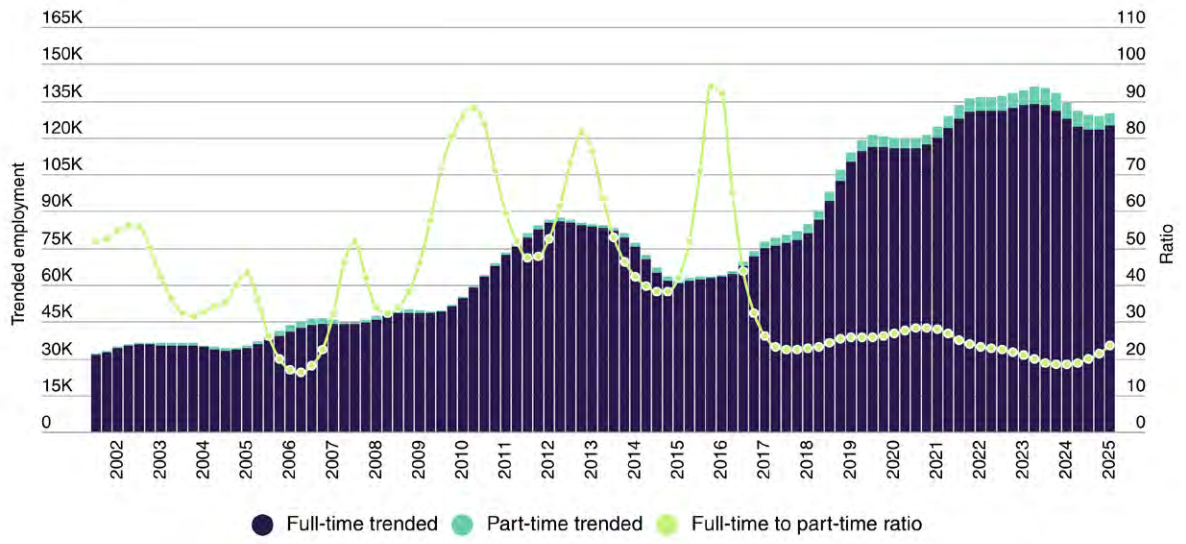
The Metal Ore Mining sector currently employs 130,000 workers,[25] representing an increase of 45,000 (+54%) total workers (Figure M5).[26] Full and part-time employment increased by 43,600 (+54%) and 1,800 (+49%), respectively (Figure M5). Over time, the Metal Ore Mining sector has seen an improvement in the ratio of male-to-female employment. In the early 2000s, the ratio was 6:1 for a decade, before falling to 3:1 in 2025.

Figure M5: Composition and employment trends in Metal Ore Mining, 2001–2025



Source: ABS, Labour Force, Australia, Detailed, Feb 2025*. Data trended by AUSMASA.*

Figure M6: Composition and employment trends by status of the Metal Ore Mining sector, 2001–2025



Source: ABS, Labour Force, Australia, Detailed, Feb 2025*. Data trended by AUSMASA.*

25 16,000 fewer workers than a series high from May 2023.
26 Please refer to our dashboard for Oil and Gas Extraction for an in-depth view on workforce composition and trends, https://ausmasa.org.au/media/scxphb42/07-oil-and-gas.pdf

On the brink of an ageing workforce

The age distribution of the Metal Ore Mining sector's workforce is younger than that of the overall Australian workforce, with a median age of 40 (Table M3) compared to the Australian workforce's median age of 42.[27] The age distribution of the workforce increased by one year between the census years. In total, 25% of the workforce was over 50 years of age or older and 10% over 57 years of age, compared to the average age of retirement for all workers in 2023 of 57.[28] This likely indicates an ageing workforce.

Iron ore's importance, despite recent price decreases linked with economic uncertainties in China and that of critical minerals, means the sector will continue to require a steady stream of new workers.[29] While new entrants into the workforce are generally younger, with a median age of 30, an ageing workforce will present more significant economic and strategic challenges for Australia, given iron ore's importance to the economy. This trend, however, may be temporary, as the Australian Government shifts to support on-shore processing and beneficiation of critical minerals.[30] Nonetheless, a better understanding of the iron ore mining industry, its attraction challenges, its support services, occupation pathways, and the promotion of diverse career options in the sector is needed.

Table M3: Age distribution of the Metal Ore Mining workforce

Percentile	2021 Census	2016 Census	Apprentices and trainees in 2024 Age at the completion
25th	32	31	24
50th (median)	40	39	30
75th	50	49	39

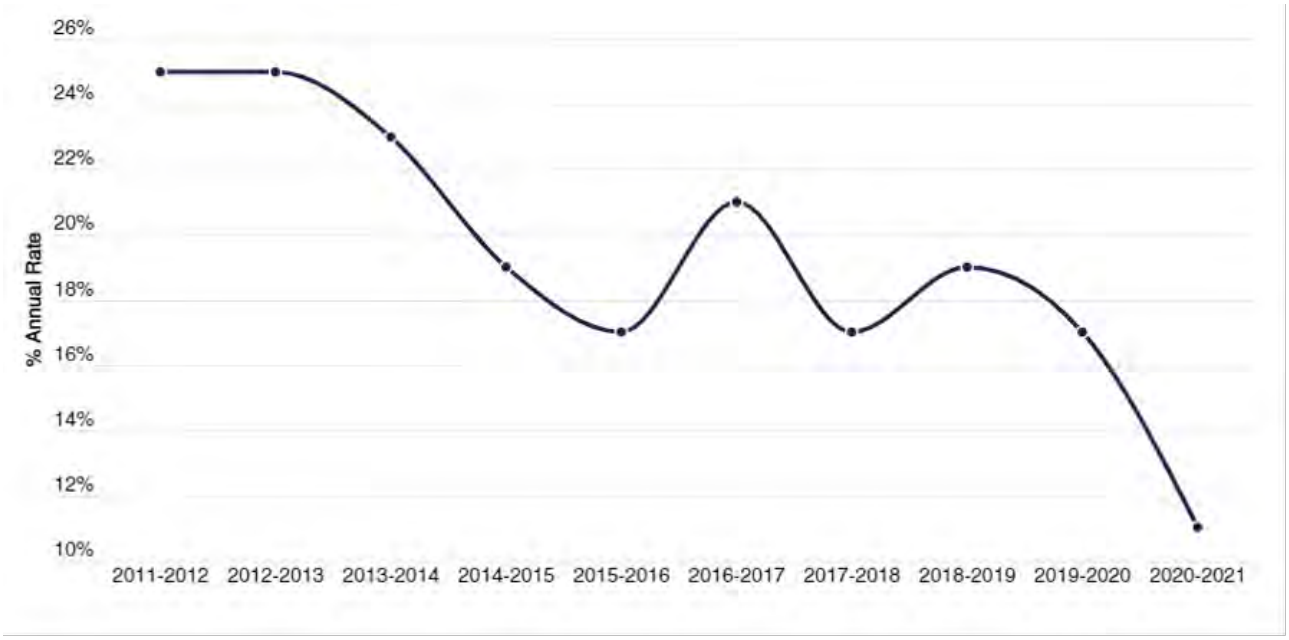
Source: 2021 Census – counting persons,15 years and over; 2016 Census – Counting Employed Persons, Place of Work POW); NCVER VOCSTATS, Apprentices and trainees – June 2024, Age by type of training by reporting period and training contract status.

27 ABS, "Employment in the 2021 Census | Australian Bureau of Statistics", 2022.
28 ABS, "Retirement and Retirement Intentions, Australia", 22 May 2024.
29 Hays, "Mining Industry Report Australia FY24/25", 2024.
30 DISR, "Critical Minerals Strategy 2023–2030", 2023.

Falling labour turnover

Labour turnover in the Metal Ore Mining sector fell to a series low of 11% (-14%) in 2020–21 (Figure M7). This represented the largest fall in turnover by sector for the mining industry. This is positive, as it indicates the workforce is increasingly able to stay in the sector compared to other sectors in the industry. AUSMASA will continue to study this phenomenon and derive lessons for the broader sector and future pathways to further reduce turnover.[31]

Figure M7: Turnover in Metal Ore Mining, 2011–2021



Source: JSA, Data on Occupation Mobility, Jan 2024; Key occupations by sub-industry mapped by AUSMASA.

Job advertisements in the Metal Ore Mining sector have steadily increased following the COVID-19 pandemic, rising by 21,400 (+84%) from January 2021 to March 2023. This trend, however, reversed, with a decrease of 9,300 (-20%) from March 2023 to October 2024.

31 Labour turnover is computed from data and research made available by JSA through their publication on Occupation Mobility – the data only goes up to 2020–21.

Electrifying heavy vehicles

With the largest workforce and number of key occupations in the mining industry, including several electrical-related roles, the Metal Ore Mining sector is at the forefront of electrifying heavy vehicles and other mobile plant equipment. This, however, also poses challenges to those who use, repair and maintain new equipment in electrical and automotive occupations. For example, a conversion of a Liebherr R 9,400 excavator from diesel to electric relied on workers from a factory in France to undertake the conversion in Western Australia.[32]

Industry stakeholders have also suggested that high-voltage electrical work on new and existing heavy vehicles, as well as mobile plant equipment, will likely require new, multi-skilled workers. Work is being undertaken with Curtin University on a block program that allows those with VET qualifications to secure an undergraduate certificate.[33] This means the current workforce can upskill without leaving the industry and risk industry-level productivity.

Similar creative solutions are required to address existing and future workforce challenges and will require coordinated mobilisation of both higher education and VET education providers. The VET workforce also faces challenges in ensuring trainers and assessors have industry currency in emerging technologies. Industry believes collaborations between VET providers and small and medium-sized enterprises (SMEs) can alleviate some of these challenges. VET changes and reforms are straightforward compared to higher education, due to the centralised nature of VET implementation. On the other hand, coordination from universities will require contribution and coordination from various university governing bodies, departments, and accreditation bodies. The benefits, however, from such mobilisation would be significant for the mining sector. AUSMASA will endeavour to work with tertiary education institutes and industry to find and enable such solutions.

Table M4: Top 5 Metal Ore Mining occupations

Occupations	Workforce numbers in 2021 Census	5-yr changes in IVI	Included in Core Skills Occupations List (CSOL)?	Shortage
Drillers, Miners, and Shot Firers	17,500	16.12%	No	RS
Metal Fitters and Machinists	9,100	45.92%	Yes	S
Other Building and Engineering Technicians	5,900	14.76%	Yes	S
Electricians	4,200	49.62%	Yes	S
Production Managers	3,700	64.97%	Yes	NS

Source: Jobs and Skills Australia, Internet Vacancy Index Oct 2024; Key occupations by sub-industry mapped by AUSMASA; Total workforce numbers are based on the Metal Ore Mining snapshot *in the Workforce Plan 2024, including* Core Occupation Skills *and* Occupation Shortage List.

Notes: RS: Regional Shortage; S: Shortage; NS: Not in Shortage. Our conversations with the industry indicate that the Census numbers may be smaller than reality, and we welcome identifying data sources that can paint a more accurate picture.

32 Liebherr, "Groundbreaking", 2023.
33 Thomson, "Fortescue uplifts First Nations employees - Australian Mining", 2024

Enrolments in Metal Ore Mining qualifications

Trends in RII Metal Ore Mining qualifications reflect the role of new VET students and upskilling for mining a range of metals including iron ore, copper, gold, and some critical minerals like nickel. From 2016 to 2019, enrolments and completions fell to 497 (-45%) and 125 (-55%), respectively. However, from 2019 to 2023, enrolments and completions increased to 685 (+38%) and 339 (+171%), respectively. If completions continue to fall, it will reduce the potential supply for the workforce, and greater investigation into this declining trend will be required.[34] Lower rates of full-time study, which can shift completions forward into later years, also suggest fewer completions going forward – as these rates had fallen 16 percentage points to 2% of enrolments by 2023.

While Metal Ore Mining occurs across Australia, Western Australia accounts for 65% of the workforce, which partially differs from where qualifications were delivered. From 2016 to 2020, Western Australia accounted for an average of 45% of student enrolments yearly, followed by New South Wales with 39% and Queensland with 16%, respectively. Western Australia, however, almost doubled this to an annual average of 83% of enrolments from 2021 to 2023, respectively, while the proportions decreased to an average of 11% for New South Wales and 5% for Queensland from 2021 to 2023. Although Western Australia's proportion of completions only averaged 34% from 2016 to 2020 and 45% from 2021 to 2023, Western Australia's recent enrolment increases suggest that it may benefit from more completions in the future, compared to other jurisdictions.

Key issues identified in Metal Ore Mining

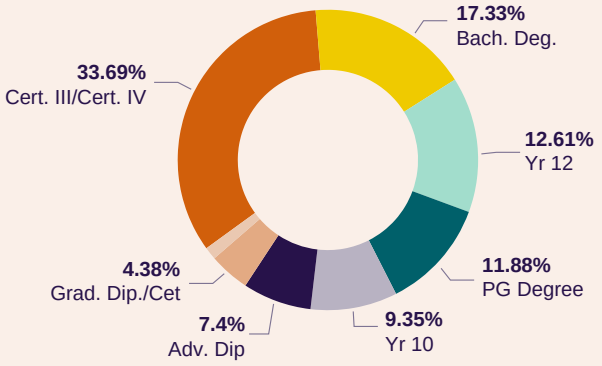
The global demand for critical minerals like nickel and lithium presents challenges for Australian miners, particularly against countries like Indonesia, which use carbon-intensive methods. This global competition has led to price volatility, with nickel prices dropping by 51% since early 2022. Due to ongoing challenges in the nickel industry, up to 10,000 workers could be affected.[35] While the broader metal ore industry is expanding, job losses in less concentrated mining areas like Tasmania are more complex to absorb. An in-depth investigation and study of career pathways for workers susceptible to displacement are needed. AUSMASA will continue to work with stakeholders to identify such opportunities and solutions.

34 Non-completions may also represent instances where a student withdraws upon securing employment, withdraws as they had originally only intended to do some units, or decides to pursue a different career path.

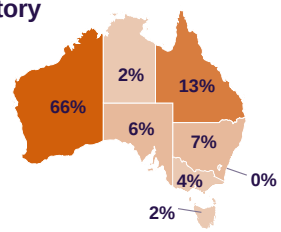
35 Chamber of Minerals and Energy of Western Australia, "A Critical Juncture – Australia's Opportunities and Challenges in Nickel", 2024.

Dashboard 2: Metal Ore Mining[36]

Education level of the workforce



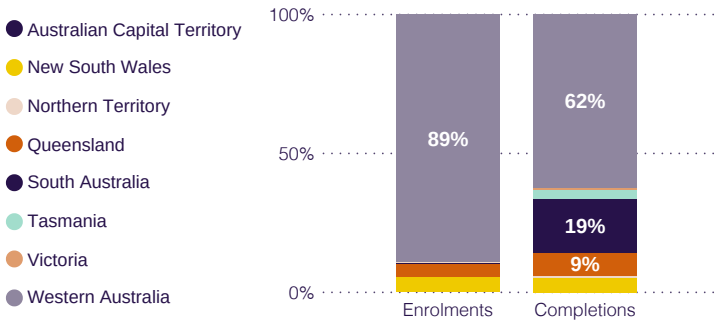
Total workforce by state/ territory



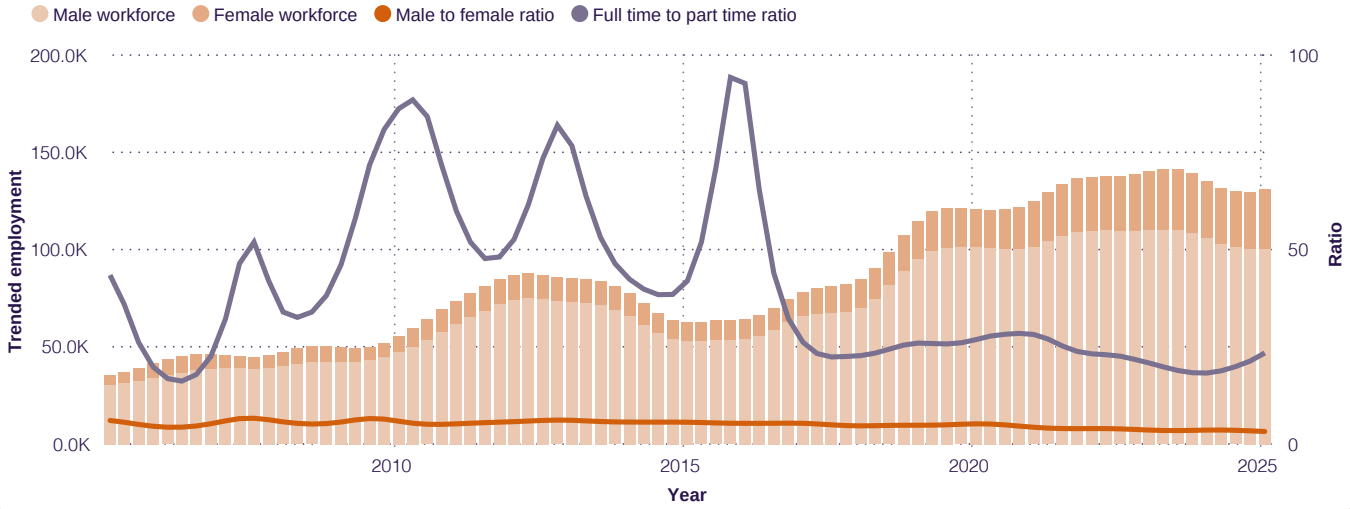
Projected growth over next decade	% female workforce
12%	20%

Median age	% workforce aged 24 or younger	% workforce aged 60 and above
40	6%	8%

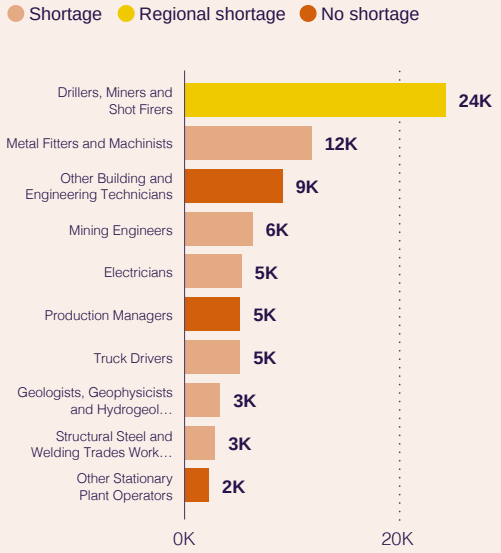
Training package status by state/territory of residence



Trends in employment by gender and work type



Top 10 ANZSCO occupations by workforce number

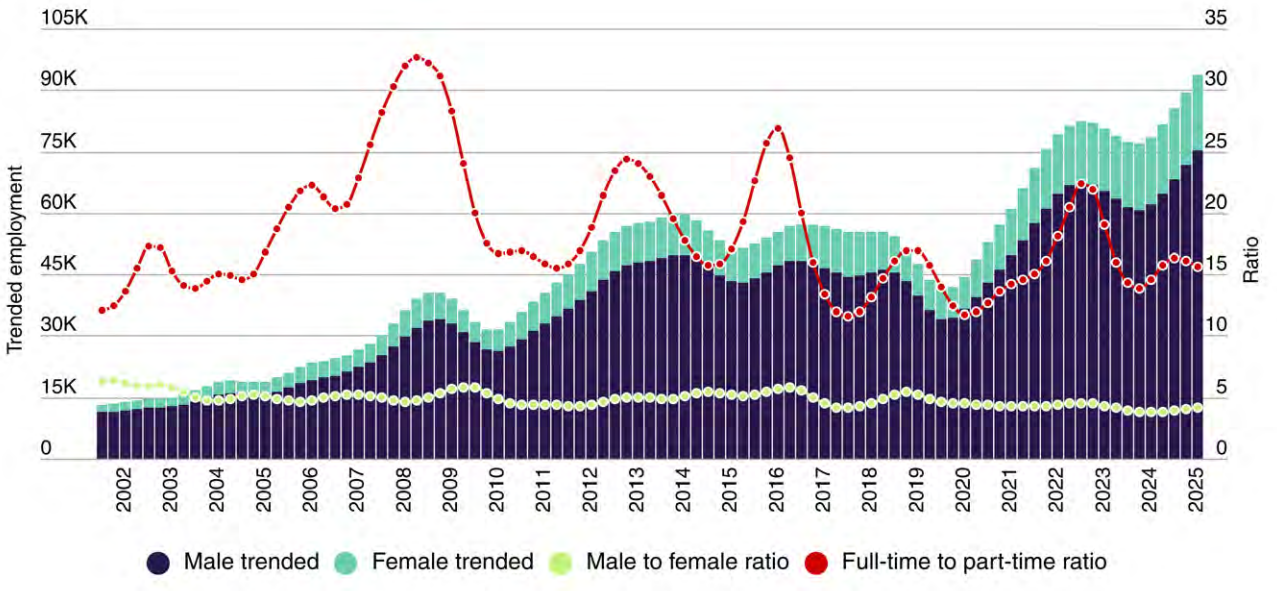


36 List of data source are in the Appendix 'Workforce Data Dashboard'.

Exploration and Other Mining Support Services

The Exploration and Other Mining Support Services' workforce has seen reasonable growth and gains in participation across genders, while the male-to-female ratio improved from around 6:1 to 4:1.[37] The Exploration and Other Mining Support Services sector employs over 93,000 workers, reflecting an increase of 38,300 (+69%) workers (Figure M8). Full and part-time workers have seen an increase of 36,500 (+71%) and 1,700 (+44%), respectively. While increases in full-time roles are positive, as they show the sector continues to perform well with a strong labour market, the relatively smaller increases in employment by females are less positive, as a lack of gender diversity can be associated with current or impending skills shortages.[38] The ratio of male-to-female employment in the sector remained largely consistent at around 6:1 from the early 2000s to 2019, before decreasing to 4:1 in 2025.

Figure M8: Composition and employment trends in Exploration and Other Mining Support Services, 2001–2025



Source: ABS, Labour Force, Australia, Detailed, Feb 2025. Data Trended by AUSMASA.

37 Please refer to our dashboard for Exploration and Other Mining Support Services for an in-depth view on workforce composition and trends, https://ausmasa.org.au/media/yylfj415/10-exploration-and-other-mining-support-services.pdf

38 JSA, "2024 Occupation Shortage List", 14 October 2024.

A younger workforce

Between the census years, the age distribution of the workforce remained largely the same, with the median age being 40 and the oldest 25% of the workforce being above 50 (Table M5). This is slightly younger than the Australian workforce, as the median age of all Australian workers was 42 in Census 2021.[39] Over 10% of the workforce was over 57 years old, noting that the average age of retirement was 57 for all workers in 2023.[40]

While some other parts of the industry are skewed more towards older workers, the sector's key role in bringing onstream new supplies of resources like critical minerals and supporting downstream activities in other sectors means the industry will continue to require a steady stream of new and likely younger workers.[41] As many specialised occupations in the sector require several years of higher education (for example, Geologists, Metallurgists, and Mining Engineers), younger workers may be better placed to commit to this level of training. The median age of new entrants is 28 years – which is positive for the future of the workforce.

Table M5: Age distribution of the Exploration and Other Mining Support Services

Percentile	2021 Census	2016 Census	Apprentices and trainees, 2024 Age at the completion
25th	31	31	25
50th (median)	40	40	28
75th	50	49	33

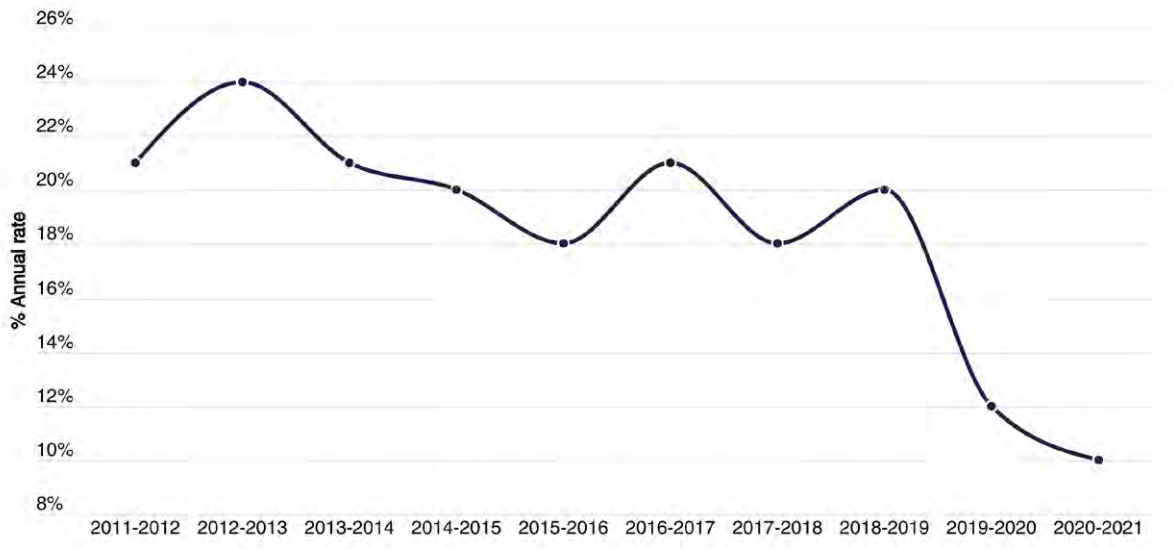
Source: 2021 Census – counting persons, 15 years and over; 2016 Census – Counting Employed Persons, Place of Work (POW); NCVER VOCSTATS, Apprentices and trainees – June 2024, Age by type of training by reporting period and training contract status.

Falling labour turnover

Labour turnover fell to 10% (-14%) in 2020–21 from a series high of 24% in 2012–13 (Figure M9). As the mining industry as a whole performed well, with almost no job losses during the onset of COVID-19, this data suggests that the sector performed even better than the industry overall.[42] Falling turnover indicates that the workforce is increasingly able to remain employed in the sector. AUSMASA will continue to study this trend and derive lessons for the broader industry on improving labour turnover.[43]

39 ABS, "Employment in the 2021 Census", 2021.
40 ABS,"Retirement and Retirement Intentions, Australia." 2023.
41 MCA, "Minerals-Plus", September 2024.
42 AusIMM, "The supply and demand of mining, metallurgical and geotechnical engineers in the Australian resources industry." 2021.
43 Labour turnover is computed from data and research made available by JSA through their publication on Occupation Mobility – the data only goes up to 2020–21.

Figure M9: Turnover in Exploration and Other Mining Support Services, 2011–2021



Source: JSA, Data on Occupation Mobility, Jan 2024; Key Occupations by sub-industry mapped by AUSMASA.

Job advertisements in the Exploration and Other Mining Support Services industry have steadily increased following the COVID-19 pandemic, rising by 7,000 (+81%) from January 2021 to March 2023. This trend reversed, however, with a decrease of 2,700 (-17%) from March 2023 to October 2024.

Table M6: Key Exploration and Other Mining Support Services occupations

Occupations	Workforce numbers in 2021 Census	5-yr changes in IVI	Included in CSOL?	Shortage
Drillers, Miners, and Shot Firers	5,200	16.12%	No	RS
Metal Fitters and Machinists	2,100	45.92%	Yes	S
Geologists and Geophysicists	1,300	15.35%	Yes	S
Other construction and mining labourers	1,200	46.04%	No	NS
Other Building and Engineering Technicians	800	14.76%	Yes	S

Source: Jobs and Skills Australia, Internet Vacancy Index Oct 2024; Key occupations by sub-industry mapped by AUSMASA; Total workforce numbers are based on the Exploration and Other Support Services mining snapshot in the Workforce Plan 2024, including Core Occupation Skills and Occupation Shortage List.

Notes: RS: Regional Shortage; S: Shortage; NS: Not in Shortage. Our conversations with industry indicate that the Census numbers may be smaller than reality, and we welcome the identification of data sources that can paint a more accurate picture.

From 2016 to 2023, more people have been enrolling in and completing mining-related qualifications. Enrolments went up by 198% to 7,210, and completions increased by 83% to 3,335.

Most of this growth, however, comes from students choosing shorter and lower-level courses (Certificate II), while the number taking longer, more advanced courses (Certificate III) has dropped. This shift means students may now have fewer skills and less experience, which could present a problem for the mining industry and its workforce needs.

Queensland accounts for 40% of enrolments and 30% of completions, and Western Australia accounts for 39% and 42%, respectively. This aligns with the distribution of the workforce, as Western Australia and Queensland account for 57% and 22%, respectively.[44]

Distribution is likely influenced by Western Australia's Skills Ready program, launched in 2020,[45] and the Driller's Offsider Job Ready Program, which began in 2022.[46] The program subsidised one skill set (Driller's Offsider Job Ready Skill Set) and several Certificate II-IV qualifications for students to progress in drilling operations – including 3 of the 10 RII qualifications we categorise as Exploration and Other Mining Support Services qualifications.

Key issues identified in Exploration and Other Mining Support Services

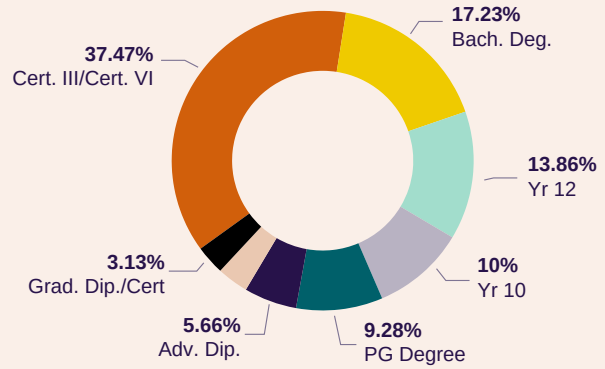
The 2024 Workforce Plan identified that exploration and drilling expenditure fluctuates with commodity prices, leading to high workforce turnover rates. In fact, turnover rates are 2 to 3 times higher than other mining sectors, due to harsh conditions and job transiency. This creates significant workforce planning challenges.[47] Jobs and Skills Australia (JSA) data suggests that labour turnover is falling in the sector, which warrants further investigation. AUSMASA will continue to investigate this trend.

Furthermore, technological advancements, such as drones, unmanned aerial vehicles, and automatic data processing, are changing task performance. These innovations can help achieve more with the existing workforce, attract new entrants, and necessitate upskilling for higher digital skills.[48] Specifically, skill pathways for these higher digital skills need to be developed. AUSMASA will work with stakeholders to identify and enable such pathways.

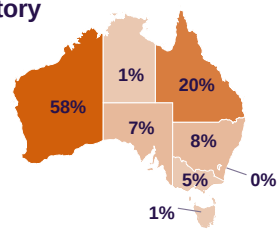
44 VOCSTATS, "Total VET students and courses", August 2024.; ABS, Labour Force, Australia, Detailed, Nov 2023 - Aug 2024 (4 quarter average).
45 JSWA, "Training", 2025.
46 JSWA, "Driller's Offsider Job Ready Program", 2022.
47 D. S. Houghton. Long-distance Commuting: a new Approach to Mining in Australia. The Geographical Journal. 1993.
48 Kazuya Okada. Breakthrough Technologies for Mineral Exploration. Mineral Economics 35. 2022.

Dashboard 3: Exploration and Other Mining Support Services[49]

Education level of the workforce



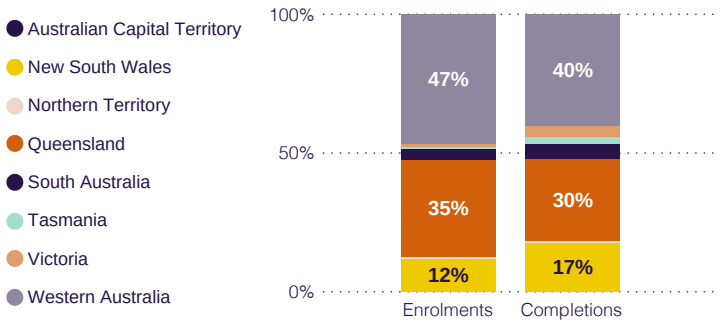
Total workforce by state/ territory



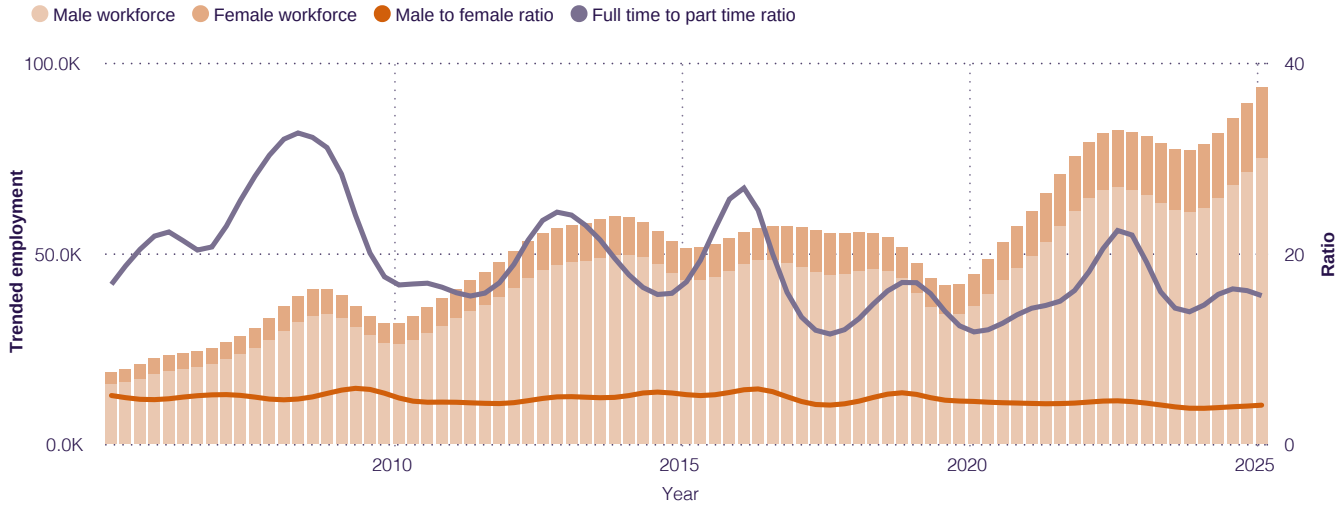
Projected growth over next decade	% female workforce
6%	25%

Median age	% workforce aged 24 or younger	% workforce aged 60 and above
40	8%	9%

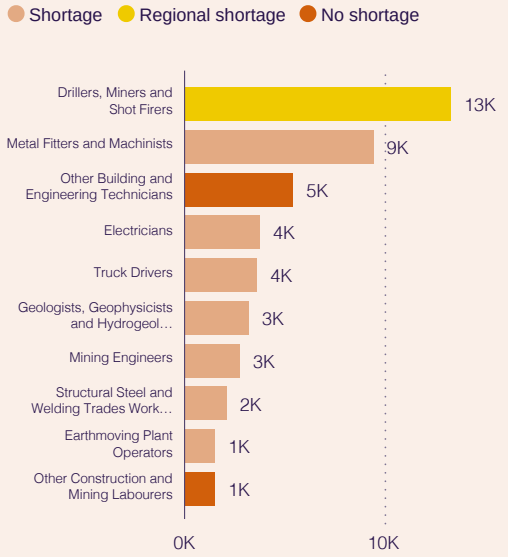
Training package status by state/territory of residence



Trends in employment by gender and work type



Top 10 ANZSCO occupations by workforce number

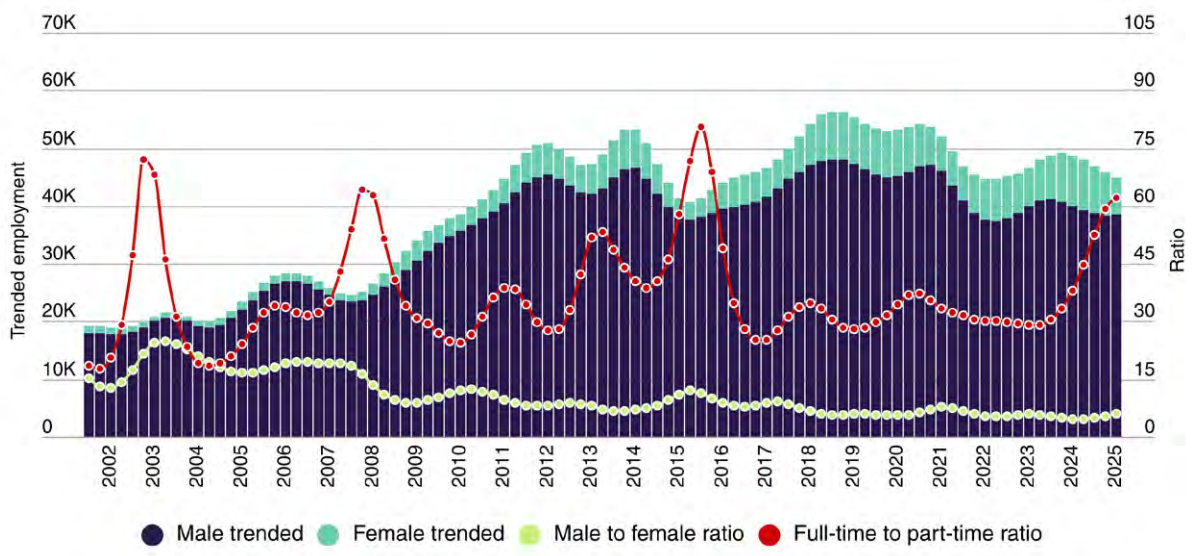


49 List of data source are in the Appendix 'Workforce Data Dashboard'.

Coal Mining

The Coal Mining workforce has seen a notable decline in size since COVID-19, currently employing 45,000 workers (Figure M10).[50] None of the top 10 key occupations in coal mining saw a decrease in size, however, which is largely led by a decline in ancillary and support occupations in the sector. The sector also saw a trend favouring female employment and part-time workers.

Figure M10: Composition and employment trends in Coal Mining, 2001–2025



Source: Australian Bureau of Statistics (ABS), Labour Force, Australia, Detailed, Feb 2025*. Data trended by AUSMASA.*

50 Please refer to our dashboard for Coal Mining for an in-depth view on workforce composition and trends, https://ausmasa.org.au/media/gpnmexev/06-coal-mining.pdf

An ageing workforce

Between the 2016 and 2021 censuses, the age distribution of the Coal Mining workforce remained broadly consistent, only getting a year older for workers (Table M7). This reflects a robust but somewhat waning attraction rate of younger workers, particularly compared to the median Australian workforce age[51].

Indicating entrenched community dependence on the Coal Mining sector, the recruitment trends require further investigation to determine whether coal-dependent communities and towns are driving this trend. Regardless of the source of the trend, it creates the need for significant upskilling and redeployment in the Coal Mining workforce.

> As the country moves towards net zero, the proportion of the workforce needing re-skilling will only increase.

Greater automation and technological change will continue to reduce demand for labour. The shift to automation, however, is creating the need for skills in programming, data management, data communications, and autonomous systems management. These skills currently lack structured pathways, as they are often not tied to formal qualifications and are in short supply.

AUSMASA will continue to leverage the tripartite system to investigate pathways into the industry for such skills and evaluate how these skill gaps can be best serviced. They may result in a natural decrease in labour demand for roles like labour workers and machinery operators in favour of those more specialised or 'skilled'.[52]

51 ABS, "Employment in the 2021 Census,' 30 November 2022.
52 Hays, "Hays Mining Industry Report Australia FY24/25,' 2024.

Better perception needed from younger workers

The 25th percentile shifted up by a year between the census years. While minor, these shifts could also be seen as indicators of an attraction issue. AUSMASA's research on Generation Z found negative perceptions of mining were primarily associated with coal.[53]

Most respondents were less interested in 'traditional' mining occupations and unaware of opportunities in more specialised or 'skilled' areas critical to the sector's future.

More consideration should be given to how to bolster the number of younger workers going forward. Further improvements in turnover and retention could also come from supervisory practice, as various industry stakeholders, particularly in Queensland, call for better implementation of the Brady Review's findings around concerns of appropriate supervision, consistency and relevance to critical control management. AUSMASA has been funded to advance a project that will address mine site supervisor competencies.

Table M7: Age distribution of the Coal Mining workforce

Percentile	2021 Census	2016 Census	Apprentices and trainees, 2024 (age at completion)
25th	33	32	22
50th (median)	41	40	30
75th	50	49	36

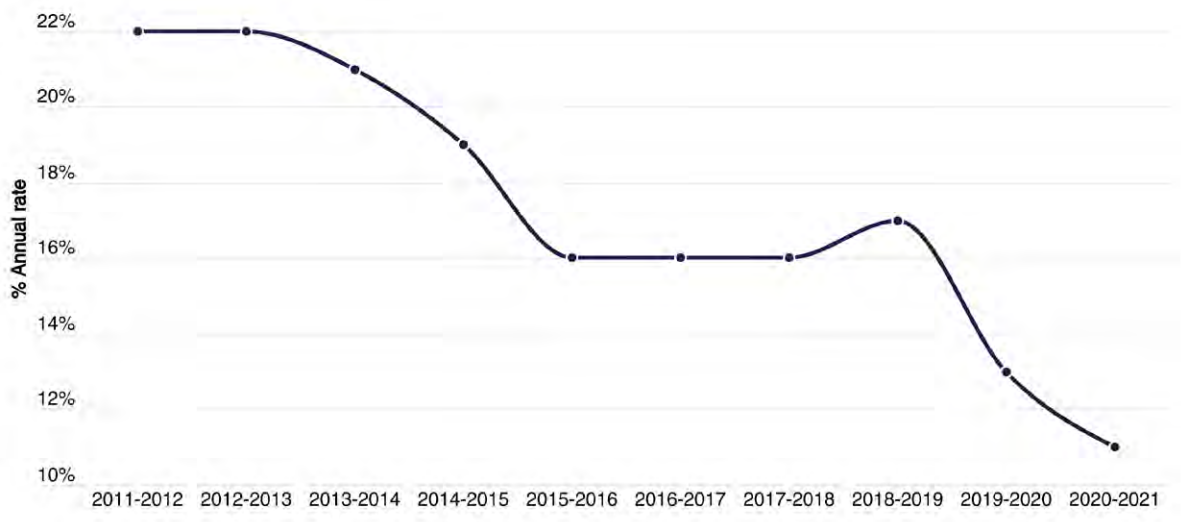
Source: 2021 Census – counting persons, 15 years and over; 2016 Census – Counting Employed Persons, Place of Work (POW); NCVER VOCSTATS, Apprentices and trainees – June 2024, Age by type of training by reporting period and training contract status.

53 Mining and Automotive Skills Alliance (AUSMASA), "Gen Z Perceptions of Mining", 10 April 2024.

Falling labour turnover in Coal Mining

Labour turnover in the Coal Mining sector decreased from a high of 22% in 2011–12 to a low of 11% at the start of COVID-19 in 2020–21 (Figure M11). Falling labour turnover is a positive sign, particularly in a tight job market, as it indicates the workforce increasingly prefers to stay in the sector. With a range of new coal mines set to open,[54] workers will be drawn to the sector to find employment. AUSMASA will continue to research and investigate these trends to understand better how to enhance turnover and retention.[55]

Figure M11: Turnover in Coal Mining, 2011–2021



Source: Jobs and Skills Australia, Data on Occupation Mobility, Jan 2024; Key occupations by industry subdivision mapped by AUSMASA.

54 Hays, "Hays Mining Industry Report Australia FY24/25", 2024.
55 Labour turnover is computed from data and research made available by JSA through their publication on Occupation Mobility – the data only goes up to 2020–21.

Advertisements for key occupations in the Coal Mining sector have steadily increased following the COVID-19 pandemic, rising by 12,900 (+87%) from January 2021 to March 2023 (Table M8). This trend reversed, however, with a decrease of 5,200 (-19%) from March 2023 to October 2024.

Table M8: Top 5 Coal Mining occupations

Occupations	Workforce numbers in 2021 Census	5-yr changes in IVI	Included in CSOL?	Shortage*
Drillers, Miners, and Shot Firers	15,900	16.12%	No	RS
Metal Fitters and Machinists	6,200	45.92%	Yes	S
Other Building and Engineering Technicians	2,900	14.76%	Yes	S
Electricians	2,600	49.62%	Yes	S
Truck Drivers	2,400	75.69%	No	S

Source: Jobs and Skills Australia, Internet Vacancy Index Oct 2024; Key occupations by sub-industry mapped by AUSMASA; Total workforce numbers are based on the Coal Mining snapshot in the Workforce Plan 2024, including Core Occupation Skills List (CSOL) and Occupation Shortage List.

Notes: RS: Regional Shortage; S: Shortage; NS: Not in Shortage. Our conversations with the industry indicate that the Census numbers may be smaller than reality, and we welcome the identification of data sources that can paint a more accurate picture.

Enrolments in Coal Mining RII qualifications

From 2016 to 2021, coal enrolments in RII fell to 2,024 students (-13%) before increasing to 3,361 (+63%) in 2023. Female participation increased as the share of female enrolments rose roughly 12% (+5%) from 2016 to 2023.

These recent increases have not (yet) flowed through to the rise in female completions. Completions increased, however, to 523 (+127%) from 2022 to 2023.

At the jurisdictional level, it should be noted that these national trends were almost entirely driven by Queensland – since the state accounted for 83% of enrolments on average each year between 2016 and 2023 and is home to a larger share of relevant RTOs. The wider workforce distribution, however, is split between Queensland with 61%, and New South Wales with 33%.[56]

At the same time, this trend was less pronounced in completions, as Queensland accounted for 46% of student completions on average each year from 2016 to 2023, while New South Wales notably accounted for an average of 51% of completions. We consider these differences linked to the Underground Coal Mine Safety Skill Set, which can provide credit towards various Certificate II and III RII qualifications and other Queensland requirements for specific workers.

Key issues for Coal Mining sector

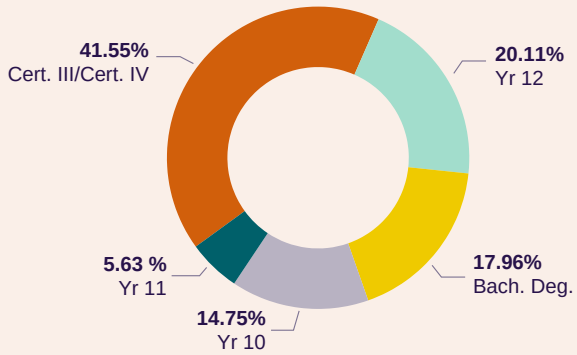
Australia's coal industry faces increasing pressure due to global climate change targets. The International Energy Agency's Net Zero by 2050 Roadmap calls for no new unabated coal plants, phasing out the least efficient coal plants by 2030, and retrofitting remaining plants by 2040.[57]

The transition away from coal-fired power stations will impact nearly all coal mines. Governments are investing in helping affected communities transition to clean energy jobs, requiring large-scale re-skilling with more complex and digital skills.[58] A greater understanding of the nature of skills required in this transition and in enabling the decommission of mines is required. AUSMASA welcomes insight from stakeholders on these issues and will continue to work on identifying such insights to better align today's workforce for tomorrow.

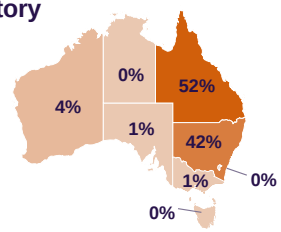
56 ABS Detailed Labour Force Survey (Table EQ06, 4-quarter Average), Reference Period: February 2024
57 International Energy Agency, "Net Zero by 2050 - A Roadmap for the Global Energy Sector", May 2021.
58 The World Bank. For a Just Transition Away from Coal, People Must Be at the Centre', November 2021.

Dashboard 4: Coal Mining[59]

Education level of the workforce



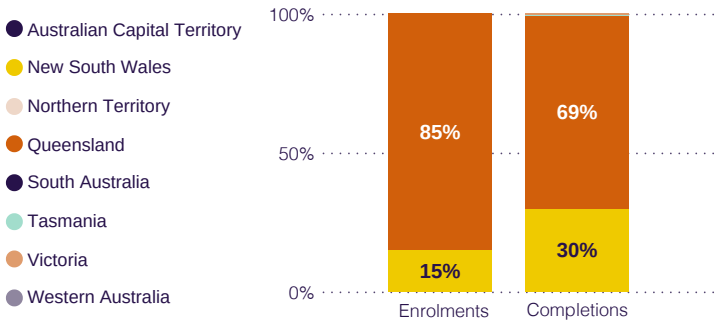
Total workforce by state/ territory



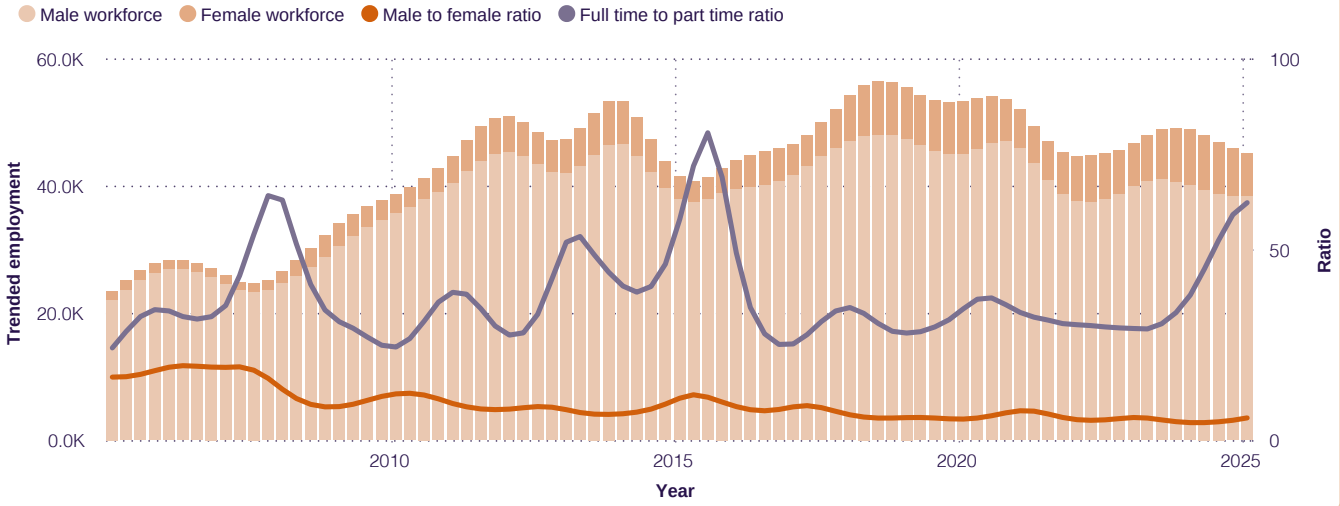
Projected growth over next decade	% female workforce
-1%	17%

Median age	% workforce aged 24 or younger	% workforce aged 60 and above
41	6%	7%

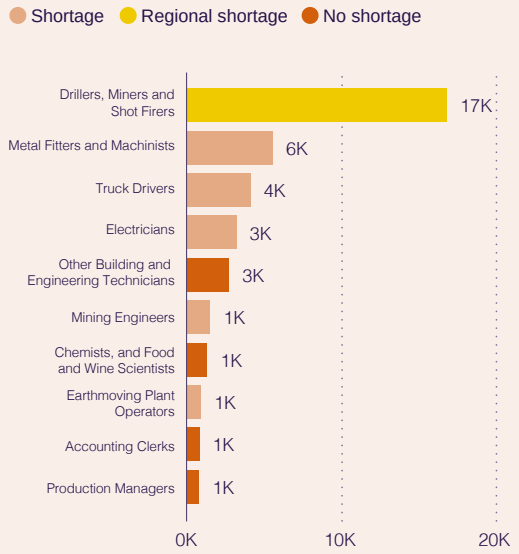
Training package status by state/territory of residence



Trends in employment by gender and work type



Top 10 ANZSCO occupations by workforce number



59 List of data source are in the Appendix 'Workforce Data Dashboard'.

Oil and Gas Extraction

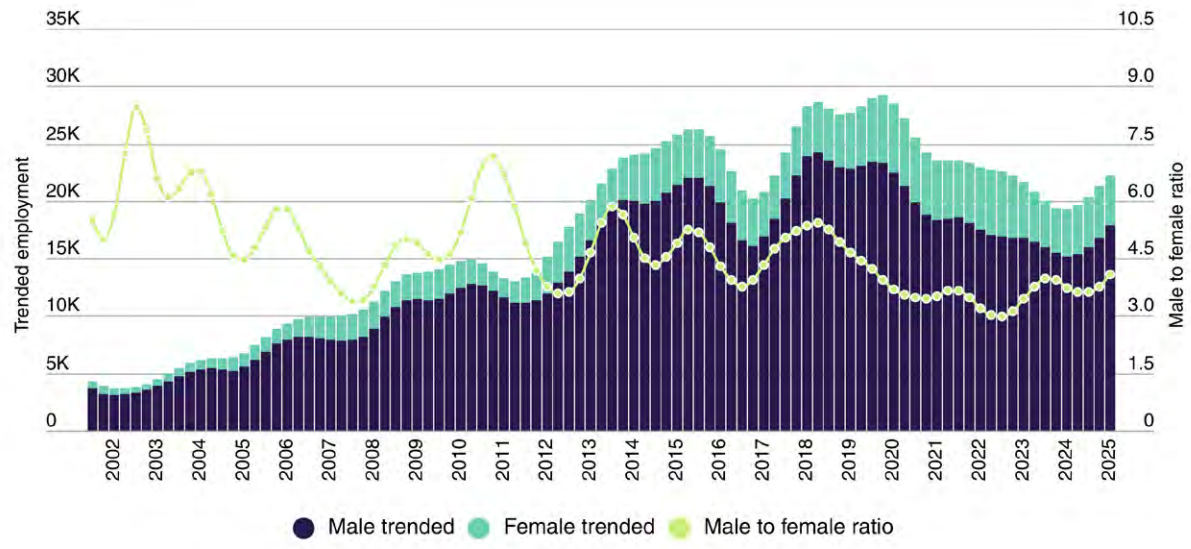
The Oil and Gas Extraction sector currently employs over 22,000 workers, a decrease of 6,000 (-21%) total workers since February 2018 (Figure M12).[60] Both full and part-time workers decreased by 5,600 (-21%) and 460 (-39%), respectively, from February 2018 to February 2025 (Figure M13). This overall decrease may suggest a reduced demand for workers following the peak in 2018 – likely driven by the movement to net zero. The decline in employment was largely spurred by decreases in the size of the chemical, gas, and petroleum generation plant operators and other support occupations. No other key occupation in the sector saw a decrease in employment.

The ratio of male to female employment reached its peak at 8:1 during the 2011–2012 mining boom, before its present 4:1. The decrease was largely driven by the shrinking workforce, maintaining a steady proportion of female workers as male employment fell.

AUSMASA research and stakeholder consultation show that the sector needs to further improve female representation by way of improved employment outcomes, visible and practised career progression, greater work flexibility, and mentoring opportunities.

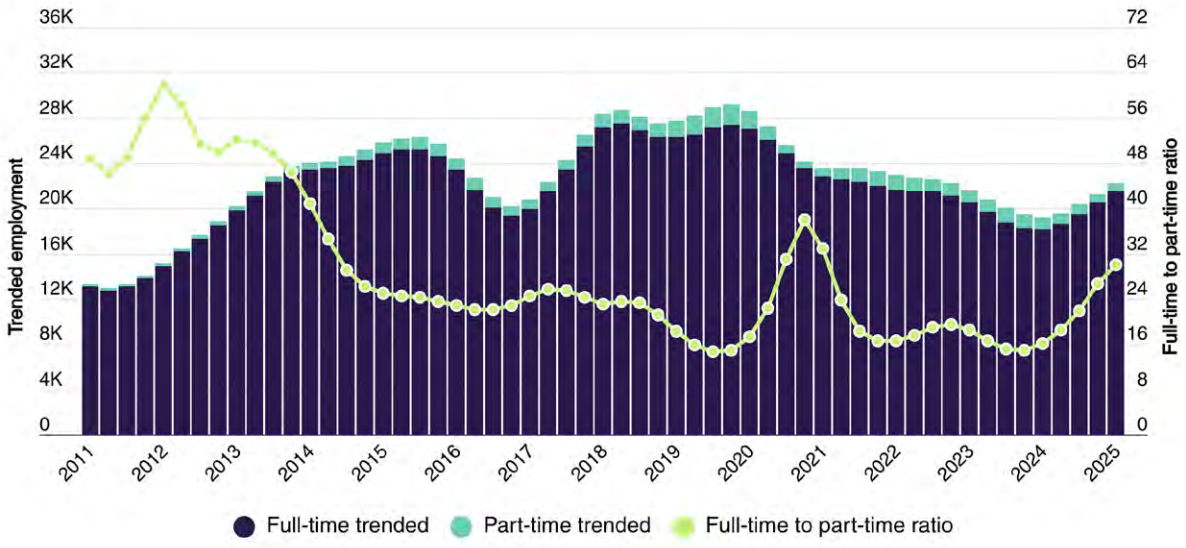
60 Please refer to our dashboard for Oil and Gas Extraction for an in-depth view on workforce composition and trends, https://ausmasa.org.au/media/scxphb42/07-oil-and-gas.pdf

Figure M12: Composition and employment trends in Oil and Gas Extraction, 2001–2025



Source: ABS, Labour Force, Australia, Detailed, Feb 2025*. Data Trended by AUSMASA.*

Figure M13: Composition and employment trends by employment status in Oil and Gas Extraction, 2011–2025



Source: ABS, Labour Force, Australia, Detailed, Feb 2025*. Data Trended by AUSMASA.*

Onset of an ageing workforce

The age distribution of the Oil and Gas Extraction sector is largely similar to the overall Australian workforce, with all Australian workers having a median age of 42 in Census 2021 (Table M9). With only 5% of workers below the age of 26, there is a clear risk of the industry facing an ageing workforce. [61] Over the census years, the median age has increased by 2 years; robust retention typically retains the median age. Additionally, 25% of the sector's workers were 35 years old or younger as of the 2021 census, which is 3 years older than in 2016. This ageing trend is likely a manifestation of underlying workforce attraction issues. Given that the oldest 25% of the incoming workforce (Table M9) is above the age of 30, as older workers retire, the workforce may decline and age.

Table M9: Age distribution of the Oil and Gas Extraction workforce

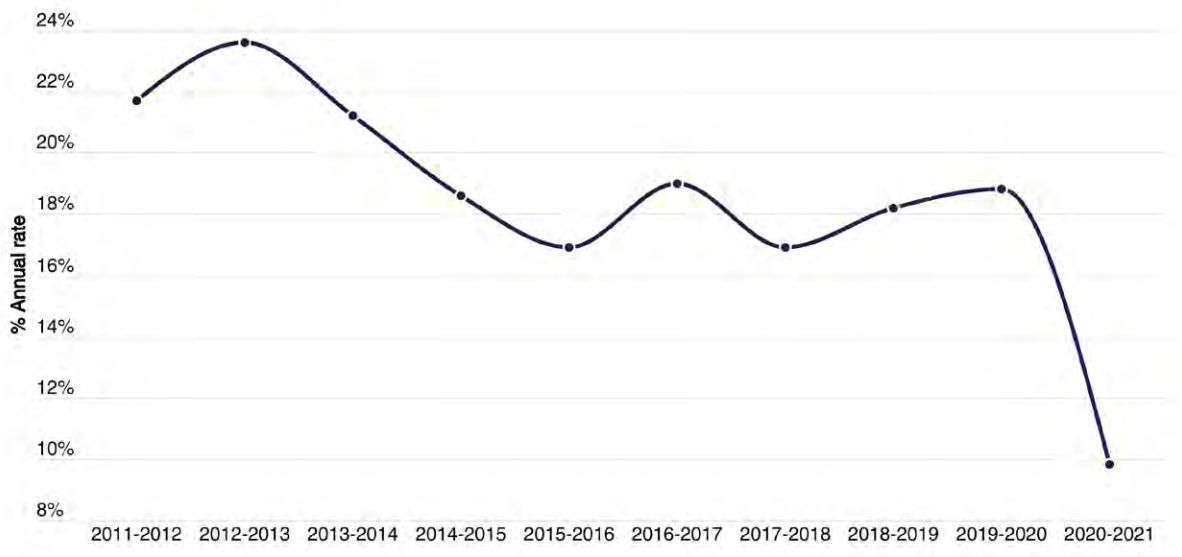
Percentile	2021 Census	2016 Census	Apprentices and trainees in 2024 Age at the completion
25th	35	32	22
50th (Median)	42	40	25
75th	50	48	30

Source: 2021 Census – counting persons, 15 years and over; 2016 Census – Counting Employed Persons, Place of Work (POW); NCVER VOCSTATS, Apprentices and trainees – June 2024, Age by type of training by reporting period and training contract status

61 AUSMASA, "Industry Workforce Plan Moving ahead together 2024", August 2024.

Labour turnover in the Oil and Gas Extraction sector fell to a series low of 9.8% in 2020–21 (-11.8%) (Figure M14). Given the shrinking and ageing of the sector's workforce, the lower turnover is a positive sign, indicating lower attrition and allowing the industry more time to attract younger workers. AUSMASA will continue to research and investigate these trends to better understand how to improve turnover and retention.[62]

Figure M14: Turnover in Oil and Gas Extraction, 2011–2021



Source: JSA, Data on Occupation Mobility, Jan 2024; Key occupations by sub-industry mapped by AUSMASA

Job advertisements in the Oil and Gas Extraction sector have shown a steady increase following the COVID-19 pandemic, rising by 8,400 (+90%) from January 2021 to October 2023 (Table M10). This trend reversed, however, with a decrease of 3,000 (-17%) from October 2023 to October 2024.

Table M10: Top 5 Oil and Gas Extraction occupations

Occupations	Workforce numbers in 2021 Census	5-yr changes in IVI	Included in CSOL?	Shortage*
Chemical, Gas, Petroleum and Power Plant Operators	1,700	-5.00%	Yes	NS
Mining Engineers	1,100	4.72%	Yes	S
Drillers, Miners, and Shot Firers	1,000	16.12%	No	RS
Metal Fitters and Machinists	800	45.92%	Yes	S
Other Building and Engineering Technicians	600	14.76%	Yes	NS

Source: JSA, Internet Vacancy Index Oct 2024; Key occupations by sub-industry mapped by AUSMASA; Total workforce numbers are based on the Oil and Gas mining snapshot in the Workforce Plan 2024, including Core Occupation Skills List (CSOL) and Occupation Shortage List.

Notes: RS: Regional Shortage; S: Shortage; NS: Not in Shortage. Our conversations with industry indicate that the Census numbers may be smaller than reality, we welcome the identification of data sources that can paint a more accurate picture.

62 Labour turnover is computed from data and research made available by JSA through their publication on Occupation Mobility – the data only goes up to 2020-21

Enrolments in RII Oil and Gas qualifications

Enrolments in RII Oil and Gas qualifications have been volatile. From 2016 to 2021, the enrolments fell by 2,402 (-77%), then from 2021 to 2023 enrolments increased 1,149 (+164%). Oil and Gas completions were flat – at about 520 from 2016 to 2019 – before they fell to a low of 327 (-60%) in 2021. They increased to a high of 959 (+174%) in 2023.

Although enrolments and completions for female students followed a similar pattern to the overall figures, their figures were too low for any meaningful analysis. In 2023, there were 23 annual female enrolments and 5 completions. This suggests that the future female workforce will continue to stagnate unless efforts are made to increase diversity in the talent pool. AUSMASA will continue to investigate barriers around female participation in relevant qualifications and pathways to improve female participation.

Queensland's overrepresentation in this data is also a point of interest. While 30% of the entire Oil and Gas workforce is in Queensland, 42% in Western Australia and 14% in Victoria,[63] Queensland represented 97% of onshore RII Oil and Gas enrolments and 78% of completions on average each year from 2016 to 2023.[64] Queensland's large reserves of onshore coal seam gas, its User Choice Program, and its large number of RTOs offering these qualifications may account for these discrepancies. As early as 2017, this employment-based program has subsidised several related traineeships, with Priority 1 qualifications 100% funded and Priority 2 qualifications subsidised by 87.5%.[65] Indigenous students were eligible for a 100% subsidy, with their percentage of enrolments and completions roughly doubling from 3% to 4% in 2016 to 6% to 7% in 2023. It appears that Queensland's program has likely supported and diversified its onshore Oil and Gas sector, which may warrant further investigation to support the training needs of other sectors.

Key issues identified in Oil and Gas Extraction

The Oil and Gas Extraction industry workforce are predominantly middle-aged, with a median age of 42. Only 5% are under 26, and 6% are over 60. This reflects the specialised skills required and the remote, challenging working conditions.[66] These conditions prevent robust recruitment and retention. Further investigation is required to identify possible mitigation strategies.

63 South Australia also accounted for 6% of the wider Oil and Gas workforce, followed by the Northern Territory with 2% and Tasmania and the Australian Capital Territory with 1%. https://ausmasa.org.au/media/5vxngfo2/ausmasa-industry-workforce-plan-2024.pdf#page=92

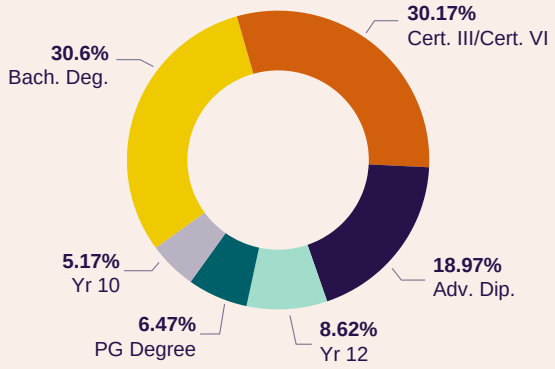
64 NCVER. 2023. TVA program enrolments 2022 (VOCSTATS).

65 Queensland Department of Trade, Employment and Training, VET Funding and pricing, June 2024.

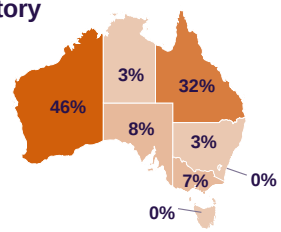
66 Australian Bureau of Statistics. February 2024 - Labour Force, Australia, Detailed - 'Table EQ06

Dashboard 5: Oil and Gas Extraction[67]

Education level of the workforce



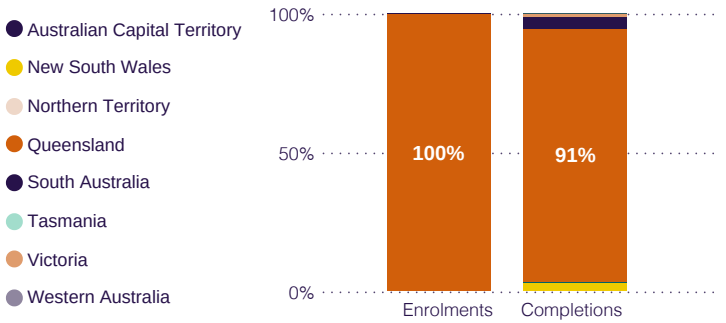
Total workforce by state/ territory



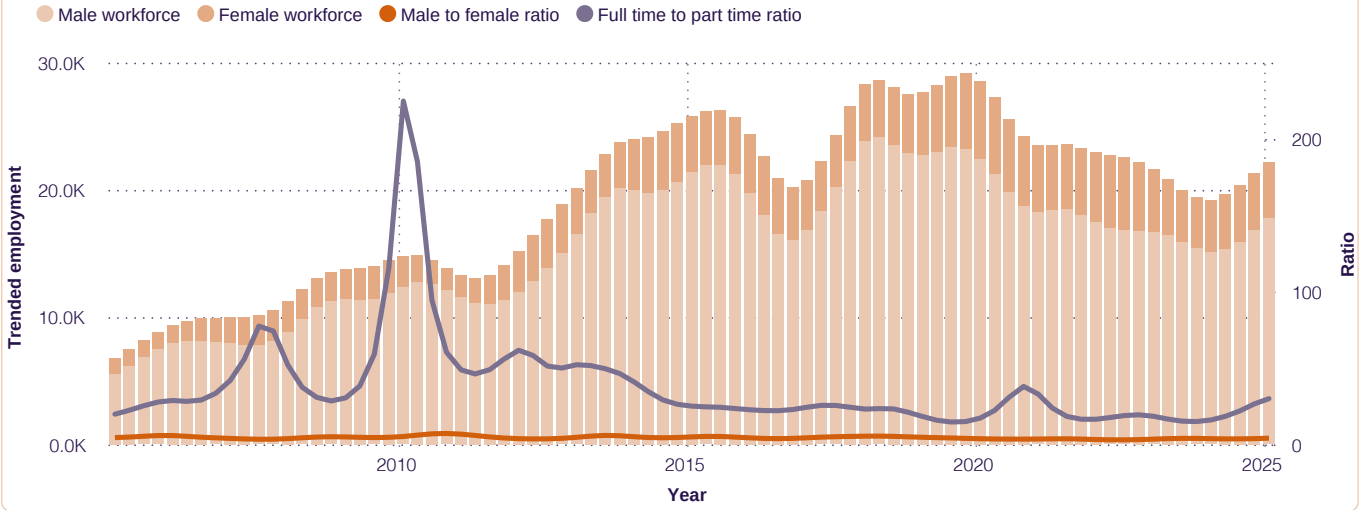
Projected growth over next decade	% female workforce
15%	18%

Median age	% workforce aged 24 or younger	% workforce aged 60 and above
42	3%	6%

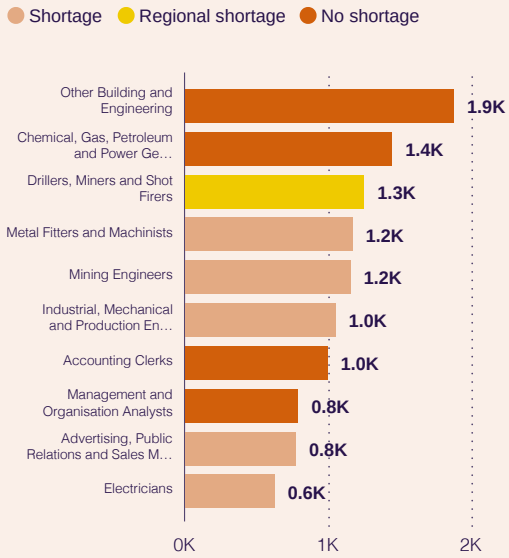
Training package status by state/territory of residence



Trends in employment by gender and work type



Top 10 ANZSCO occupations by workforce number



67 List of data source are in the Appendix 'Workforce Data Dashboard'.

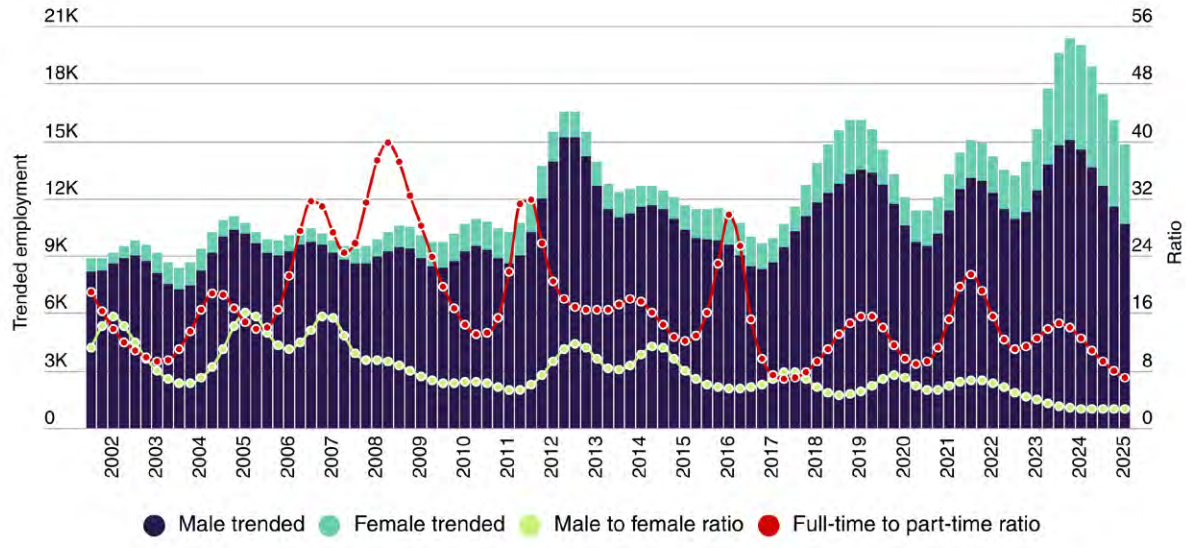
Non-Metallic Mineral Mining and Quarrying

The Non-Metallic Mineral Mining and Quarrying sector currently employs over 14,800 workers, reflecting an increase of 970 (+7%) total workers (Figure M15).[68] Full and part-time workers saw an increase of 460 (+3%) and 520 (+38%), respectively. Trends in favour of full-time employment and participation by females are indicative of a strong and diverse labour market, which is promising for the sector and its workforce.

> Participation by females in the sector has improved, with the ratio of male to female employment going from a series high of 16:1 in the early 2000s to 3:1 in 2025.

There were almost no job losses in mining at the onset of the COVID-19 pandemic in 2020, which, in addition to gains in gender diversity, may explain the resilience of workforce participation by females in the sector.[69]

Figure M15: Composition and employment trends in Non-Metallic Mineral Mining and Quarrying, 2001–2025



Source: ABS, Labour Force, Australia, Detailed, Oct 2024. *Data trended by AUSMASA.*

68 Please refer to our dashboard for Non-Metallic Mineral Mining and Quarrying for an in-depth view on workforce composition and trends, https://ausmasa.org.au/media/ms1do5jm/09-non-metallic-mineral-mining-and-quarrying.pdf

69 AusIMM, "The supply and demand of mining, metallurgical and geotechnical engineers in the Australian resources industry", 2021.

An ageing workforce

Across the census years, the median workforce age remained consistent at 45 – this is higher than the median age of Australian workers of 42 in Census 2021[70].

The oldest 25% of the workforce is above 55 – almost retirement age, with 20% of the workforce above the average age of retirement of 57 in 2023. (Table M11).

It is important to note that the mining workforce typically has some of the lowest intended retirement ages,[71] which poses higher risks to the Non-Metallic Mineral Mining and Quarrying sector, due to its older age distribution. Ageing workforces also experience higher rates of worker compensation claims, while sector issues like mine dust disease[72] may also contribute to worker attrition or early retirement. The sector also has a relatively higher 25th percentile compared to other mining sectors, with the median age of new entrants at 32 – all signs of an ageing workforce.

70 Australian Bureau of Statistics, "Employment in the 2021 Census | Australian Bureau of Statistics," www.abs.gov.au, 30 November 2022.
71 ABS, "Retirement and Retirement Intentions, Australia", 2023.
72 Resources Safety and Health Queensland, "Queensland Mines and Quarries Safety Performance and Health Report", 2020.

According to industry research, a similar trend is also apparent at the tertiary level for the industry, with fewer university entrants in mining-related qualifications and declines in enrolments and graduates since 2015.[73]

This points to a clear sector and industry issue around attracting younger employees, which will need to be overcome if the sector is to contribute to increasing Australia's critical minerals capabilities and workforce needs.[74] Given that any national objectives involving critical minerals, medical technology, renewables, and advanced manufacturing are dependent on mineral mining, research into improving diversity and creating sustainable long-term career pathways for new entrants will be particularly important to ensure a thriving workforce and sector. AUSMASA will continue to investigate these issues and explore pathways to mitigate the effects of an ageing workforce.

Table M11: Age distribution of the Non-Metallic Mineral Mining and Quarrying workforce

Percentile	2021 Census	2016 Census	Apprentices and trainees in 2024 Age at the completion
25th	34	34	25
50th (median)	45	45	32
75th	55	54	42

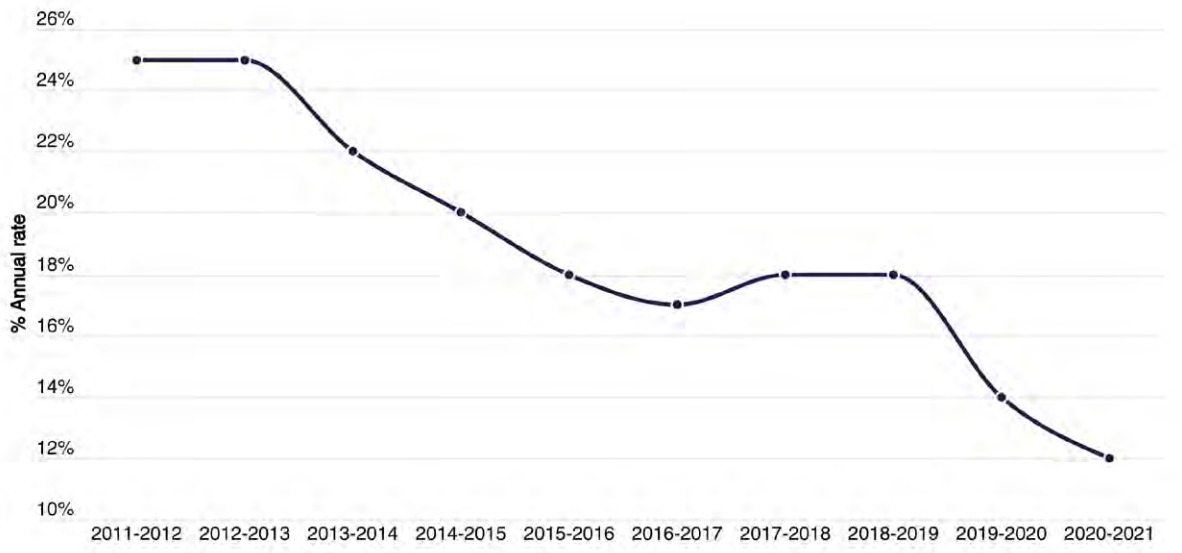
Source: 2021 Census – counting persons, 15 years and over; 2016 Census – Counting Employed Persons, Place of Work (POW); NCVER VOCSTATS, Apprentices and trainees – June 2024, Age by type of training by reporting period and training contract status.

73 AusIMM, "The supply and demand of mining, metallurgical and geotechnical engineers in the Australian resources industry", 2021.
74 Hays, "Mining Industry Report", 2025.

Falling labour turnover

Labour turnover in the non-metallic mineral and quarrying sector fell to a series low of 12% (-13%) in 2020–21 (Figure M16). Falling labour turnover is a positive sign, particularly in a tight job market, as it indicates the workforce increasingly prefers to stay in the sector. This represented the second-largest fall in turnover by sector across the mining industry, also in line with the wider industry's trend. AUSMASA will continue to research and investigate these trends to better understand how to improve turnover and retention.[75]

Figure M16: Turnover in Non-Metallic Mineral Mining and Quarrying, 2011–2021



Source: JSA, Data on Occupation Mobility, Jan 2024; Key occupations by sub-industry mapped by AUSMASA.

75 Labour turnover is computed from data and research made available by JSA through their publication on Occupation Mobility – the data only goes up to 2020-21.

Job adverts in the Non-Metallic Mineral Mining and Quarrying sector have steadily increased following the COVID-19 pandemic, rising by 3,100 (+76%) from January 2021 to March 2023. This trend later reversed, with a decrease of 1,400 (-20%) from March 2023 to October 2024.

Table M12: Top 5 non-metallic mining and quarrying occupations

Occupations	Workforce numbers in 2021 Census	5-yr changes in IVI	Included in CSOL?	Shortage*
Truck Drivers	1,300	75.69%	No	S
Drillers, Miners, and Shot Firers	1,100	16.12%	No	RS
Production Managers	800	64.97%	Yes	NS
Earthmoving Plant Operators	700	31.15%	No	S
Metal Fitters and Machinists	600	45.92%	Yes	S

Source: Jobs and Skills Australia, Internet Vacancy Index Oct 2024; Key occupations by sub-industry mapped by AUSMASA; Total workforce numbers are based on the Non-Metallic Mineral and Quarrying mining snapshot *in the Workforce Plan 2024, including* Core Occupation Skills List (CSOL) *and* Occupation Shortage List.

Notes: RS: Regional Shortage; S: Shortage; NS: Not in Shortage. Our conversations with industry indicate that the Census numbers may be smaller than reality, we welcome the identification of data sources that can paint a more accurate picture.

Enrolments in Non-Metallic Mineral Mining and Quarrying qualifications[76]

From 2016 to 2021 enrolments and completions decreased to 19,201 (-51%) and 2,826 (-73%), respectively. With the decrease in enrolments and completions, coupled together with an ageing workforce and older VET entrants, the sector is going to increasingly face workforce challenges. Enrolments and completions increased to 21,976 (+15%) and 4,309 (+52%), respectively, from 2021 to 2023.

Although positive, these trends only take enrolments back to levels from 2020, while completions sit around 2018 and 2019 levels. Notably, these trends also broadly held for Indigenous students, who had the highest participation rates in Non-Metallic Mineral Mining and Quarrying qualifications – averaging 9% of enrolments and 17% of completions each year from 2016 to 2023. Their higher completions potentially reflect less student attrition or deferrals, which would be positive.

Given the government's focus on onshore processing and beneficiation of critical minerals,[77] further investigation of the sector is required. A separate ANZSIC classification relevant to critical minerals would aid in the investigation process, cutting across several data sets and providing improved resolution for in-depth analysis. AUSMASA is in the process of making a submission to the ABS to identify 'critical minerals' as a separate subdivision.

76 Although many Non-Metallic Mineral Mining and Quarrying qualifications support work in other sectors or industries, making direct comparisons between this qualifications data and the workforce difficult. This data still provides important insights relevant to the sector and the wider industry as they represent the largest group of RII qualifications in our remit.

77 DISR, "Critical Minerals Strategy 2023–2030", 2023.

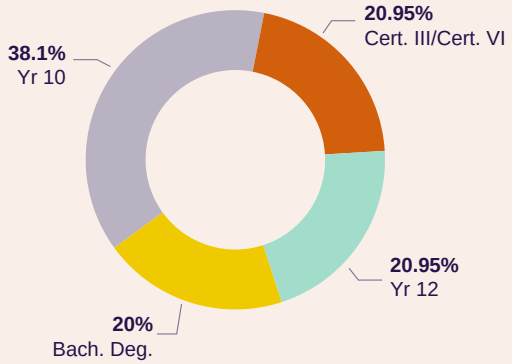
Key issues identified in Non-Metallic Mineral Mining and Quarrying

The quarrying industry faces workforce retention challenges due to potential worker loss to coal, Metal Ore Mining, and construction sectors. While it cannot match the wages of larger mining operations, it should highlight its unique aspects to attract workers. Attracting new workers, especially younger ones, and promoting the sector as a stepping stone to larger opportunities is crucial. Additionally, the industry could appeal to experienced mining workers looking to transition from larger operations, particularly those involving shift work and Fly-In, Fly-Out (FIFO) requirements.[78]

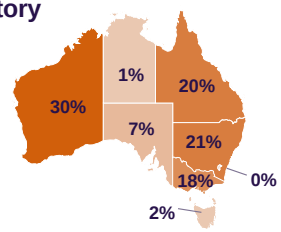
78 Jobs and Skills Australia, 'Employment Projections', 2023.

Dashboard 6: Non-Metallic Mineral Mining and Quarrying[79]

Education level of the workforce



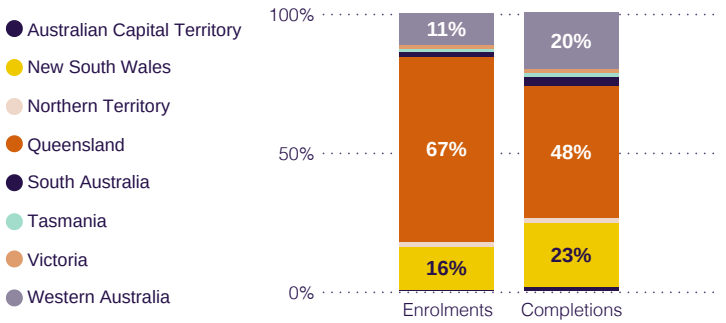
Total workforce by state/ territory



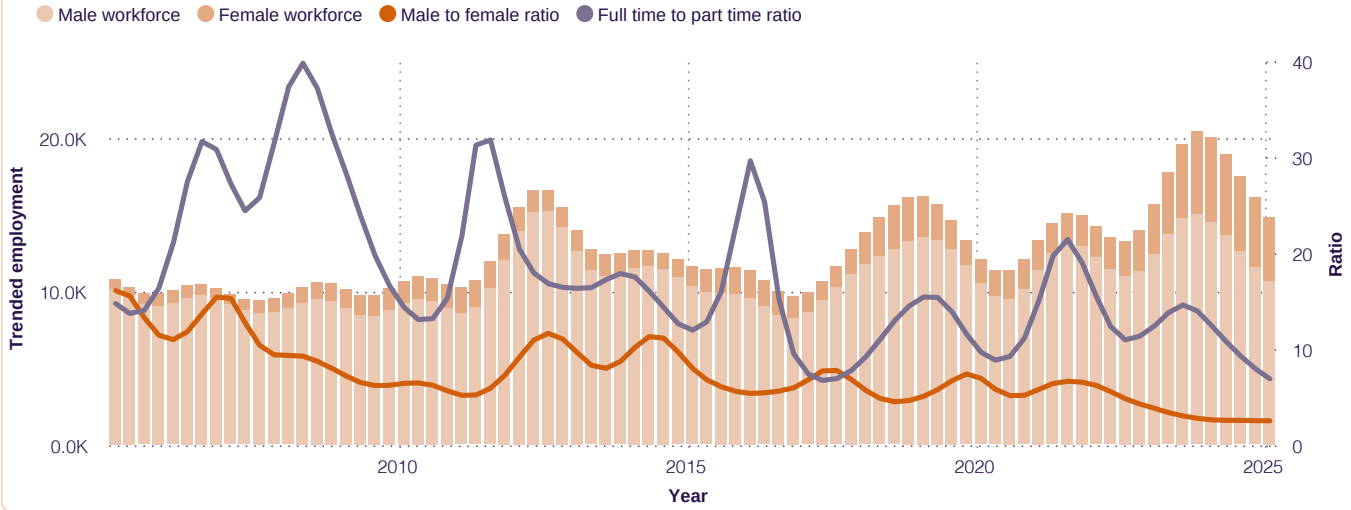
Projected growth over next decade	% female workforce
19%	21%

Median age	% workforce aged 24 or younger	% workforce aged 60 and above
45	6%	15%

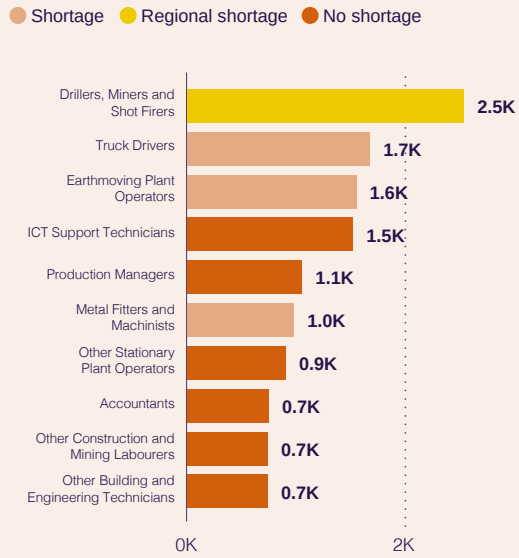
Training package status by state/territory of residence



Trends in employment by gender and work type



Top 10 ANZSCO occupations by workforce number

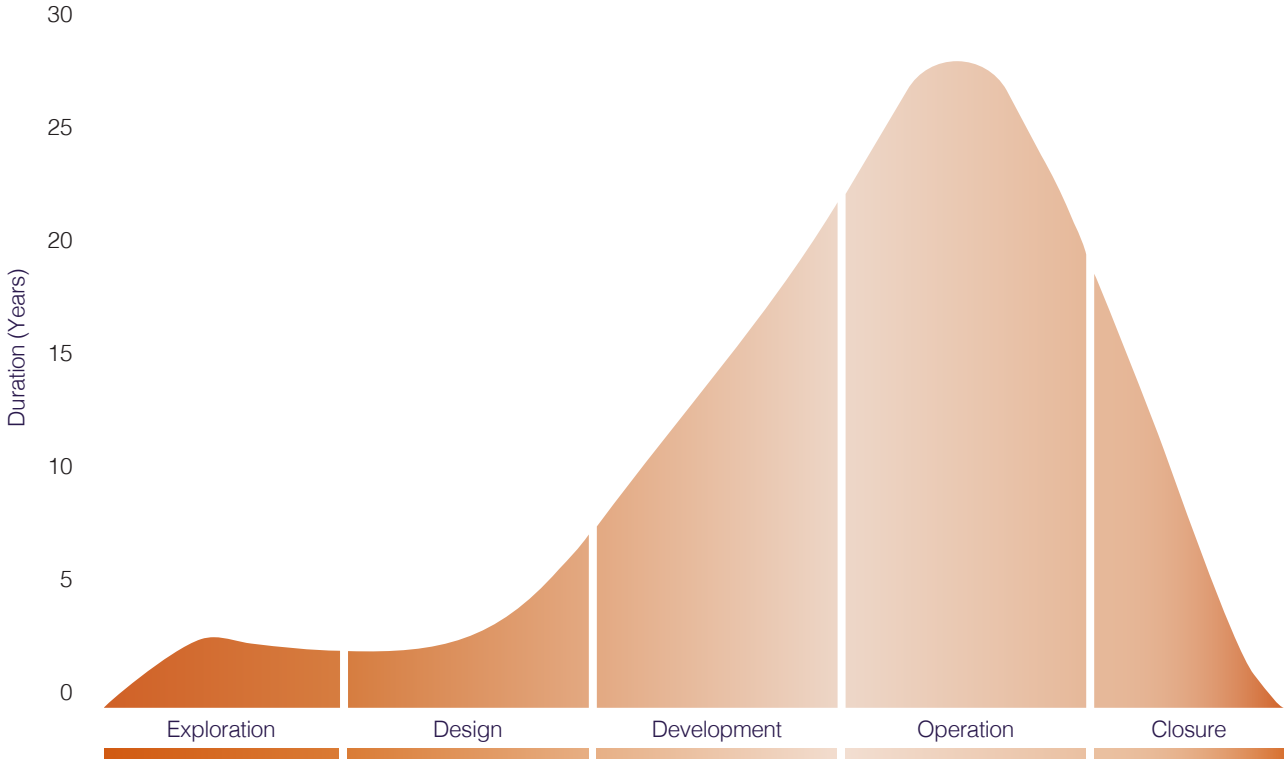


79 List of data source are in the Appendix 'Workforce Data Dashboard'.

Mine life-cycle

The life-cycle of a mine can be broadly divided into 5 stages: exploration, design, development, operations, and closure, with each stage requiring various occupations (Figure M17).
The exploration stage involves identifying and assessing potential mineral deposits, mapping the site, and extracting samples for analysis, which may culminate in an analysis that establishes the economic viability of the mine site.

Figure M17: Key occupations across the mine life-cycle



Exploration	Design	Development	Operation	Closure
Drilling Technician	Mine Designer	Project Manager	Mining Engineer	Environmental Engineer
Assay Laboratory Technician	Mine Planner	Heavy Equipment Operator	Blaster	Hydrologist
Geological Modeler	Geotechnical Engineer	Construction Engineer	Driller	Reclamation Specialist
Mining Engineer	Civil Engineer	Drilling & Blasting Expert	Heavy Equipment Operator	Demolition & Decommissioning Specialist
Environmental Scientist	Mechanical Engineer	Environmental Officer	Metallurgist	Community Liaison Officer
Financial Analyst	Electricla Engineer	Safety Officer	Process Engineer	Waste Management Specialist
Economist	Environmental Engineer	Contractor	Geotechnical Engineer	Soil Scientist
Hydrogeologist	Health & Safety Expert	Skilled Tradespersons	Health & Safety Officer	Water Quality Specialist
Project Coordinator	Permitting & Regulatory Officer	Materials Coordinator	Environmental Specialist	Land Restoration Expert
Regulatory Compliance Officer	Structural Engineer	Supply Chain Manager	Maintenance Technician	Regulatory Affairs Manager

Source: Resources and Engineering Skills Alliance (RESA)

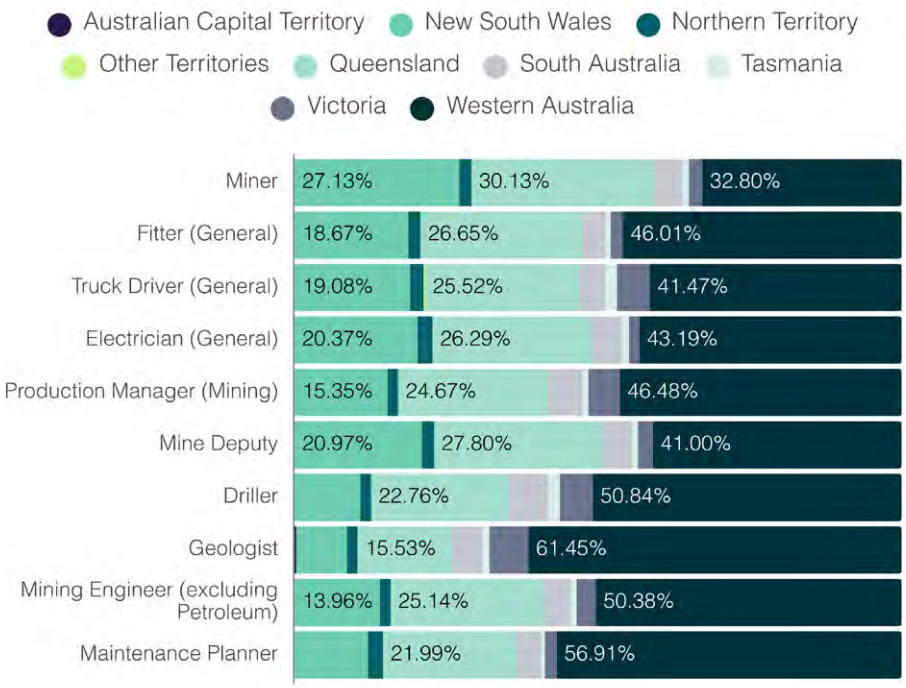
Workforce data by occupation

The number of employees in a mine tends to vary based on the company size, type, and operational phase of the mine. For example, BHP employs around 8,000 workers across 5 of its mines, averaging about 1,600 employees per site.[80] Fortescue employs over 2,200 workers for its 2 mine sites, Kings and Firetail, averaging about 1,100 workers per site.[81] Rio Tinto has 16,000 employees across its 17 mine sites, averaging approximately 940 employees per site.[82]

Large-scale mines, especially ones focused on extensive extraction and processing, may require a varying workforce size to manage different tasks such as extraction, maintenance, logistics, environmental management, and administrative duties. This workforce includes miners, fitters, truck drivers, safety officers, engineers, geologists, and support staff.

The size of the workforce changes based on production needs, automation levels, and mine life-cycle stages, with staffing levels typically higher during the operational and production stages and lower during closure or rehabilitation phases.

Figure M18: Top 10 occupations by state and territory in 2021

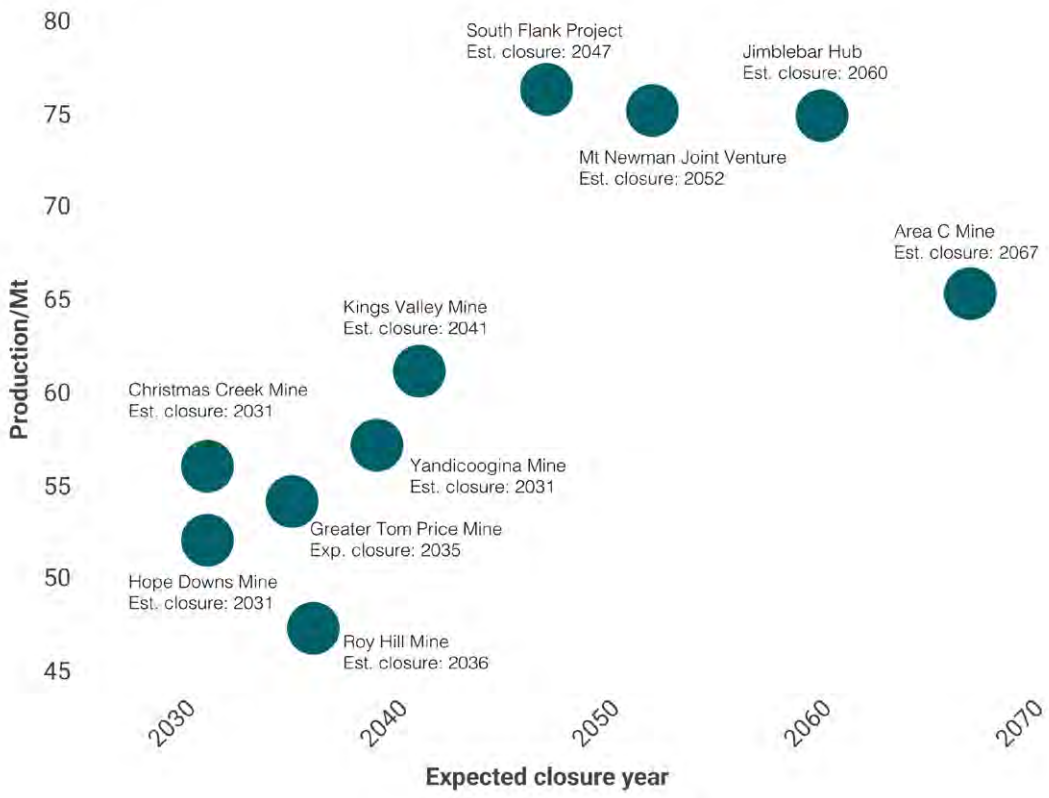


Source: Australian Bureau of Statistics, "Australian Census Population and Housing, 2021, TableBuilder", 2021

In 2021, the top occupations related to a mine's operation stage were miners, fitters, and truck drivers (Figure M18). As the mine transitioned to the closure stage, however, the key roles shifted to fitters, electricians, and maintenance planners. Please see the mine closure section for more information on mine closures.

80 BHP, "Western Australia Iron Ore", 3 October 2022.
81 Fortescue, "Operation Site-Solomon", 2025.
82 Rio Tinto, "Iron Ore Western Australia", 2023.

Figure M19: Top 10 mines and workforce coverage, 2023



Sources: GlobalData, "The ten biggest surface mines in Oceania, 2023", June 2024.

In 2023, the largest iron ore mine sites in Western Australia employed significant numbers of workers. For example, BHP's Mining Area C employed 4,103 people, accounting for 6.8% of the state's iron ore workforce. Fortescue's Solomon Operations followed with 3,840 employees, making up 6.3%. Meanwhile, Roy Hill Operations employed 3,711 people, representing 6.1% of the total iron ore employment in the region.[83]

The expected closure years for the largest mines in Australia may lead to changes in workforce demand over time (Figure M19). The South Flank Project, with operations expected to continue until 2047, shows that workforce demand will remain steady for several years, reflecting the mine's ongoing production needs. Following closely, the Mt Newman Joint Venture, projected to close in 2052, suggests a slightly longer period of workforce demand, due to its extensive infrastructure and ore reserves. The Jimblebar Hub, expected to close in 2060, indicates a prolonged workforce demand driven by continuous investment, resource development, and technological advancements.

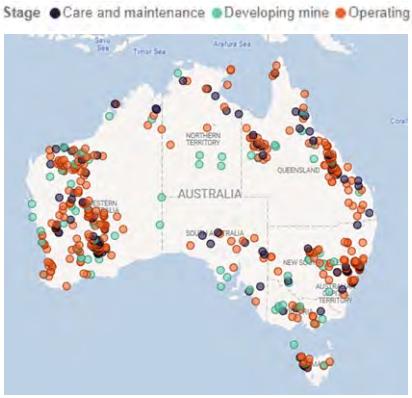
Workforce planning is crucial for anticipating labour demands, allocating resources efficiently, and ensuring the mine is staffed with the right skills throughout its life-cycle. It also helps with addressing community relations, workforce training, and maintaining safety standards. By understanding these workforce distributions, companies can better plan for long-term operational success and sustainability. As mines go through various life stages, career and skills needs require consistent re-evaluation and alignment with the training product system (Figure M20).

83 Department of Jobs, Tourism, Science and Innovation, "Western Australia Iron Ore Profile", May 2024.

Workforce planning is crucial for anticipating labour demands, allocating resources efficiently, and ensuring the mine is staffed with the right skills throughout its life-cycle. It also helps with addressing community relations, workforce training, and maintaining safety standards. By understanding these workforce distributions, companies can better plan for long-term operational success and sustainability. As mines go through various life stages, career and skills needs require consistent re-evaluation and alignment with the training product system (Figure M20).

Figure M20: Mine life-cycle stages and future changes

2021



Source: Geoscience Australia, "Australian Operating Mines Map 2021 Data, March 2022", 2022. Customised by AUSMASA.

2030

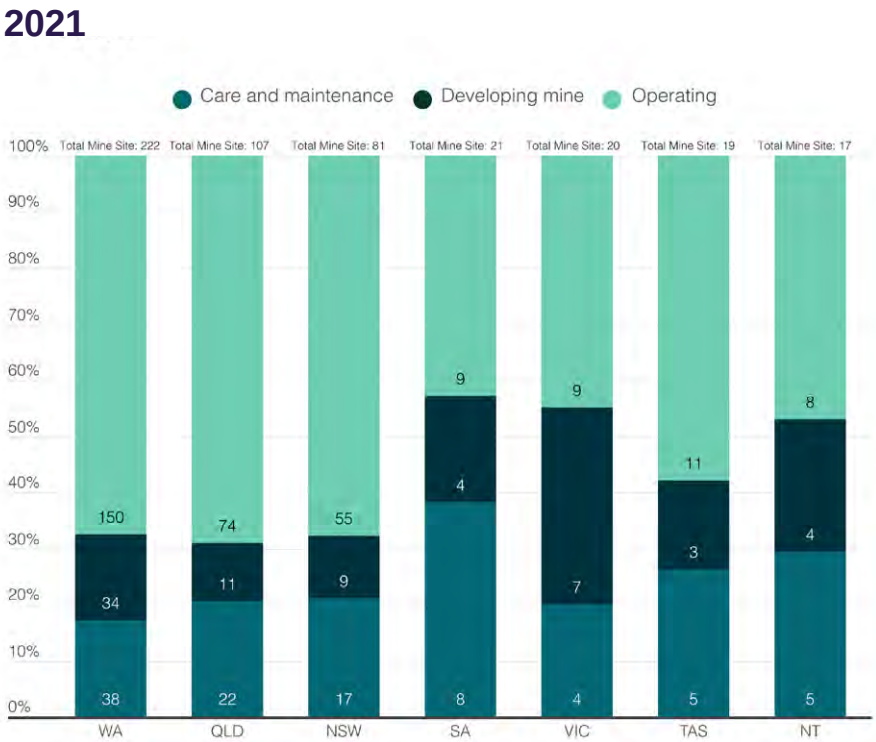
Source: Geoscience Australia, "Australian Operating Mines Map 2021 Data, March 2022", 2022. Customised by AUSMASA.

2040

Source: Geoscience Australia, "Australian Operating Mines Map 2021 Data, March 2022", 2022. Customised by AUSMASA.

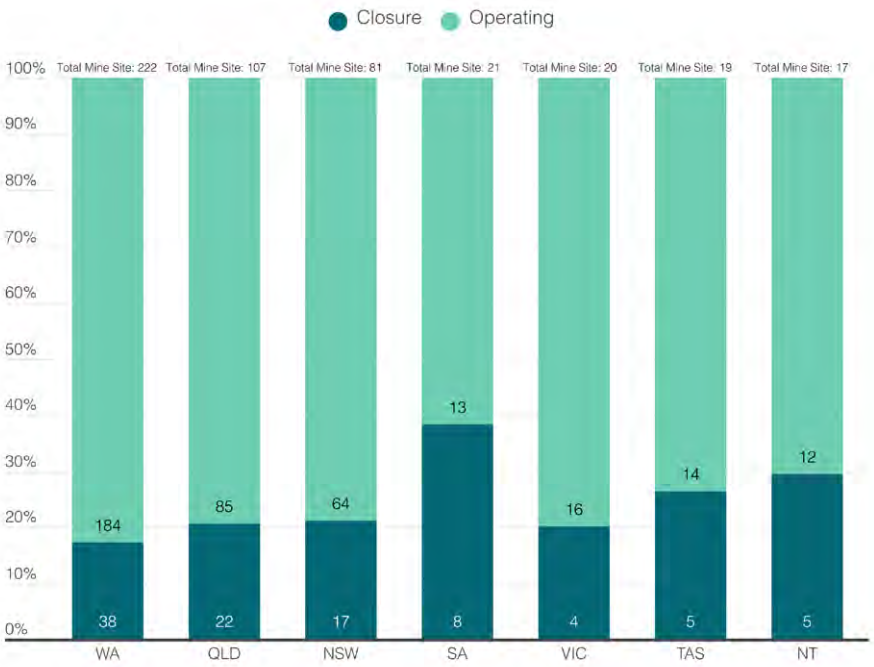
Based on mine life-cycles, we are able to project mine operating status by state by year (Figure M21).

Figure M21: Number of mines by status by state



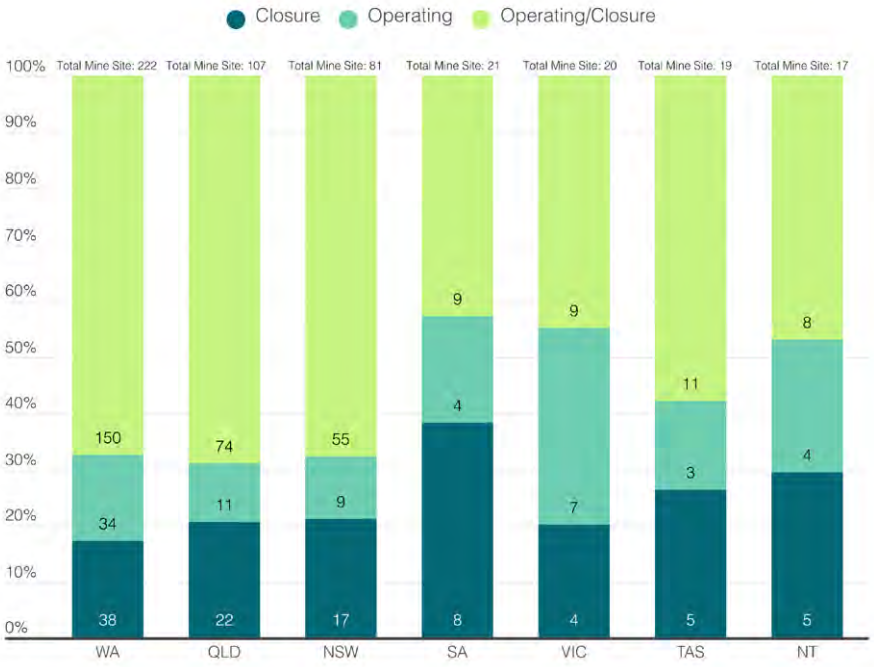
Source: Geoscience Australia, "Australian Operating Mines Map 2021 Data, March 2022", 2022. Customised by AUSMASA.

2030



Source: Geoscience Australia, "Australian Operating Mines Map 2021 Data, March 2022", 2022. Customised by AUSMASA.

2040



Source: Geoscience Australia, "Australian Operating Mines Map 2021 Data, March 2022", 2022. Customised by AUSMASA.

In 2021, there were 150 operating mines in Western Australia, 74 in Queensland, and 55 in New South Wales. By 2030, the number of active mines is expected to grow, with Western Australia adding 34 new operations, Queensland increasing by 11, and New South Wales by 9.

As mines progress through their life-cycle – from exploration to development, production, and eventually closure – many of the currently operating sites will near the end of their productive life by 2040. It is anticipated that around 150 mines in Western Australia may approach closure, leaving only 34 still operational. Similarly, the 74 operating mines in Queensland and 55 in New South Wales from 2021 may also reach the closure stage by this time.

With nearly 300 mines in Australia set to enter the closure stage from 2040, it's crucial for the industry to plan its approach, particularly regarding potential workforce shortages and needs. As mining operations wind down, the focus should shift from what's being phased out to what's being transitioned into.

Table M13: Projected occupation growth

Occupation	May 2024 ('000)	May 2029 ('000)	May 2034 ('000)
Drillers, Miners and Shot Firers	71.0	70.6	73.8
Metal Fitters and Machinists	119.5	120.1	125.9
Other Building and Engineering Technicians	38.5	40.0	42.7
Truck Drivers	185.2	187.2	193.6
Electricians	188.7	201.9	212.9
Production Managers	61.7	65.8	70.8
Mining Engineers	12.9	14.1	15.3
Geologists, Geophysicists and Hydrogeologists	11.8	12.4	13.4
Structural Steel and Welding Trades Workers	77.3	76.3	79.8
Other stationary plant operators	26.6	27.1	28.2

Note: Color-coded with orange to indicate a shortage in the occupation. Source: Jobs and Skills Australia, "Employment Projections", 2025.

Table M13 highlights the top 10 occupations (at the 4-digit ANZSCO level) in demand, based on employment growth over 5-year and 10-year periods. The top occupation – Drillers, Miners and Shot Firers – are projected to decrease by 200 workers by 2029, then increase by 2,400 workers by 2034. This occupation is currently identified as being in shortage. Metal Fitters and Machinists, projected to grow by 200 roles by 2029 and by 1,600 roles by 2034, are also facing a shortage. Other Building and Engineering Technicians are expected to increase by 800 workers in 2029 and by 2,200 workers by 2034.

Several resource sector construction projects that were completed or moved into production in 2023–24 are expected to have a positive impact on employment. For example, Mineral Resources' Onslow Iron project, which shipped its first ore in May 2024, and Liontown Resources' Kathleen Valley Lithium Operation, which began producing spodumene concentrate in July 2024, are both likely to create significant job opportunities. Similarly, Pilbara Minerals' Pilgangoora P680 Expansion Project, which officially opened in August 2024, will likely lead to an increase in employment within the mining and production sectors.

On the other hand, some major projects were suspended or placed under care and maintenance, such as BHP's West Musgrave copper and nickel project, which transitioned to care and maintenance in July 2024, and Albemarle Corporation's halted construction of Trains 3 and 4 at the Kemerton Lithium Hydroxide Plant. These pauses are likely to result in temporary job losses or shifts in workforce requirements.[84]

While 3,000 jobs were 'lost' when BHP closed its Nickel West operations, the company is committed to redeploying around 1,600 frontline nickel miners across its Pilbara iron ore and South Australian copper operations. In addition, a total of 107 mining and energy projects are expected to proceed by 2029, creating demand for around 26,810 new production roles and growing the workforce by 9.4% over 5 years. Of these, 88 mining projects are projected to require around 23,400 workers, with approximately 18,000 needed by the end of 2026.

Coal remains the largest driver of new demand, with 13 projects expected to create 4,836 jobs by 2027. Other key contributors include iron ore (4,495 workers), gold (2,830 workers), critical minerals (3,078 workers), and copper, which has surged to require 2,775 workers across 10 projects by 2026. In contrast, lithium demand has softened, with just 970 workers needed across 6 projects. Diversification is also evident, with 16 'Other Commodity' projects (for example, alumina, graphite, phosphate) expected to require nearly 2,000 workers. Meanwhile, the energy sector's mini-investment boom continues, with 19 projects forecast to create 3,410 new operating phase roles by 2029.[85]

Potential actions:

- Research to better understand occupation and skills needs based on various stages of the mine life-cycle.
- Research to investigate occupation pathways in tandem with other relevant industries to map streams in and out of mining occupations in relevance to mining industry needs.
- Stakeholder engagement to further inform research work, identify skills shortages, and programs and policies to match these needs.
- Training product gap analysis to identify changes to products and anticipate changes needed based on workforce demand driven by mine life-cycles.
- Stakeholder input into our examination and interrogation of the mine life-cycle data and analysis to better align with industry experiences.

84 Department of Energy, mines, Industry Regulation and Safety, "Economic indicators", 25 March 2025.
85 AREEA, "Workforce Forecast 2024–2029", September 2024.

Mine closures and decommissioning

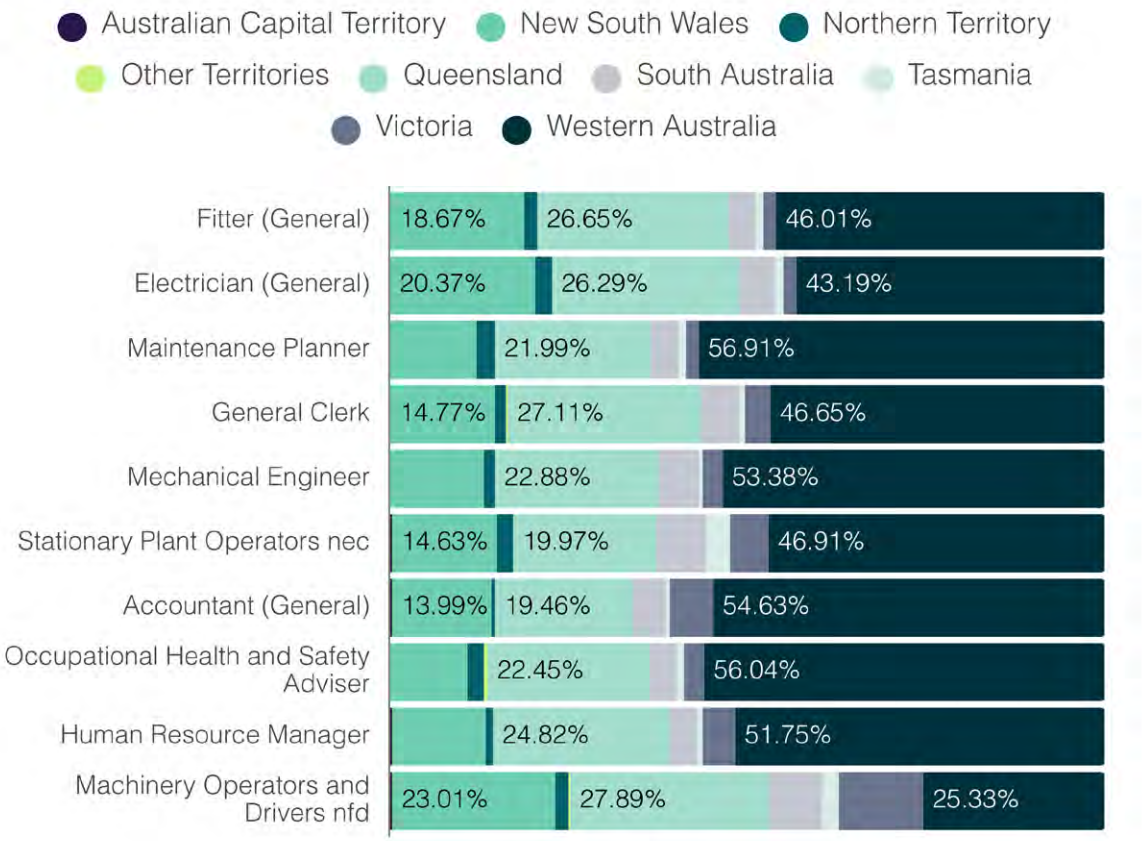
The process of mine closure is complex and resource-intensive and is carried out over an extended period of time.[86] The Commonwealth Scientific and Industrial Research Organisation (CSIRO) estimates suggest that 240 existing Australian mines will close by 2040, generating up to $4 billion in expenditure on mine rehabilitation and closure activities.[87] Mining companies implement closure planning through a dedicated multidisciplinary team, with members contributing either full time or alongside their primary responsibilities.

> While approaches differ, a growing trend among leading mining companies is the inclusion of community relations or social performance specialists within these teams, alongside environmental scientists, engineers, geologists, accountants, and human resources professionals.[88]

Environmental engineers and reclamation specialists play a crucial role in decommissioning and reclamation efforts. Enlisting safety officers and construction teams to dismantle and access mining facilities is essential for ensuring the safe removal of infrastructure, managing hazardous materials and preparing the site for environmental restoration and long-term stability. Environmental officers are responsible for monitoring compliance with regulatory requirements, assessing potential environmental risks, and implementing mitigation strategies to ensure the site is rehabilitated in accordance with best practices and legal standards.[89] Australia is poised to become a global leader in supplying solutions for mine closures, leveraging domestic challenges to fuel international industry growth.[90]

86 Sustainable Minerals Institute, "Mine Closure Overview," 2024.
87 CSIRO, "Enabling Mine Closure and Transitions: Opportunities for Australian Industry," 2023.
88 Sustainable Minerals Institute, "Mine Closure Overview," 2024.
89 Government of Western Australia, "Mine Closure Completion Guideline Available," March 31, 2025.
90 CSIRO, "Enabling Mine Closure and Transitions: Opportunities for Australian Industry," 2023.

Figure M22: Top 10 occupations during mine closures, 2021



Source: Australian Bureau of Statistics, "Australian Census Population and Housing, 2021, TableBuilder", 2021.

As identified in Figure M22, 3 out of the 10 occupations needed to support a mine closure are in shortage. This includes Fitters, Electricians, and mechanical engineers, who are in shortage nationwide and integral to both closure and post-closure processes.

As the mine enters the closure stage, the focus shifts to decommissioning and rehabilitation, with Fitters, Electricians, and Maintenance Planners becoming the key occupations (Figure M23). Fitters continue to play an essential role in dismantling equipment and maintaining machinery during the shutdown process. Electricians are responsible for safely removing and decommissioning electrical systems to ensure the site is safe during and after closure. Maintenance Planners' roles are to develop maintenance strategies, schedule tasks, and coordinate the maintenance of all plant equipment to ensure that operations run smoothly and efficiently.[91] These top occupations are adapted to the changing needs of the mine as it transitions from active production to responsible and sustainable closure.

Figure M23: Occupations involved with mine closures

Source: Resources and Engineering Skills Alliance (RESA), "Jobs: Mine Life Cycle", 2025

91 Jobs and Skills Australia, "Occupations", 2025.

Challenges associated with mine closures and decommissioning

The rehabilitation or closure of large-scale mines that have extensively transformed the natural landscape poses significant technical and economic hurdles. Key challenges include:

- stabilising landforms to mitigate erosion
- preventing the release of contaminants, such as heavy metals and chemicals from mine waste, into local waterways
- restoring native ecosystems on reclaimed land.[92]

Mine closures require many skills, including traditional trades, multiple engineering disciplines, environmental knowledge and First Nations cultural awareness. Training programs delivering such skills tailored to this phase of a mine are essential to meet workforce needs.[93]

Key challenges at each stage of the mine closure process include:[94]

- co-design and partnerships (data management solutions to support transparency, governance, co-design and delivery of mine closure outcomes)
- waste reduction
- repurposing mineral waste
- resource recovery – related to circular economy objectives
- recycling non-mineral waste
- hydrological systems
- pollutant management
- revegetation and biodiversity
- post-closure land use.

92 Sustainable Minerals Institute, "Mine Closure Overview," 2024.
93 AUSMASA "AUSMASA 2025 Consultation papers", 2025.
94 CSIRO, "Enabling Mine Closure and Transitions: Opportunities for Australian Industry," 2023.

Environmental concerns with mine closures

Mine closures have been rated among the top 5 operating risks in mining.[95] Integrated closure planning and implementation can systematically incorporate and balance the perspectives, concerns, efforts, and expertise of both internal and external stakeholders.[96]

One of the main environmental concerns associated with mine closures is acid mine drainage, which contributes to mining-related pollution. This acidic runoff dissolves heavy metals like copper, lead, and mercury, which then leach into groundwater aquifers and surface water sources, posing risks to both human health and wildlife.[97] Runoff from these mines can also impact soil by creating sediment containing heavy metals, which settle into the ground or water and contaminate rivers or other land areas. These metals are not biodegradable, so the soil stays contaminated without corrective action.[98]

Mine closures also often disproportionately impact Indigenous communities, as the Traditional Owners of the land. Therefore, it is important to incorporate their perspectives and knowledge into the planning and closure processes for successful and sustainable outcomes.[99] Local Indigenous groups working alongside mining companies help to increase the Indigenous participants' technical skills, self-confidence and ability to engage in the wider environmental and economic community. Indigenous engagement promotes meaningful work to 'look after Country', maintaining connection to Country and passing on traditional econological knowledge to younger generations.[100]

95 ICMM, "ICMM • Responsible Mine Closures Ensure a Sustainable Environment and Economy," 2019
96 Ibid.
97 Thermo Fisher Scientific, "Mining and the Environment: What Happens When a Mine Closes?," July 10, 2014.
98 Ibid.
99 Sustainable Minerals Institute, "Diavik Traditional Knowledge Panel – Mine Closure Case Study," 2025.
100 UoQ, "Indigenous groups, land rehabilitation and mine closure: exploring the Australian terrain," 2020.

Economic consequences

Mine closure can have various economic consequences, including job losses, reduced economic activity and challenges for local businesses and communities. Involving communities is essential to developing a common framework and vision for the post-mining landscape and process.

Host communities that are dependent on mining operations are especially vulnerable during the closure, and are likely to experience considerable socio-economic impacts.[101] This is often the case for mines in remote areas, where an operation may be the primary local economic driver, impacting job security across the area.[102]

Once a mine reaches the end of its life-cycle, the local economy can develop an inherent vulnerability that affects other industries. Mine companies will often redeploy their workers to another area within the business, give them priority for open positions, or offer retraining opportunities to mitigate the socio-economic impacts of the mine closure.[103]

Effective mine closure planning is essential to ensuring sustainable environmental, social, and economic outcomes. By integrating comprehensive closure strategies, mining companies can proactively address key challenges such as land rehabilitation, pollutant management, and post-closure land use by mitigating the long-term environmental impacts of mining activities.

Additionally, strategic planning helps lessen the economic disruptions caused by mine closures, which in turn supports local communities through workforce redeployment, retraining programs, and economic diversification initiatives. A balanced closure approach would involve the identification and development of training packages and career pathways that equip workers with the necessary skills to manage mine closures efficiently.[104]

Potential actions:

- Stakeholder engagement to better understand the process of mine closures and the skills and occupations that enable appropriate processes around mine closures and rehabilitation.
- Research to understand what skills and occupations are in shortage and anticipate future shortages.
- Research to map career pathways in and out of the mine closure space to better understand workforce demand and supply.
- Training product gap analysis to identify if the VET system is adequately equipped to deliver the skills needed in the mine rehabilitation space.
- Stakeholder engagement to better understand coordination needed from various stakeholder groups, government bodies, and local citizens.

101 ICMM, "The Mine Closure Challenges for Government and Industry," 2021.
102 Ibid.
103 News.com.au, "Aussie Mining Giant Cuts 1000 Jobs," June 19, 2024.
104 ICMM, "Integrated Mine Closure: Good Practice Guide," 2021.

Artificial intelligence

Digitisation and industry transformations can have various implications for relevant industries. Such industry trends and transformations are often disruptors for the industry. These disruptors can bring opportunities for productivity gains and often require industry-level appropriate responses to mitigate any negative effects. Progress and technological change in the digital space have resulted in the ubiquity of cloud-based platforms, the Internet of Things (IoT), and, more recently, generative AI. Digital transformation is crucial for current trends that emphasise broader goals such as corporate environmental, social, and governance (ESG) targets and the transition to net zero emissions. The mining industry is no exception.[105]

> According to a 2024 GlobalData mine-site technology adoption survey, 81% of employees at major global mines believe that AI will significantly impact their operations within the next 10 years (Figure M32).[106]

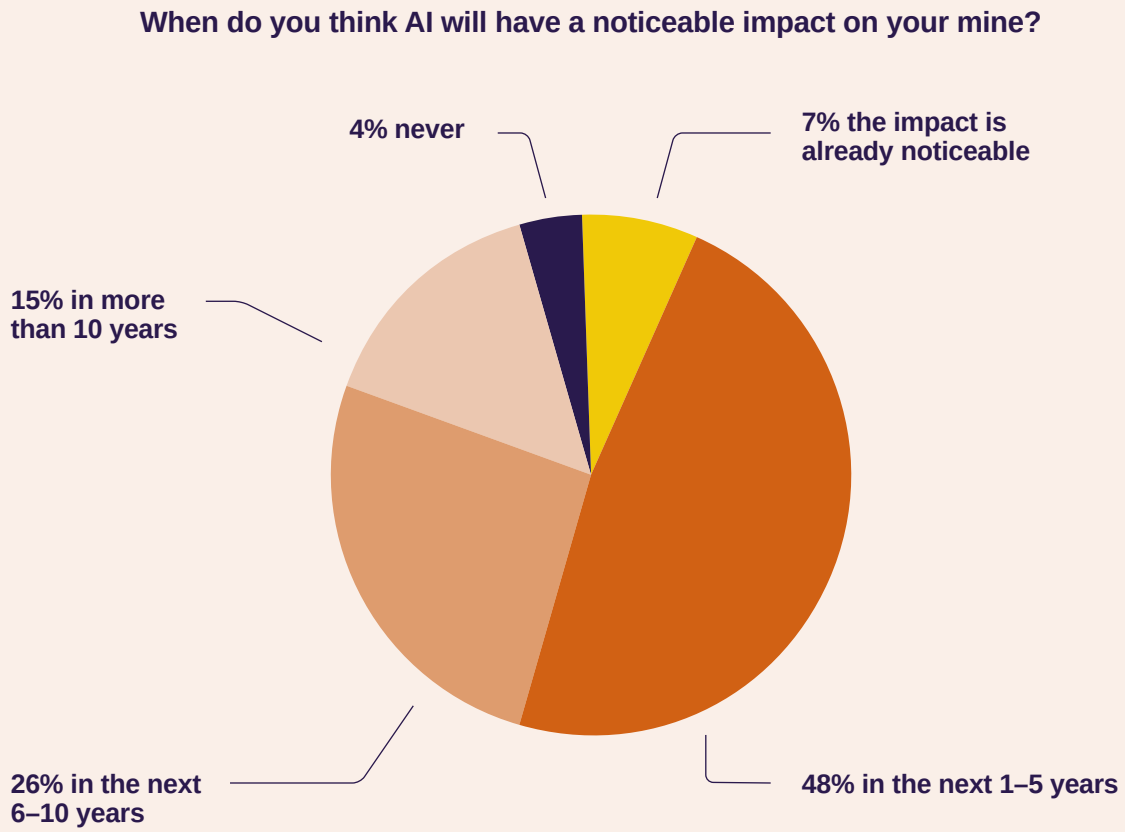
While AI technology is still evolving, it holds great potential for addressing long-standing workforce challenges in the mining industry.

105 Microsoft, "Futureproof the mining industry with AI and digital innovation", June 2024.
106 Mine, "The impact of AI on the mining sector", October 2024 (original data source from HYPERLINK "https://www.globaldata.com/store/report/mine-site-technology-adoption-survey-analysis/"Mine-Site Technology Adoption Survey, 2024 Update

According to a 2024 GlobalData mine-site technology adoption survey, 81% of employees at major global mines believe that AI will significantly impact their operations within the next 10 years (Figure M32).[107] While AI technology is still evolving, it holds great potential for addressing long-standing workforce challenges in the mining industry.

Figure M32: How major mines think AI will impact mine operations

81% of employees at major mines globally think that AI will noticeably impact their mine operations withing the next 10 years



Source: GlobalData mining-technology.com survey conducted from March to May 2024 with a sample of 46 employees working at major mines globally. Major mines were defined as those with over $500 million in revenue.

Source: The impact of AI on the mining sector - Mine | Issue 145 | October 2024*: citing* Mine-Site Technology Adoption Survey, 2024 Update

107 The impact of AI on the mining sector - Mine | Issue 145 | October 2024 (original data source from Mine-Site Technology Adoption Survey, 2024 Update)

AI in addressing safety issues in the mining industry

Mining employs about 1% of the global labour force, but accounts for 8% of fatal accidents.[108] AI can significantly enhance safety in mining by automating the more dangerous tasks. Autonomous trucks, drones, and rock cutters can perform jobs that would otherwise put human workers at risk, thereby reducing accidents.[109] Currently, AI is not widely deployed across some of these applications. As AI becomes ubiquitous, AI will become increasingly integrated into these applications.

Examples of autonomous trucks improving safety

Autonomous trucks can handle loading and haulage, eliminating risks associated with human driver fatigue and fatigue-related judgement lapses. As of July 2024, GlobalData's Mining Intelligence Centre tracked 2,080 autonomous haul trucks operating on surface mines worldwide, which have reduced accidents by 80%.[110] Furthermore, Rio Tinto's autonomous haulage system in the Pilbara region has demonstrated a 15% increase in effective usage, with zero injuries related to haul truck operations since implementation.[111]

Virtual reality in mining safety

Safety remains paramount in mining operations, and virtual reality (VR) emerges as a powerful tool for risk mitigation. By simulating emergency scenarios and complex operational challenges, VR training programs provide workers with realistic, low-risk environments to develop critical skills. Workers can repeatedly practice safety protocols, equipment operation, and emergency response procedures, significantly reducing the potential for real-world accidents.[112]

AI-powered wearable sensors

Mining companies also utilise AI to use sensors, real-time data, and analytics to understand when changes occur in physical factors of mine workers, such as temperature and vibration deviations. AI-powered wearable sensors can continuously monitor mine workers for signs of drowsiness, fatigue, and physical discomfort, enabling proactive measures to help workers at heightened risk of accidents. BHP Billiton started using AI-powered drowsiness caps in its Chilean copper mine in 2022 to monitor drivers' brainwaves for signs of fatigue.[113]

AI in enhancing efficiency

AI algorithms enhance efficiency by enabling companies to make more informed decisions, predict equipment failures, and optimise resource allocation through the analysis of extensive datasets. Mining operations generate data from various sources, such as equipment sensors, geological surveys, and production processes, which were previously underutilised. Rio Tinto utilises automated haul trucks at the Gudai-Darri mine site. They employ a digital replica of the site, which integrates data from actual plants with historical design information to enhance operational efficiency. This 3D model enables teams to comprehend the site's layout and specifications before entering and performing work.[114]

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108 Global Mining Review, "Embracing Generative AI In Mining", February 2024
109 GlobalData, "The impact of AI on the mining sector", October 2024.
110 Ibid.
111 SE Asia Consulting, "AI and Robotics: The Future of Mining in Australia", October 2024
112 Discovery Alert, "Revolutionizing Mining with Virtual Reality: Enhancing Safety and Efficiency", December 2022
113 GlobalData, "The impact of AI on the mining sector," October 2024.
114 Rio Tinto, "Look inside a mine of the future | Global," 2022.

Potential actions:

- Stakeholder engagement to understand skills and occupations that can benefit from AI and AI integration.
- Stakeholder engagement to map occupations relying on AI tools.
- Research to understand industry needs relating to AI.
- Research to identify occupations at risk from AI.
- Training product gap analysis to establish whether AI deployment, diagnosis, and maintenance capabilities are required in training packages in our remit.

Figure M33: Summary of stakeholder comments from national roundtables and potential actions

 **Digital transformation and emerging technologies**	**Keywords:** AI integration, digital skills, remote/ autonomous control, data analytics, VR simulation, drones, electrification, BEVs, rare earths processing, EV hydrogen systems.	Growing need for digital literacy and AI competency in technicians and operators. Emphasis on AI for predictive maintenance, risk management, and ore sorting.	Demand for VR and simulation-based training, especially for safety and skill development. Rise of electric and hydrogen-powered equipment (e.g. Battery Electric Vehicles (BEVs)) requiring new technical skill sets.
 **Skills gaps and workforce transition**	**Keywords:** ageing workforce, declining Science, Technology, Engineering and Mathematics enrolments, succession planning, school placements, upskilling, new qualifications, bite-sized training, shortage of trainers.	The sector is facing a shortage of qualified workers, including mine deputies, Drillers, and trainers. There is an urgent need to attract youth via school programs and pre-vocational pathways.	Succession planning and ageing workforce concerns highlight the need for upskilling and mentoring. Falling automotive workforce in regions is a key risk to talent pipelines.
 **Training system challenges**	**Keywords:** outdated qualifications, micro-credentials, skill set reviews, lack of RTOs, VET lag, certification pathways, industry-RTO collaboration.	Many qualifications (e.g. RII and Construction, Plumbing and Services Training Packages) are outdated and need review. Micro-credentials and bite-sized learning are seen as critical to agile workforce development.	RTO collaboration with Original Equipment Manufacturers (OEMs) and industry is encouraged to improve cost-efficiency and responsiveness. The VET system is not keeping pace with the evolving needs of the mining industry.
 **Safety and regulatory requirements**	**Keywords:** Work Health and Safety, confined space, hydrogen safety, supervisor training, electronic blasting units, psychosocial safety.	A strong need for updated safety training, including hydrogen systems, electronic blasting, and confined space. Supervisor safety skills and psychosocial competencies are becoming a top priority.	Demand for shorter, more flexible safety certifications suited to machine operators and miners.
 **Operational evolution and role changes**	**Keywords:** autonomous operations, mobile mining equipment, light/heavy vehicle technicians, earthmoving, electrification, internal training solutions.	Roles are becoming more complex and tech-heavy, even for historically hands-on jobs. Technicians are being upskilled to operate autonomous and electric machinery.	Companies are often forced to develop internal training solutions due to gaps in formal training offerings.

Figure M33: Summary of stakeholder comments from national roundtables and potential actions

Digital transformation and emerging technologies

Potential actions:

Research to better understand digital, literacy, and AI needs in the mining industry.
Research to investigate skills needs around AI for predictive maintenance, risk management, and ore sorting.
Stakeholder engagement to understand current uses of AI for predictive maintenance, risk management, and ore sorting.
Research to understand utilisation of VR and simulation-based training, especially for safety and skill development.
Gap analysis of training products to understand opportunities for deployment of training solutions around electric and hydrogen-powered equipment (e.g. BEVs) skill sets.

Cross-skilling and convergence of trades

Potential actions:

Research to investigate and better understand ongoing shortage of qualified workers, including mine deputies, Drillers, and trainers.
Stakeholder engagement to identify current approaches in industry to boost youth engagement.
Workforce planning to report and monitor above approaches.
Workforce planning to investigate and report on the success of various industry succession planning and upskilling initiatives.
Stakeholder engagement to identify underlying supply and demand forces around the mining complementary regional automotive workforce and talent pipelines.

Training system challenges

Potential actions:

Gap analysis of training products servicing industry needs around blasting units of competence.
Stakeholder engagement to identify and monitor the success of micro-credentials and bite-sized learning as a pipeline to building an agile workforce.
Workforce planning to report and monitor above approaches.
Workforce planning to investigate and report on the success of various industry succession planning and upskilling initiatives.
Stakeholder engagement to identify underlying supply and demand forces around the mining complementary regional automotive workforce and talent pipelines.

Safety and regulatory requirements

Potential actions:

Gap analysis of training products around safety training, including hydrogen systems, electronic blasting, and confined space.
Research to investigate and inform supervisor safety skills and psychosocial competencies.
Research to investigate and better understand demand for shorter, more flexible safety certifications suited to machine operators and Miners.

Operational evolution and role changes

Potential actions:

Research to better understand industry needs around higher degree technological skills and instreams to such occupations.
Workforce planning to monitor and map out the changing nature of occupations and whether pathways are evolving in tandem.
Stakeholder engagement to better understand the changing nature of technical jobs and how training solutions can better cater to such changes.
Stakeholder engagement to identify gaps in training products, where companies are often forced to develop internal training solutions due to gaps in formal training offerings.

Insights for tomorrow

2025 Automotive Workforce Plan

Automotive

The automotive industry has undergone significant transformation in recent years, following the ceasing of large-scale passenger vehicle manufacturing in Australia, and the increasing adoption of EVs and Plug-in Hybrid Electric Vehicles (PHEVs). Recovering global supply chains following COVID-19 also led to a structural undersupply of new vehicles[115].

> With a total operational workforce of almost 318,000 workers, 21 million registered vehicles in Australia, and revenue projected to reach over $180 billion in 2024–25,[116,117] the industry is a major employer and innovator.

Through partnering with the Australian Government to increase EV uptake as part of the New Vehicle Efficiency Standard (NVES), and through more specialised vehicle and component manufacturing in place of large-scale passenger car manufacturing, the industry continues to drive innovation and evolve into an industry of the future. The industry has also responded to COVID-19-linked new vehicle supply issues and the associated structural undersupply, with a record 1,237,287 new vehicles sold in 2024, of which a further record of 23,163 (2%) were PHEVs and 91,292 (7%) were EVs.[118]

The retailing and wholesaling sector had the largest market share by far, based on both imported vehicle sales (66%) and parts and accessories (13%), alongside the second largest workforce. The Repair and Maintenance sector had the largest workforce, and the second-equal largest market share based on their services (13%). This was followed by automotive manufacturing, with both the smallest workforce and market share (7%) for locally manufactured vehicles, parts, accessories and other products.[119] Despite some challenges or volatility still associated with supply issues, newer and more affordable Chinese vehicles, and consumer sentiment, the industry is expected to be supported by technological advancements and a range of different incentives associated with the NVES and other similar federal and state initiatives. As such, industry profitability and revenue are expected to continue to grow, driven by increased imports, rising household income, and ongoing EV uptake.[120]

115 JSA, "Vacancy Report January 2024," 14 February 2024.
116 Department of Infrastructure, Transport, Regional Development, Communications and the Arts, "Road Vehicles, Australia, January 2024", 23 July 2024.
117 IBISWorld, and Misaki Lishi. "Automotive Industry in Australia," August 2024.
118 RACV. "Australia's Best-Selling Cars, Utes and SUVs for 2024 | RACV," RACV, 2024.
119 IBISWorld, and Misaki Lishi. "Automotive Industry in Australia," August 2024.
120 Ibid.

Key strategic and workforce issues in the automotive industry

Community perceptions

Many industry stakeholders have raised concerns about the negative perceptions of automotive work, particularly among female apprentices. To address this, AUSMASA conducted market research to understand the perceptions of automotive careers among priority cohorts, including females and youth.

Our national research revealed that a large proportion of young Australians are unaware of the diverse and evolving career opportunities within the automotive industry. In total, 61% of high school students and 47% of career starters aged 17 to 25 are not aware of potential automotive careers. This lack of awareness is particularly concerning given the industry's rapid transformation, with EVs and advanced technologies creating exciting new roles.

Change in ANZSCO terminology of Motor Mechanics

As identified in the Workforce Plan 2024, the automotive industry strongly believes that the terms 'Motor Mechanic' and 'diesel mechanic' are outdated and detract from the vocation's appeal.[121] AUSMASA continued to advocate for an overhaul of designations and titles. With the new release of the Occupation Standard Classification for Australia (OSCA) in late 2024, the ABS replaced the title 'Motor Mechanic' with 'Automotive Technician', reflecting the government's consideration of industry feedback and AUSMASA's efforts.[122]

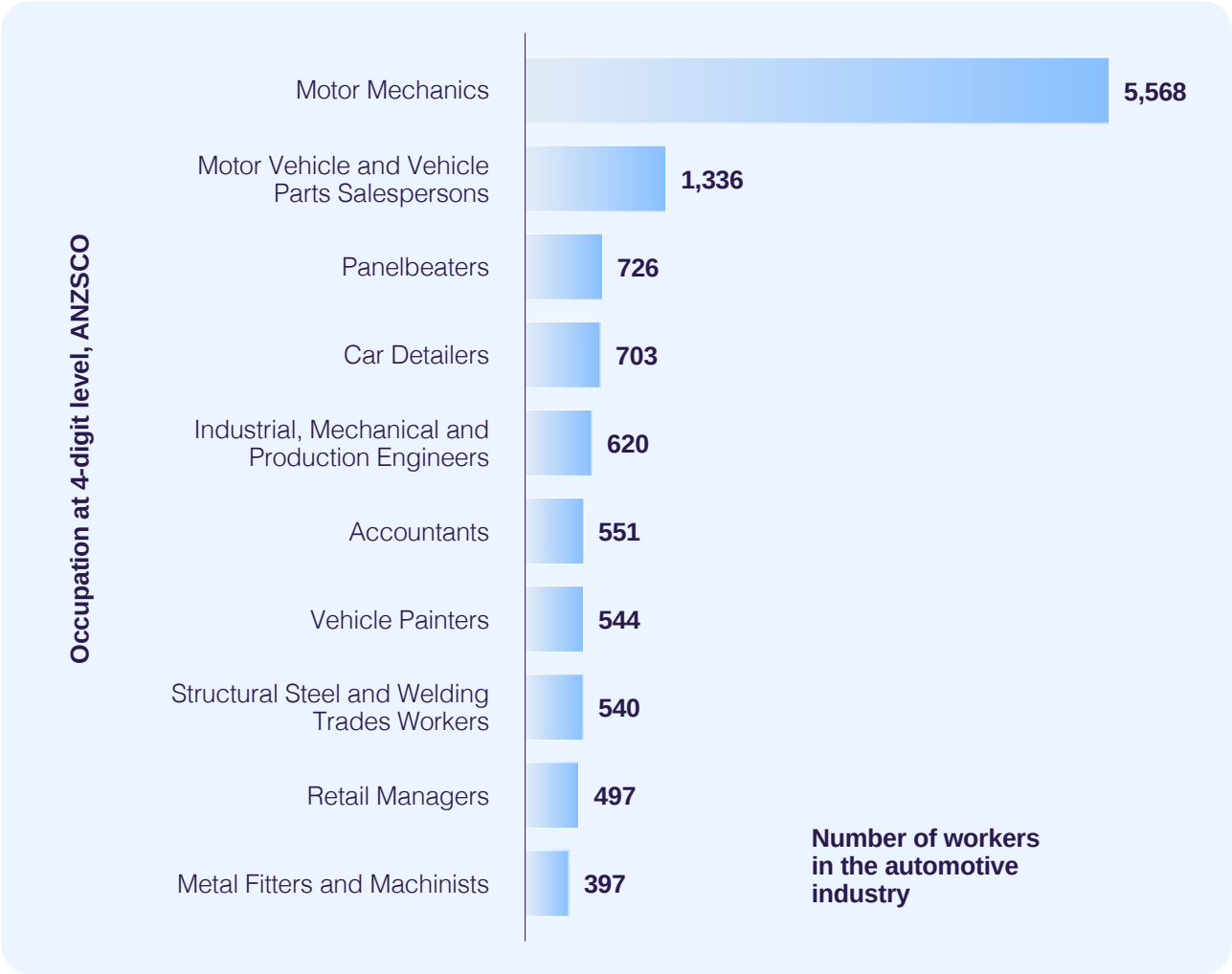
Skilled migration and international students

Various occupations in the automotive industry benefit from the migration system (Figure A1).[123] There are, however, significant barriers for international students to join the workforce, such as, the complexity and cost of the migration process.[124] Restrictions prevent international students from completing apprenticeships, leading to a lack of practical experience. Visa regulations also limit the programs that international students can participate in. AUSMASA has heard from stakeholders on the need to design more appropriate visa pathways for international students to participate in apprenticeship and VET programs without restriction.[125]

There are other challenges with bringing in skilled migrants. Industry details problems with international certifications, where training is not adequate, and employers are forced to either upskill the new hire or find a replacement. Most automotive employers are also smaller businesses and cannot afford continuous recruitment and upskilling. A better aligned migration system will mean employers are able to reduce turnover and recruitment costs, which will improve productivity and morale.

121 NCVER, "Generation Z: life at 21", 2022.
122 ABS, "351131 Automotive Technician (General)", 2024.
123 For a more detailed discussion on the migration system and the automotive industry, please see the AUSMASA February Research Bulletin.
124 Reading Writing Hotline, "Submission to the Department of Employment and Workplace Relations Future Directions consultation paper", 2023.
125 At the time of writing, the Government was investigating caps on international student numbers.

Figure A1: Top 10 occupations with permanent skilled migrants, 2021



Source: Australian Bureau of Statistics, "Australian Census and Migrants, 2021, TableBuilder", 2021

Table A1: International students in VET[126]

Year	RII enrolment	AUR enrolment
2016	341	3,605
2017	43	5,558
2018	10	7,761
2019	75	12,093
2020	21	15,560
2021	17	15,604
2022	31	15,913
2023	13	17,382

Source: VOCSTATS, "Total VET students and courses", August 2024.

126 There are zero international student enrolments in AUM.

Female participation

Participation by females is low in the automotive sector, with 20% of the total workforce, and 3% of Automotive Technicians, including both light and heavy vehicle technicians, being females.[127] Additional research is needed to better understand the gender pay gap and initiatives that can support females in the industry.

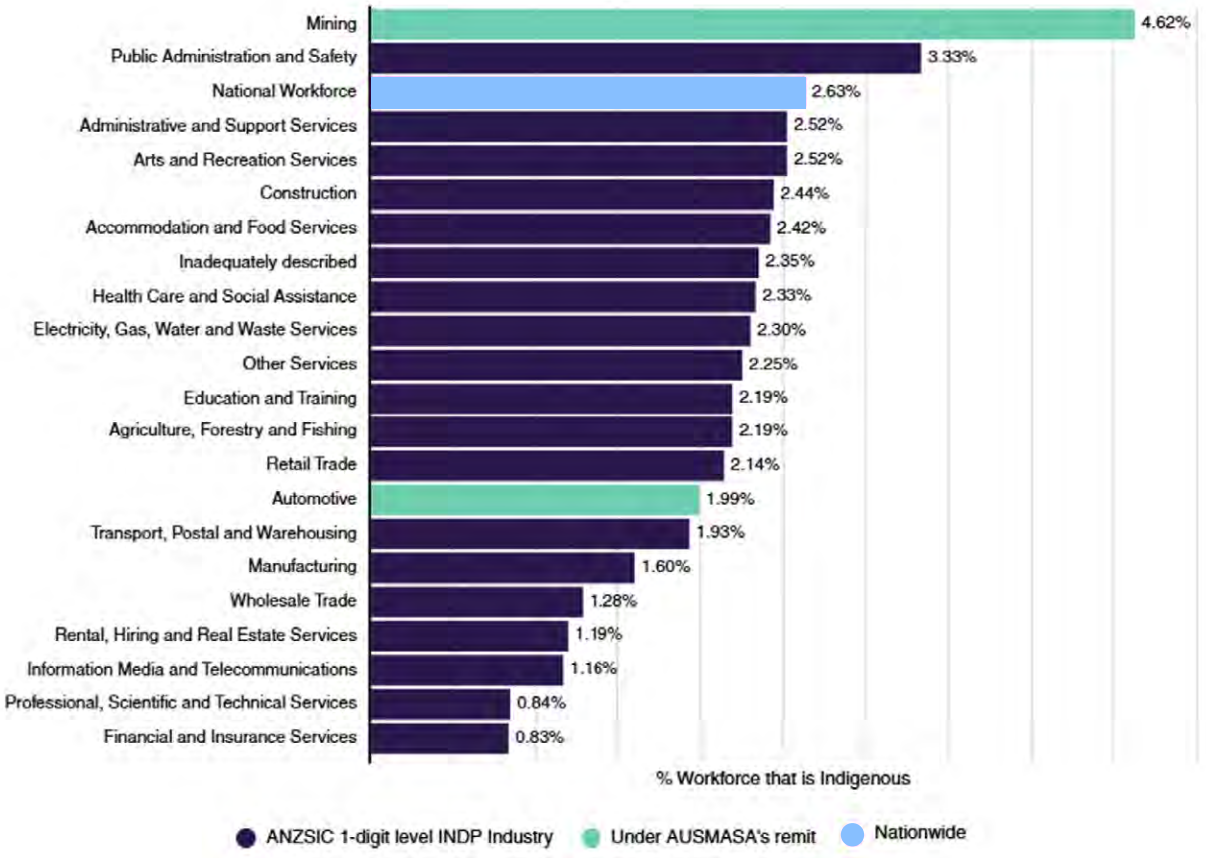
Stakeholder engagement has revealed that many within the industry are calling for better mentoring programs, more growth and upskilling opportunities for females, and greater transparency about the diversity of careers available to females. AUSMASA is continuing to research this area.

127 Jobs and Skills Australia, "Occupation and Industry Profiles – ANZSCO 3212 Motor Mechanics", February 2025.

First Nations employment

First Nations employees make up just 2% of the workforce, below the national average (Figure A2).

Figure A2: Proportion of Indigenous workforce by industry, 2021



Source: ABS Table Builder 2021 Census – employment, income, and education. Note: the proportion of the Automotive Industry has been calculated by aggregating the 3-digit ANZSIC groups covering the industry and applying the Indigenous Status (INGP) to derive the proportion.

The graph above highlights the underrepresentation of First Nations peoples in the automotive industry, where they make up only 1.99% of the workforce. This low representation reflects the broader challenges faced by First Nations peoples in accessing opportunities within this industry.

AUSMASA is committed to advancing Indigenous employment by working with industry to enable the design and implementation of employment and training programs tailored to First Nations communities. These are essential for fostering participation. AUSMASA will continue research into this space to better understand the nuances around the challenges.

Technological advancements

Technological advancement and adoption outpace curated training responses. For example, advanced technologies like Advanced Driver Assistance Systems (ADAS) attract new apprentices but pose challenges for VET providers, due to reluctance within the industry to share proprietary systems. There are also training concerns where RTOs do not have the equipment necessary to train workers in the new technology. This absence can create a lag in adoption, meaning the technology will sit idle (or not be fully used) until the training of the existing workforce is completed.

Electrification

Australia's Automotive Repair and Maintenance sector faces significant challenges from servicing both existing and new EVs. Key workforce challenges include expanding EV-focused training and apprenticeships, transitioning the existing workforce to become qualified in multiple skills through retraining, and diversifying the workforce to ensure a sufficient labour supply for the transition to net zero.

The sector needs to increase the uptake of EV-focused vocational education and training (VET) programs, with Certificate III in Automotive Electric Vehicle Technology currently being the only EV-focused VET qualification. While the Certificate III in Light Vehicle Mechanical Technology covers some EV training, retraining Internal Combustion Engine (ICE) Automotive Technicians is critical because a dual-qualified/skilled workforce would be needed to service both during the transition.[128]

Broadly, the challenges posed by electrification in the automotive manufacturing, retail, and wholesale sectors are less pronounced, compared to the Repair and Maintenance sectors. This is due to the decline of large-scale passenger vehicle manufacturing in Australia and the rise of online EV purchases. There are, however, opportunities for the Repair and Maintenance sector to explore worker retraining and deployment options.

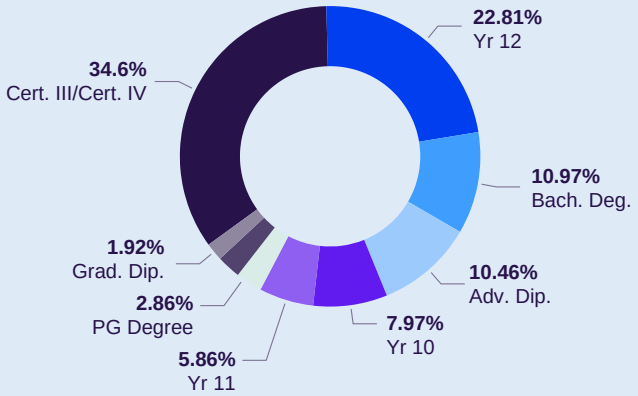
AUSMASA welcomed the establishment of the Canberra Institute of Technology's (CIT) EV Centre of Excellence (CoE). CIT's EV CoE will specialise in innovative training for light/heavy hydrogen electric vehicles, vehicle retrofitting, battery repurposing, and charging installation. It will also develop safety training for a range of occupations with touch points across the EV industry.

The Australian Government has supported the refit of the Wetherill Park TAFE college in New South Wales. This will enable the training and upskilling of both existing qualified technicians and new vehicle technicians on how to depower EVs for safe repair, and reinitialise them for full operation in a safe environment to work on high-voltage vehicles. The refurbished TAFE facility will enable the delivery of a key skill essential for the Automotive Repair and Maintenance sector and is a welcome development. Detailed career mapping of roles and skills required for the net zero transition is required to identify other similar opportunities.

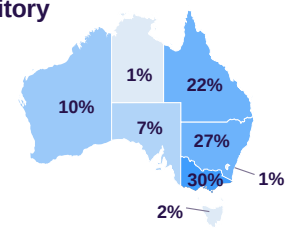
128 AUSMASA, Workforce Plan, 2024.

Dashboard 7: Automotive industry[129]

Education level of the workforce



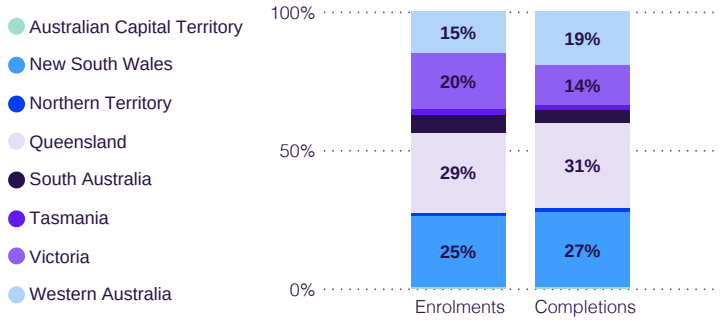
Total workforce by state/ territory



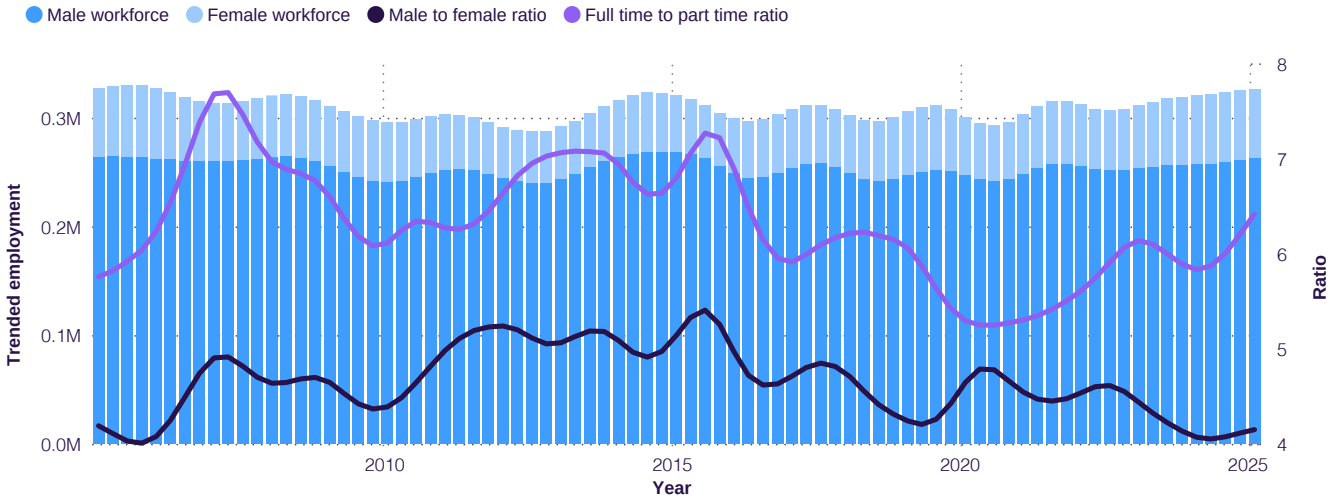
Projected growth over next decade	% female workforce
6%	17%

Median age	% workforce aged 24 or younger	% workforce aged 60 and above
40	15%	11%

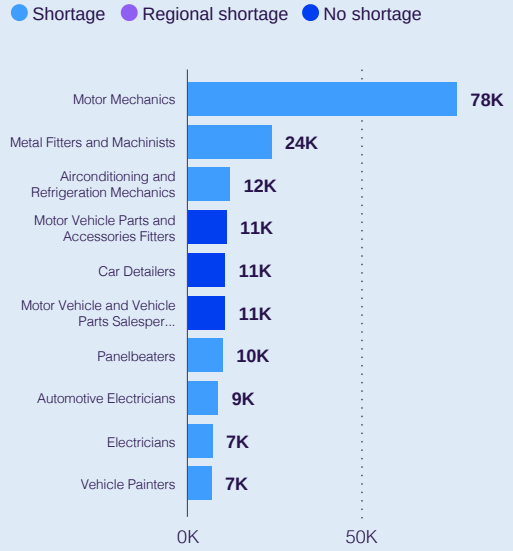
Training package status by state/territory of residence



Trends in employment by gender and work type



Top 10 ANZSCO occupations by workforce number



129 List of data source are in the Appendix 'Workforce Data Dashboard'.

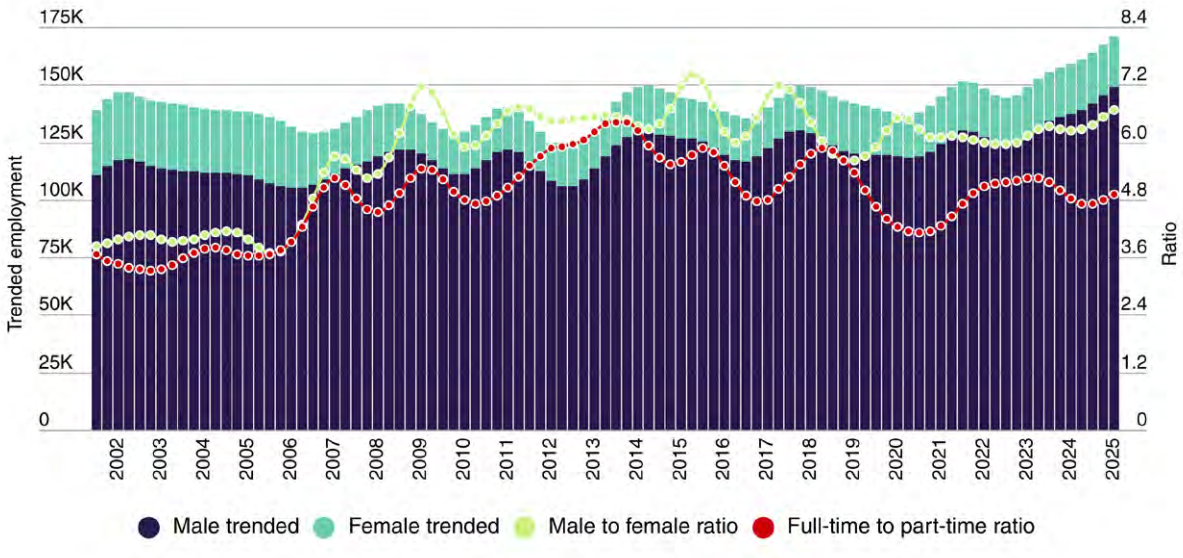
Automotive Repair and Maintenance

In the Automotive Repair and Maintenance sector, employment is at a 4-year high with 171,000 employees, driven by increases in male and full-time employment (Figure A3).[130,131] The sector, however, faces a skewed age distribution, with a median age of 38 and 25% of workers aged 51 or older, posing a risk of Skill shortages as older workers retire. The sector also faces challenges with retaining apprentices and gender diversity issues. In particular, there was a rise in the ratio of male to female workers following the 2009 Global Financial Crisis (GFC). A less diverse labour pool can add to skill shortages, illustrated by the sector experiencing the largest increase in vacancies in the industry from 2021 to 2023.

> Female participation in the Repair and Maintenance sector has remained largely consistent in recent years.

The ratio of male to female workers was around 4:1 prior to the 2009 GFC, after which it increased to roughly 7:1 and has remained at this level into 2025. This suggests the sector may now need to make more significant changes to improve female workforce participation.

Figure A3: Composition and employment trends in Automotive Repair and Maintenance, 2001–2025



Source: ABS, Labour Force, Australia, Detailed, Feb 2025*. Data Trended by AUSMASA.*

130 From February 2018 to August 2024, female workers increased by 11%, or by approximately 2,300 workers. During the same time period, part-time workers also increased by 5%, or by approximately 10,500 workers.

131 Please refer to our dashboard for Automotive Repair and Maintenance for an in-depth view on workforce composition and trends, https://ausmasa.org.au/media/c0iltsyo/94-automotive-repair_maintenance.pdf

A younger workforce

Across both census years, the age distribution for Automotive Repair and Maintenance workers was skewed towards younger workers, with a median age of 39 (Table A2). In contrast, the median age of all Australian workers was 42, which was also the same in both censuses.[132] However, 25% of workers are aged 51 years or older, and the sector continues to grow. Skill shortages become increasingly likely as older workers transition to retirement, noting that the average age of retirement was 57 for all workers in 2023.[133] Research commissioned by AUSMASA shows that around 60% of all automotive workers plan on remaining in the industry for 5 years or less, with existing Automotive Technicians and other trade workers reporting lower intentions to remain.

On the other hand, 25% of the sector's workers were 27 years old or younger as of the 2021 Census. Given the median age of apprentices in VET was 22 in 2021, and that most trade occupations are completed via apprenticeship pathways, apprentices are well-represented in this part of the workforce.[134] Yet, while 56% of apprentices have reported that they intend to remain in the industry for over 5 years in AUSMASA's research, only 21% saw themselves in the industry for their entire careers, compared to 44% for all automotive workers.

Some specific issues apprentices face may contribute to this. For example, their having to re-learn skills already gained from work experience at RTOs or TAFEs, potentially due to insufficient RPL, may play a part.[135] Given apprentices' relative youth, their importance to the sector, and younger workers' higher rates of job mobility,[136] attrition amongst these workers is a likely risk. As such, the sector must prioritise retaining apprentices and younger workers, particularly since they can contribute more working years over time.

Table A2: Age distribution of the Automotive Repair and Maintenance workforce

Percentile	2021 Census	2016 Census	Apprentices and trainees in 2024 Age at the completion
25th	27	27	20
50th (median)	39	39	22
75th	51	51	27

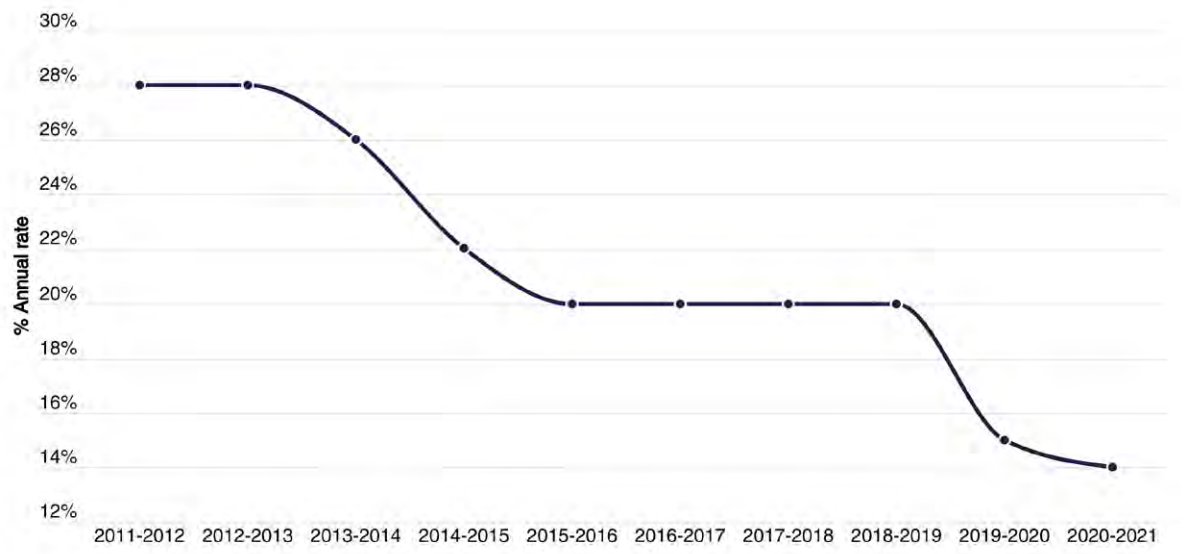
Source: 2021 Census – counting persons, 15 years and over; 2016 Census – Counting Employed Persons, Place of Work (POW); NCVER VOCSTATS, Apprentices and trainees – June 2024, Age by type of training by reporting period and training contract status.

132 Australian Bureau of Statistics, "Employment in the 2021 Census | Australian Bureau of Statistics," www.abs.gov.au, 30 November 2022.
133 Australian Bureau of Statistics, "Retirement and Retirement Intentions, Australia, 2020-21 Financial Year | Australian Bureau of Statistics," www.abs.gov.au, 29 August 2023.
134 AUSMASA, "2023 and 2021 Apprentices," AUSMASA.org.au, 2025.
135 National Centre for Vocational Education Research, "Exploring the Recognition of Prior Learning in Australian VET," 2020.
136 Australian Bureau of Statistics, "Job Mobility, February 2021 | Australian Bureau of Statistics," www.abs.gov.au, 30 June 2023.

Falling labour turnover

Labour turnover fell to a series low of 14% (-14%) in 2020–21 (Figure A4). Falling labour turnover is a positive sign, particularly in a tight job market, as it indicates that the workforce increasingly prefers to stay in the sector. Within the automotive industry, the Repair and Maintenance sector's labour turnover tended to be lower than that of other sectors within the industry. AUSMASA will continue to research what is needed to further reduce turnover and improve retention.[137]

Figure A4: Turnover in Automotive Repair and Maintenance, 2011–2021



Source: JSA, Data on Occupation Mobility, Jan 2024; Key Occupations by Sub-industry mapped by AUSMASA.

Job adverts for key occupations in the Automotive Repair and Maintenance sector have steadily increased following the COVID-19 pandemic, rising by 14,000 (+81%) from January 2021 to March 2023. This trend later reversed, with a decrease of 5,800 (-20%) from March 2023 to October 2024.

137 Labour turnover is computed from data and research made available by JSA through their publication on Occupation Mobility – the data only goes up to 2020-21

Table A3: Top 5 Automotive Repair and Maintenance occupation growth in vacancies

Occupations	Workforce numbers in 2021 Census	5-yr changes in IVI	Included in CSOL?	Shortage
Motor Mechanics (Automotive Technician)	46,000	55.69%	Yes	S
Panel Beaters[138]	9,000	177.55%	Yes	S
Car Detailers	7,000	74.34%	No	No data
Vehicle Painters	7,000	155.36%	Yes	S
Motor Vehicle Parts and Accessories Fitters	5,000	101.87%	No	NS

Source: Jobs and Skills Australia, Internet Vacancy Index Oct 2024; Key occupations by sub-industry mapped by AUSMASA; Total workforce numbers are based on the Automotive Repair and Maintenance snapshot *in the Workforce Plan 2024, including* Core Occupation Skills List (CSOL) *and* Occupation Shortage List.

Notes: S: Shortage; NS: Not in Shortage. Our conversations with industry indicate that the Census numbers may be smaller than reality, we welcome the identification of data sources that can paint a more accurate picture.

Employers' ability to fill vacancies is a primary measure of an occupation shortage used in JSA and industry research, with a fill rate of less than 67% associated with a higher chance of occupation shortages.[139] For example, JSA's research has found that occupations with 90% plus male workers, like those of automotive engineering and trades workers, have the lowest fill rates of any group at ANZSCO's sub-major-group level from 2021 to 2023.[140] Research from JSA and industry has found that these occupations, at ANZSCO's second lowest unit-group level, had some of the lowest fill rates of any occupations in their research. This was also associated with gender disparities, as 99% of Automotive Electricians, 98% of Automotive Technicians, and 98% of Panel Beaters were male by share of employment in 2021.[141] These low fill rates make sense when compared to increases in average vacancies from 2021–23. Further research is needed to better understand how to improve female participation in these occupations.

According to the Australian Automotive Aftermarket Association (AAAA), about 43% of service and repair workshops were non-employing (or sole operator) businesses in 2023. The number of non-employing businesses increased by 12 percentage points from 2021 to 2023, compared to a 3-percentage point increase in the number of employing businesses.[142]

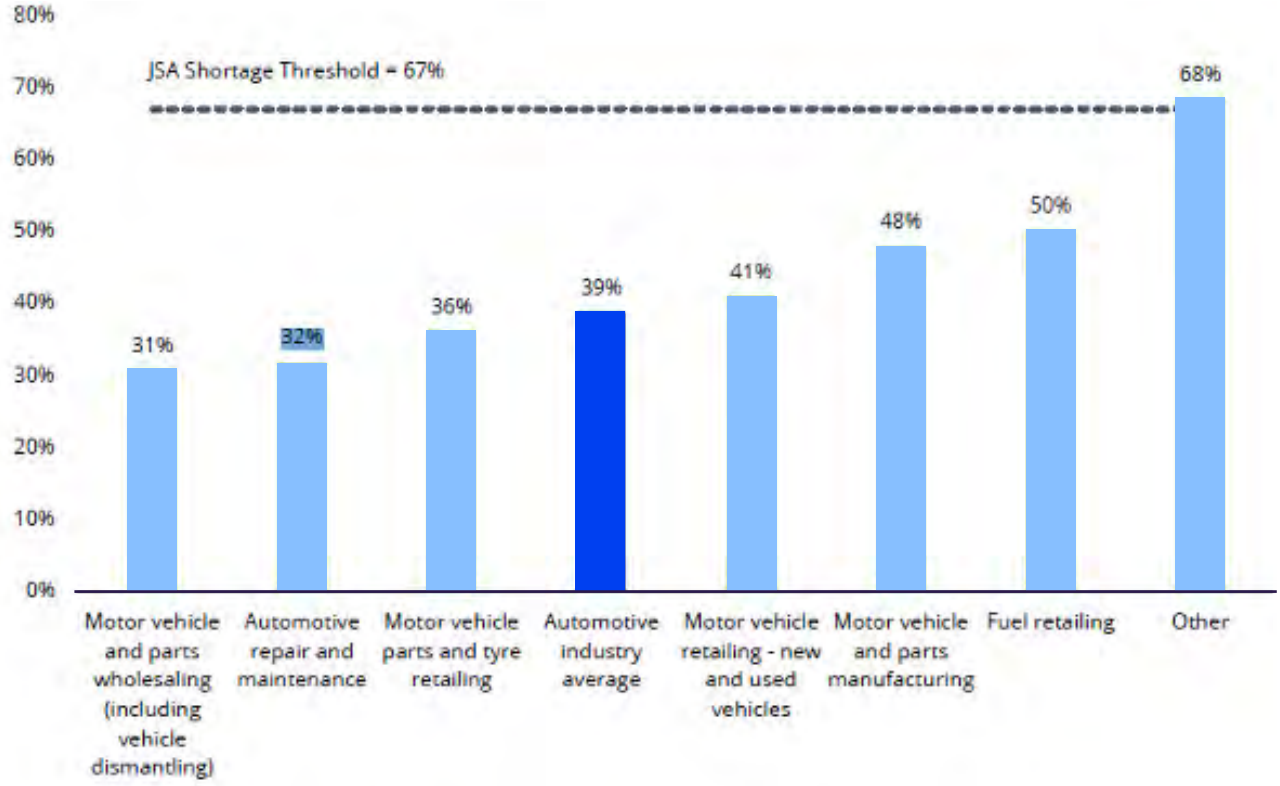
Since non-employing businesses are unable or less likely to use labour hire or online advertisements due to their cost, they often rely on word of mouth or advertisements placed on the door to secure additional staff and switch to becoming employing businesses. As such, their vacancies are not always captured in larger systematic studies and data can only be gained from industry-specific surveys, like the Motor Trades Association of Australia's (MTAA), which show lower fill rates for 2 of these key occupations.

138 With expressed concerns around the use of the word 'Panel Beater' as the qualification is titled automotive body repair, however, we defer to the use by ANZSCO as data is currently aligned to ANZSCO classifications
139 Jobs and Skills Australia, "2024 Occupation Shortage List," 14 October 2024
140 Jobs and Skills Australia, "Labour Market Update," March 2024.
141 Jobs and Skills Australia, "Occupations," Jobs and Skills Australia, 15 October 2024.
142 Australian Automotive Aftermarket Association, "AAAA State of the Industry 2024," October 2024.

Industry research has also highlighted issues with fill rates specific to the Repair and Maintenance sector. According to the MTAA, the sector had a fill rate of only 32% in 2024, below an industry average of 39% and the second-lowest rate in this research (Figure A5).[143] While the figures differ from JSA's, it is worth noting that the occupations with some of the lowest fill rates – like Panel Beater, Automotive Electrician, and Automotive Technician – were consistent and are common to the Repair and Maintenance sector.[144] Furthermore, the MTAA identified contributing factors like too few applicants, inadequate qualifications or experience, and inter-industry competition.[145]

This issue extends to EVs, where industry discussions continue on restricting Repair and Maintenance work to those with electrical or dual trades experience and VET qualifications. Since many such occupations, like Automotive Technician, are also important to the wider industry, intra-industry competition may contribute to the sector's low fill rates.[146] AAAA research also supports this, with only half of an estimated 80,000 Automotive Technicians and 40% of 37,000 Automotive Technician apprentices working in the sector.[147]

Figure A5: Fill rates in the automotive industry's sectors, 2024



Source: Deloitte, "Skills shortages in the Australian automotive industry - MTAA member survey findings 2024", 1 March 2024

143 Motor Trades Association of Australia, "MTAA Core Skills Occupations List Supporting Analysis," 31 May 2024.
144 Ibid.
145 Ibid.
146 Australian Automotive Aftermarket Association, "AAAA State of the Industry 2024," October 2024.
147 Ibid.

Enrolments in AUR Automotive Retail, Service and Repair qualifications

Over time, enrolments and completions for AUR Repair and Maintenance qualifications steadily increased, with proportionally larger increases in enrolments. From 2016 to 2023, enrolments increased to 85,757 (+64%) students, while completions only increased to 26,595 (+55%) students[148]. This disparity was larger for female students, as enrolments increased by over two and a half times from 2,246 to 5,671 students, while completions roughly doubled from 623 to 1,466 students[149].

Lower growth in commencements than enrolments, and even lower growth in completions, points to a growing build-up of enrolled students taking more time to complete their studies. This is possibly caused by the low use of RPL to shorten study duration for those with prior knowledge. The AUR training package had a rate of only 14.8% or RPL utilisation in 2018 – the lowest rate of 10 packages included in NCVER research.[150] Such issues have led some AUSMASA stakeholders to call for more funding and research into RPL, similar to work previously undertaken by the Council of Australian Governments.

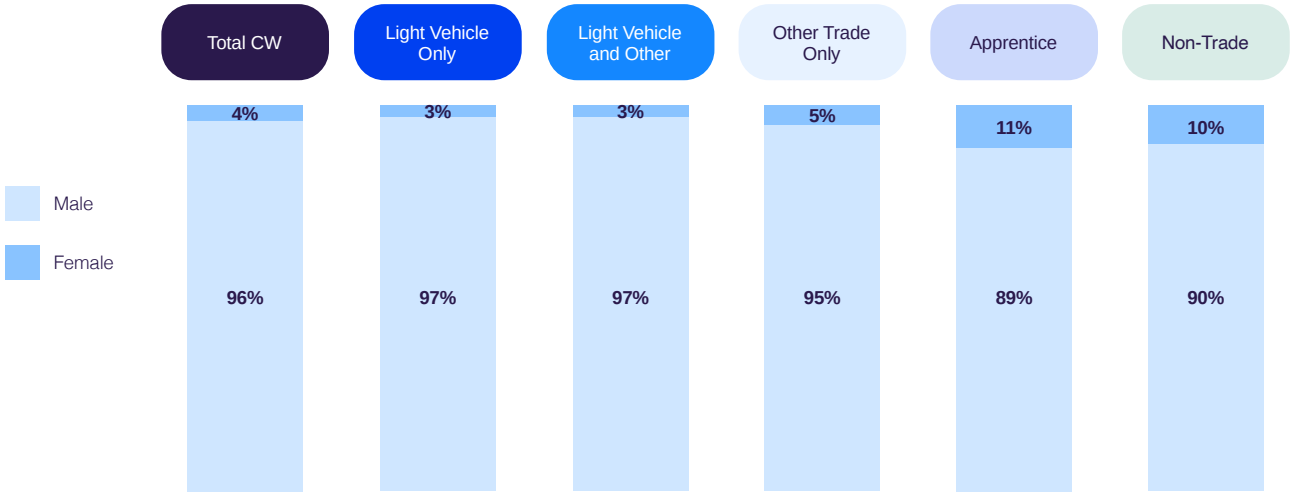
Another reason for the lengthening of the time taken to complete qualifications is illustrated by changes at the Australian Qualifications Framework (AQF) level – with shorter Certificate II level qualifications falling to 26% (-5%) of enrolments from 2016 to 2023, balanced by a similar-sized increase in longer Certificate III level qualifications, which represented two-thirds of enrolments in 2023. While these changes may not be positive for near-term supply, the former indicates that more students are studying at higher skill levels, particularly through the Certificate III in Light Vehicle Mechanical Technology, which could be of more benefit to the sector provided the qualifications are ultimately completed.

Apprentices are critical to filling key occupations in the sector, with both qualified and experienced workers.[151] The completions for Repair and Maintenance apprentices almost doubled from 3,613 in 2018 to 6,635 in 2023.[152] With moderately declining 4-year completion rates for all automotive and engineering trades apprentices, however, this points to continued challenges associated with converting students and apprentices into real supply for the industry's workforce.

148 VOCSTATS, "Total VET students and courses", August 2024.
149 Ibid.
150 National Centre for Vocational Education Research, "Exploring the Recognition of Prior Learning in Australian VET," 2020.
151 MTA Queensland, "State Election Blueprint Queensland," September 2024.
152 VOCSTATS, "Total VET students and courses", August 2024.

Although earlier data suggests that occupation and sector-specific shortages may persist, AUSMASA-commissioned research shows some promising signs of change (11% of apprentices surveyed in this research were female in 2024) (Figure A6). As apprentice roles also attracted the highest proportion of females amongst those surveyed, this suggests there are increasing numbers of entry-level opportunities for young females in the sector, given its high proportion of apprentices and a stable median age of 22 years for female apprentices in VET.[153] AUSMASA plans to continue to monitor these trends to better understand these changes.

Figure A6: Survey composition, 2024[154]



Base: all current workers (n=613), light vehicle mechanic only (n=340), light vehicle mechanic & other trade (n=112), other trade only (n=117), apprentice (n=42), non-trade (n=160)

153 AUSMASA, "2023 and 2021 Apprentices," AUSMASA.org.au, 2025.
154 Other trade is a catchall for all other categories.

Key issues identified in Automotive Repair and Maintenance

Uncompetitive wages

Many key occupations in the automotive industry require trade qualifications, but the wages for these trade-qualified workers are often lower than those in other trades. Research by the AAAA shows that apprentice Automotive Technicians earn an average of $40,000 per year, compared to $55,000 for apprentice Plumbers, Electricians, and Carpenters.[155] AUSMASA will continue to work with stakeholders and conduct research to better understand the nuances around this issue and potential solutions.

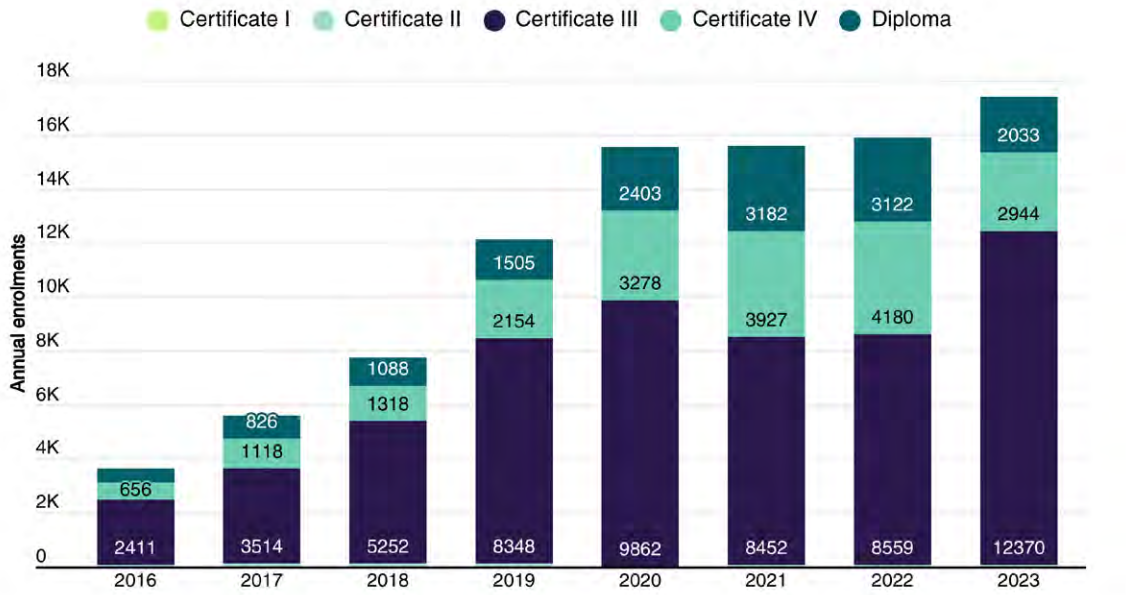
Lack of mentorship for apprentices

Training providers have expressed concerns about the lack of workplace mentorship, coaching, and support for automotive apprentices due to chronic skills shortages. Workshops are often understaffed, making it difficult to provide holistic support for apprentices, who may also need help with personal issues. This has led training organisations to feel that the responsibility of mentoring has shifted back to them.[156]

155 Australian Automotive Aftermarket Association, "Technician Salary Benchmarking Research," 2023.
156 AUSMASA, Workforce Plan 2024.

International enrolments in AUR

Figure A7: International enrolments in the AUR training package by qualification level, 2016–2023



Source: VOCSTATS, "Total VET students and courses", August 2024

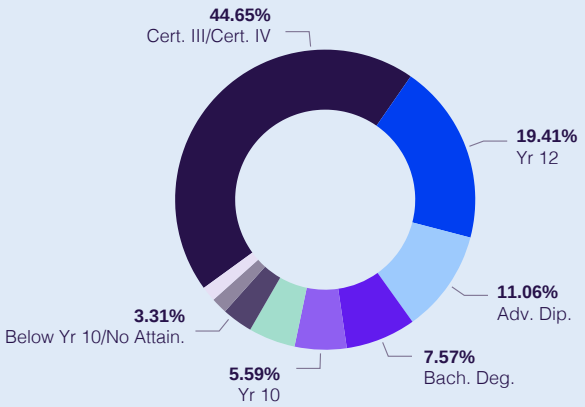
In 2023, 99% of international students were enrolled in AUR qualifications above certificate III (Figure A7). These qualifications, however, do not mandate any minimum number of practical workplace hours. International students generally cannot complete apprenticeships due to the eligibility rules requiring Australian citizenship or permanent residence.

As a result, the industry has raised significant concerns about the lack of actual, practical, and hands-on experience that international student graduates are bringing to the workforce. Many indicate that despite holding the required qualifications, international student graduates can rarely be employed as skilled Automotive Technicians.[157] AUSMASA will continue to work with industry to better understand potential solutions that can tailor entry pathways to better suit employers' needs in finding qualified workers.

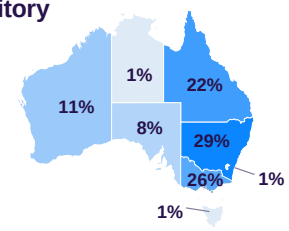
157 Ibid.

Dashboard 8: Automotive Repair and Maintenance[158]

Education level of the workforce



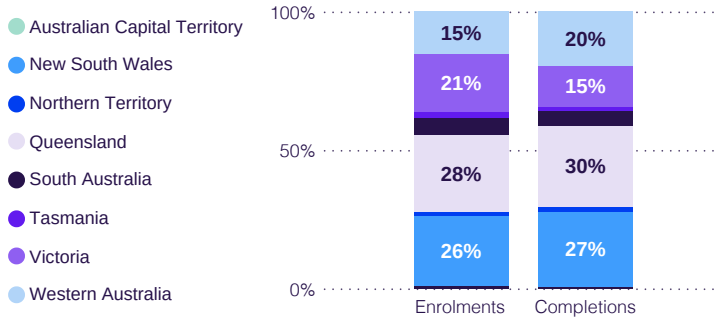
Total workforce by state/ territory



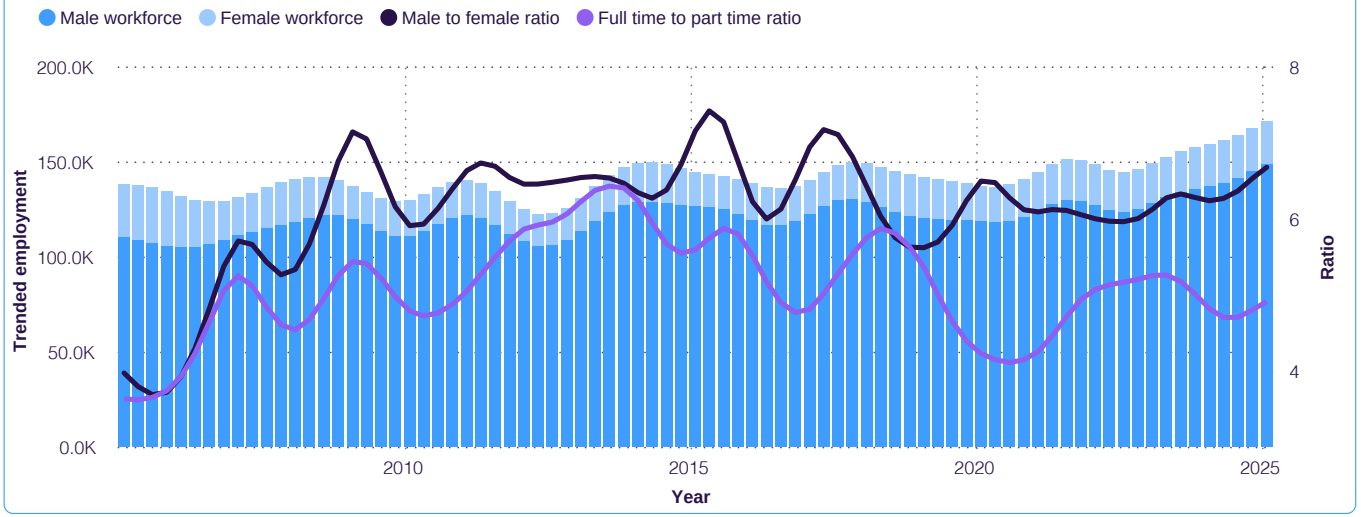
Projected growth over next decade	% female workforce
6%	13%

Median age	% workforce aged 24 or younger	% workforce aged 60 and above
39	18%	12%

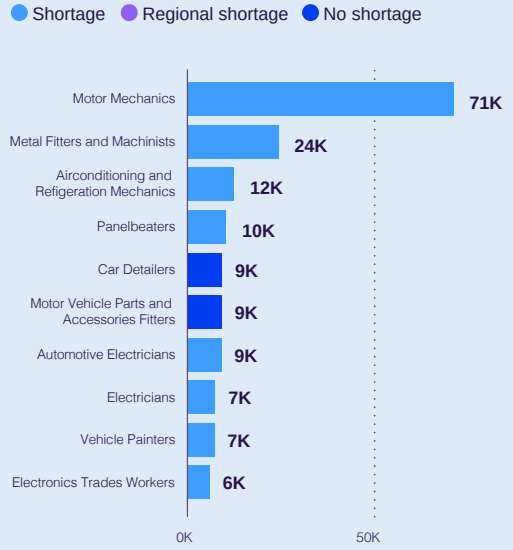
Training package status by state/territory of residence



Trends in employment by gender and work type



Top 10 ANZSCO occupations by workforce number



158 List of data source are in the Appendix 'Workforce Data Dashboard'.

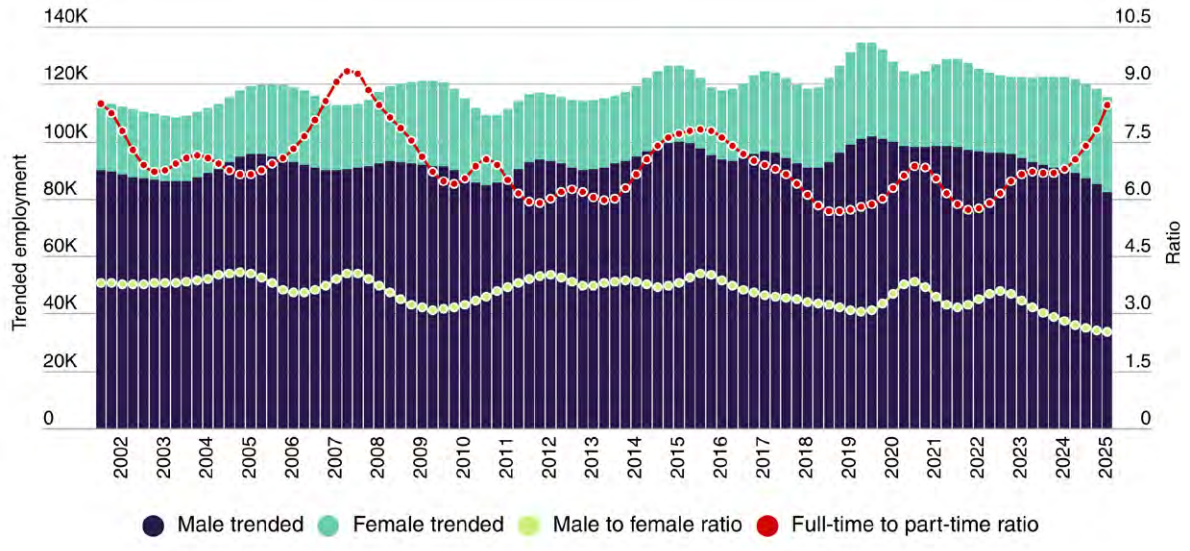
Automotive Retail and Wholesale

Although the Automotive Retail and Wholesale sector has the second-largest workforce in the industry, with 121,000 workers, it has not grown since COVID-19 (Figure A8).[159] This recent growth was driven by higher female participation across the workforce and within VET, as well as a shift in favour of more full-time roles.

> The sector faces issues with retaining existing workers in non-trades roles, as they report lower rates of intending to remain in the industry, despite high new vehicle sales and the need for workers in new digital and service-oriented roles.

Latest industry research suggests an increasing proportion of females in the industry have shifted out of retail and office roles and into working 'on the tools'.[160] This is likely driven by the greater flexibility of work offered by automotive retail compared to office-based sales or retail jobs, for example.

Figure A8: Composition and employment trends in Automotive Retail and Wholesale, 2001–2025



Source: ABS, Labour Force, Australia, Detailed, Oct 2024. *Data trended by AUSMASA*

159 Please refer to our dashboard for Automotive Retail and Wholesale for an in-depth view on workforce composition and trends, https://ausmasa.org.au/media/2mrjokmz/3539-automotive-retail-and-wholesale.pdf

160 Capricorn, "State of the Nation," Capricorn.coop, 2024.

On the brink of an ageing workforce

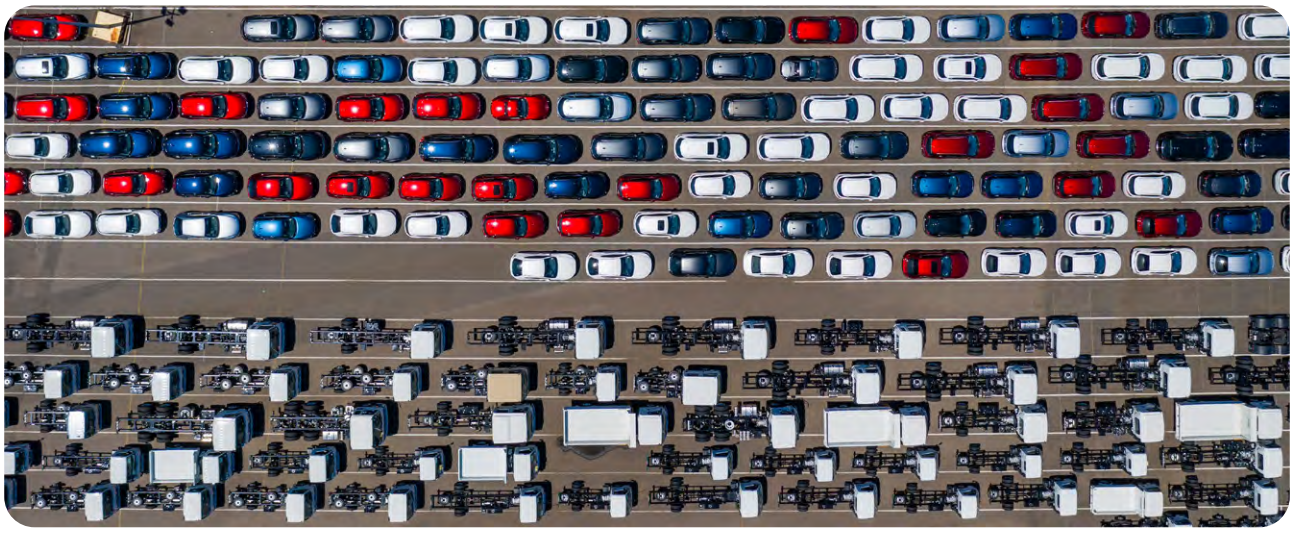
As of the 2021 Census, the median age of workers in the Automotive Retail and Wholesale sector was 40, comparable to the median age of 42 for all Australian workers in Census 2021 (Table A4).[161] While 25% of the sector's workforce was aged 52 and over, retirement poses less of a risk as the sector's non-trade roles are less physically demanding.[162] This enables older workers to remain in the sector for longer, reporting lower rates of job mobility that are often associated with health and reskilling, as they approach retirement.[163]

The size of the Automotive Retail and Wholesale workforce has continued to decline, and growth is predicted to moderate over future years. By comparison, 25% of the sector's workforce was 29 years old or younger in the 2021 Census, which was also one year older than in the 2016 Census (Table A4). As the sector continues to transition from traditional sales to more digital and service-oriented roles, with more online vehicle purchasing and customisation, younger workers will shift to new and emerging roles. Given younger workers have higher rates of job mobility, however, retention could become problematic.[164] Research commissioned by AUSMASA looks to support this view, given only 34% of automotive workers in non-trade roles saw themselves in the industry for their entire careers, compared to 44% for all automotive workers.

Table A4: Age distribution of the Automotive Retail and Wholesale workforce

Percentile	2021 Census	2016 Census	Apprentices and trainees in 2024 Age at the completion
25th	29	28	20
50th (median)	40	39	24
75th	52	50	31

Source: 2021 Census – counting persons, 15 years and over; 2016 Census – Counting Employed Persons, POW; NCVER VOCSTATS, Apprentices and trainees – June 2024, Age by type of training by reporting period and training contract status.

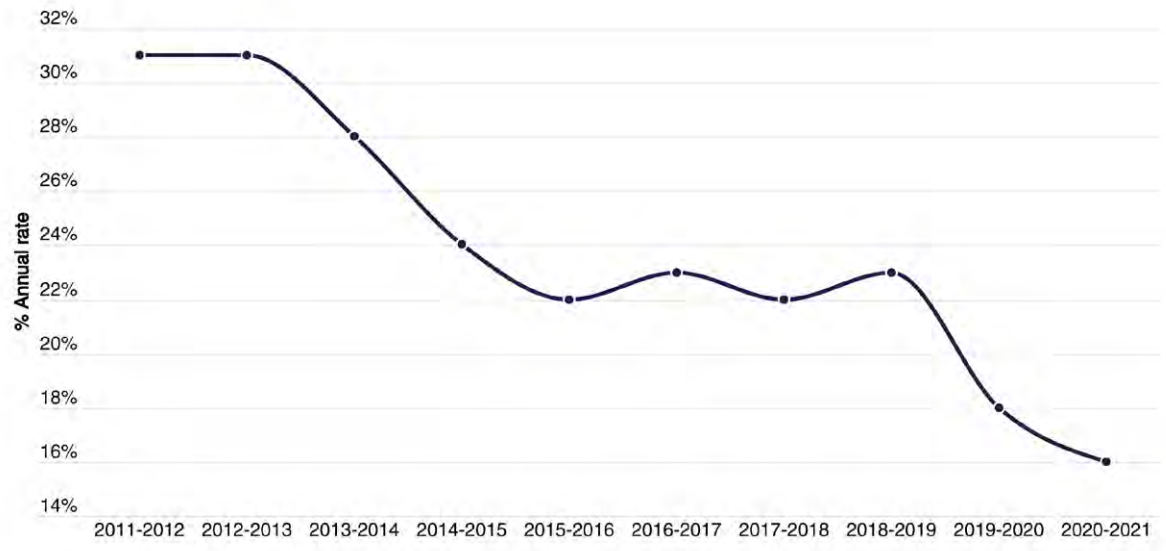


161 Australian Bureau of Statistics, "Employment in the 2021 Census | Australian Bureau of Statistics," www.abs.gov.au, 30 November 2022.
162 Capricorn, "State of the Nation," Capricorn.coop, 2024.
163 Australian Bureau of Statistics, "Left or Lost a Job," www.abs.gov.au, 24 May 2022.
164 Australian Bureau of Statistics, "Job Mobility, February 2021 | Australian Bureau of Statistics," www.abs.gov.au, 30 June 2023.

Falling labour turnover

Labour turnover in the sector fell to 16% (-15%) in 2020–21 (Figure A9). Falling labour turnover is a positive sign, particularly in a tight job market, as it indicates that the workforce increasingly prefers to stay in the sector. Although positive, the sector's turnover started from a higher level and did not fall as low as that for all other industries, illustrating that its turnover was slightly above 'average.' Within the automotive industry, the retail and wholesale sector's labour turnover started and remained at a higher level compared to all other sectors within the industry. AUSMASA will continue to work with stakeholders to identify learnings from the sector on reducing labour turnover.[165]

Figure A9: Turnover in Automotive Retail and Wholesale, 2011–2021



Source: JSA, Data on Occupation Mobility, Jan 2024; Key occupations by sub-industry mapped by AUSMASA.

165 Labour turnover is computed from data and research made available by JSA through their publication on Occupation Mobility – the data only goes up to 2020-21

Job adverts in the Automotive Retail and Wholesale sector have steadily increased following the COVID-19 pandemic, rising by 9,300 (+74%) from January 2021 to March 2023 (Table A5). This trend later reversed, with a decrease of 5,000 (or -23%) from March 2023 to October 2024.

Table A5: Top 5 Automotive Retail and Wholesale occupation growth in vacancies

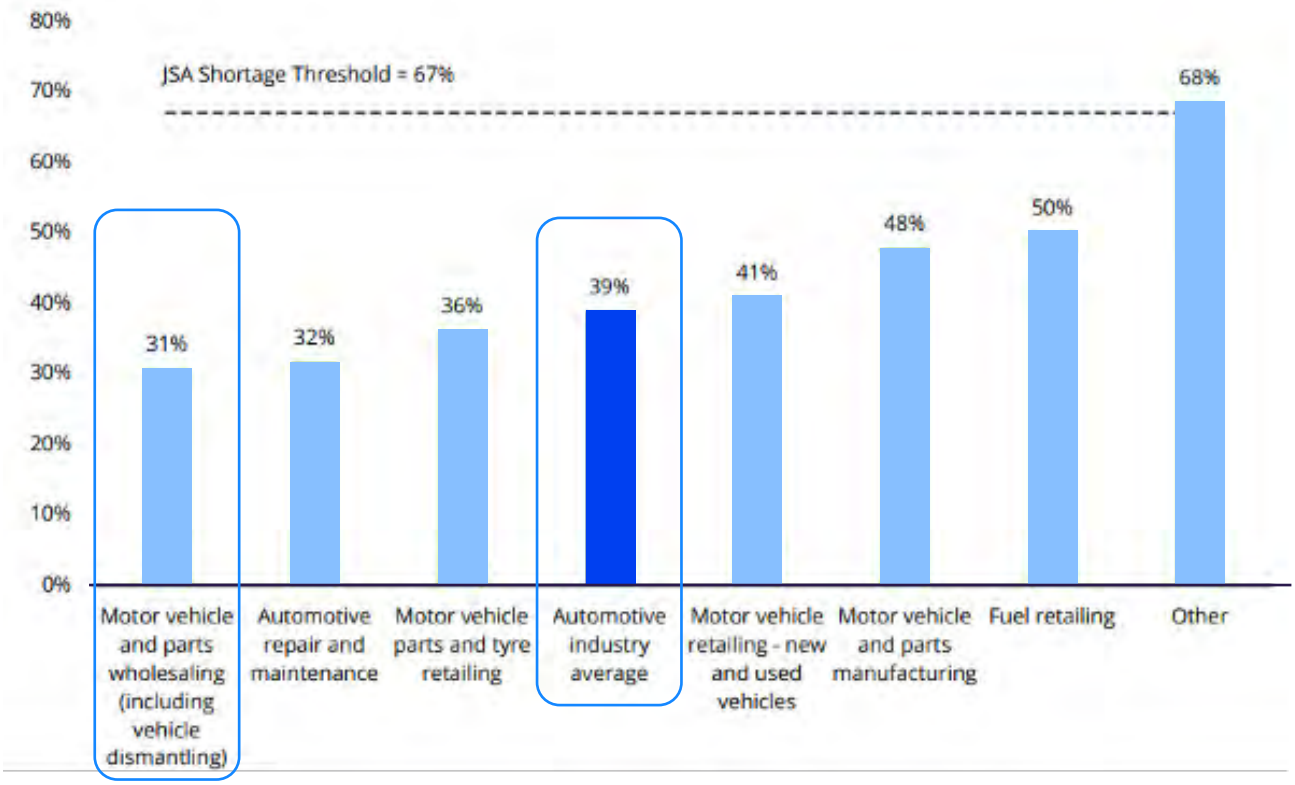
Occupations	Workforce numbers in 2021 Census	5-yr changes in IVI	Included in CSOL?	Shortage
Motor vehicle and vehicle parts salespersons	23,000	63.28%	No	NS
Motor Mechanics (Automotive Technician)	14,000	55.69%	Yes	S
Car Detailers	4,000	74.34%	Yes	No data
Sales representatives	3,000	17.79%	No	NS
Storepersons	3,000	67.27%	No	NS

Source: JSA, Internet Vacancy Index Oct 2024; Key occupations by sub-industry mapped by AUSMASA; Total workforce numbers are based on the Automotive Retail and Wholesale snapshot in the Workforce Plan 2024, including Core Occupation Skills List (CSOL) and Occupation Shortage List.

Notes: S: Shortage; NS: Not in Shortage. Our conversations with industry indicate that the Census numbers may be smaller than reality, we welcome the identification of data sources that can paint a more accurate picture.

Employers' rates of recruitment difficulty and ability to fill vacancies are 2 key measures of skill shortages used in JSA and industry research, with a fill rate of less than 67% associated with a higher chance of occupation shortages (Figure A10).[166] Recruitment difficulty increased in roles against Automotive Retailing, but decreased in roles across the automotive wholesale sector.[167] Industry-specific research from the MTAA, however, looks to go against the broader division-level trends, with fill rates for the automotive wholesaling subsector 10 percentage points lower than those for the Automotive Retailing sector.[168] Since an inverse relationship between recruitment difficulty and fill rates can usually be expected,[169] both JSA and industry research suggest the automotive wholesaling subsector faces greater difficulties with recruitment and vacancies than Automotive Retailing and retail trade more broadly.

Figure A10: Fill rates in the automotive industry's sectors, 2024



Source: Deloitte, "Skills shortages in the Australian automotive industry - MTAA member survey findings 2024", 1 March 2024

Similarly, JSA data at ANZSCOs second lowest unit group level partially differs from more detailed industry data. For example, customer service managers had fill rates of 79%[170] according to JSA and 78%[171] according to MTAA. All sales representatives had a 69% fill rate in JSAs research,[172] compared to fill rates in MTAA's industry research of 48% for sales representatives (motor vehicle parts and accessories), 56% for motor vehicle parts interpreter and automotive parts salespersons, and 78% for motor vehicle or caravan salespersons.[173]

166 JSA, "2024 Occupation Shortage List," 14 October 2024.
167 JSA, "Labour Market Update," March 2024.
168 Deloitte Access Economics, "Automotive Skills Shortages". 31 May 2024.
169 JSA, "2024 Occupation Shortage List," 14 October 2024.
170 JSA, "2024 OSL Key findings report figures and tables," 14 October 2024.
171 Deloitte Access Economics, "Automotive Skills Shortages,". 31 May 2024.
172 SA, "2024 OSL Key findings report figures and tables," 14 October 2024.
173 JSA, "Vacancy Report January 2024," 14 February 2024.

None of the sector-specific sales occupations were classified as being in a national shortage as part of JSA's Annual Skills Priority List.[174] Given the importance of these sector-specific sales occupations to Automotive Retailing and Wholesaling, their sub-67% fill rates in industry research suggest the sector faces occupation shortages that are not always visible in JSAs research.

Enrolments in AUR Retail and Wholesale qualifications

Over time, enrolments, and completions for AUR Retail and Wholesale qualifications have remained flat, with some notable fluctuations. From 2016 to 2018, enrolments decreased by 30% from 2,423 to 1,688 students and remained flat until they increased by 40% from 1,730 to 2,471 students from 2021 to 2023.[175] Female students followed the same decreasing and increasing trend, accounting for a steady average of 20% of enrolments from 2016 to 2023 – the highest proportion across all automotive qualifications.[176] By comparison, from 2016 to 2018 completions almost doubled from 246 to 480 students, remaining near this level into 2020[177]. Completions notably fell 30% to 318 students in 2021, however, and largely remained at this level into 2022, before a large 86% increase to a new high of 652 student completions in 2023.

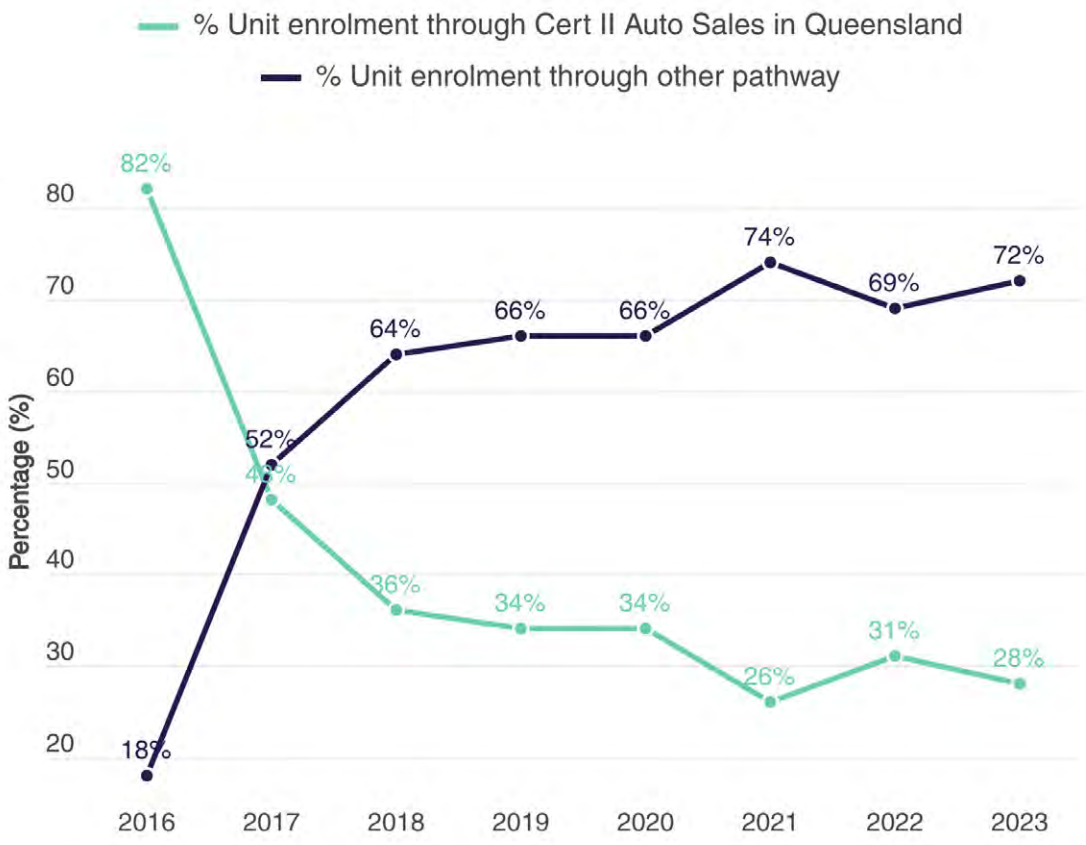
As all AUR Retail and Wholesale qualifications are at the Certificate III level, and the proportion of part-time students remained steady at an average of 96% of enrolments from 2016 to 2023, we cannot determine the exact reasons for the recent increase in completions from the data alone.[178] Increases in commencements and enrolments from 2022 onward likely contributed, with higher commencements and enrolments adding to higher completions in 2023 and future years, adding to the potential supply for the sector's workforce. We would welcome insight from industry and partners into supply and demand forces acting on the VET sector.

By jurisdiction, Queensland accounted for an outsized proportion of students (Figure A11). The state accounted for 61% of enrolments and 50% of completions on average each year from 2016 to 2023, despite only accounting for 22% of the workforce.[179]

As noted in our 2024 Workforce Plan, such discrepancies are of interest to us as they suggest mismatches between VET supply and the wider workforce. In Queensland, motor dealers are required to complete one of 2 sets of several units from Certificate III in Automotive Sales – leading to a licence – to be able to work in their occupation.[180] This requirement accounted for 92% of all student enrolments in Retail and Wholesale qualifications on average from 2016 to 2023.[181] Because Queensland only requires completion of the units for the license, however, enrolments in them via the qualification fell 54 percentage points from 82% of unit enrolments in 2016 to 28% in 2023, in favour of other pathways. As such, an increasing proportion of Queensland's students opt to avoid or withdraw from a full qualification in favour of the units only, which the state's lower proportion of enrolments and completions also looks to support. This raises questions about completing a full qualification in the state.

174 JSA, "Vacancy Report January 2024," 14 February 2024.
175 VOCSTATS, "Total VET students and courses", August 2024.
176 Ibid.
177 Ibid.
178 Ibid.
179 Ibid.
180 Queensland Government, "Apply for a Motor Dealer license", 26 November 2021.
181 VOCSTATS, "Total VET students and courses", August 2024.

Figure A11: Motor dealer unit enrolment pathway, Queensland, 2016–2023



Source: VOCSTATS, "Total VET students and courses", August 2024.

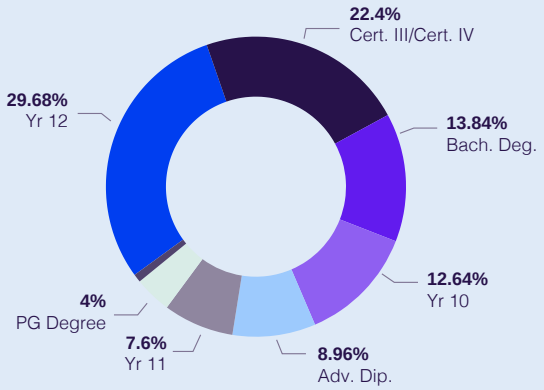
Key issues identified in Automotive Retail and Wholesale

The Automotive Retail and Wholesale sector is experiencing gradual changes in consumer behaviour and how manufacturers bring products to market. The ability to complete vehicle orders online is becoming more common, particularly among EV brands like Tesla and BYD, which have replaced traditional dealerships with company-owned stores. This shift has reduced the role of salespersons to order fulfilment in some cases. These changes highlight the evolving landscape of the Automotive Retail and Wholesale sector, driven by technological advancements and changing consumer preferences.[182] AUSMASA will continue to research and work with stakeholders to identify opportunities for workforce reskilling and redeployment.

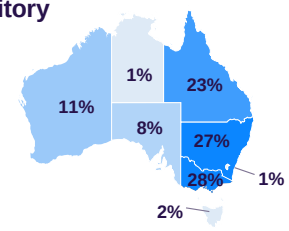
182 AUSMASA, Workforce Plan 2024.

Dashboard 9: Automotive Retail and Wholesale[183]

Education level of the workforce



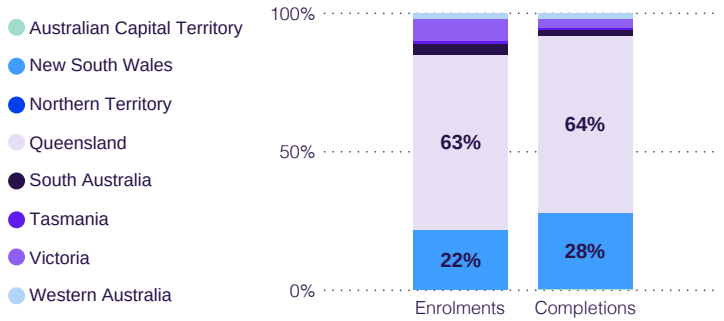
Total workforce by state/ territory



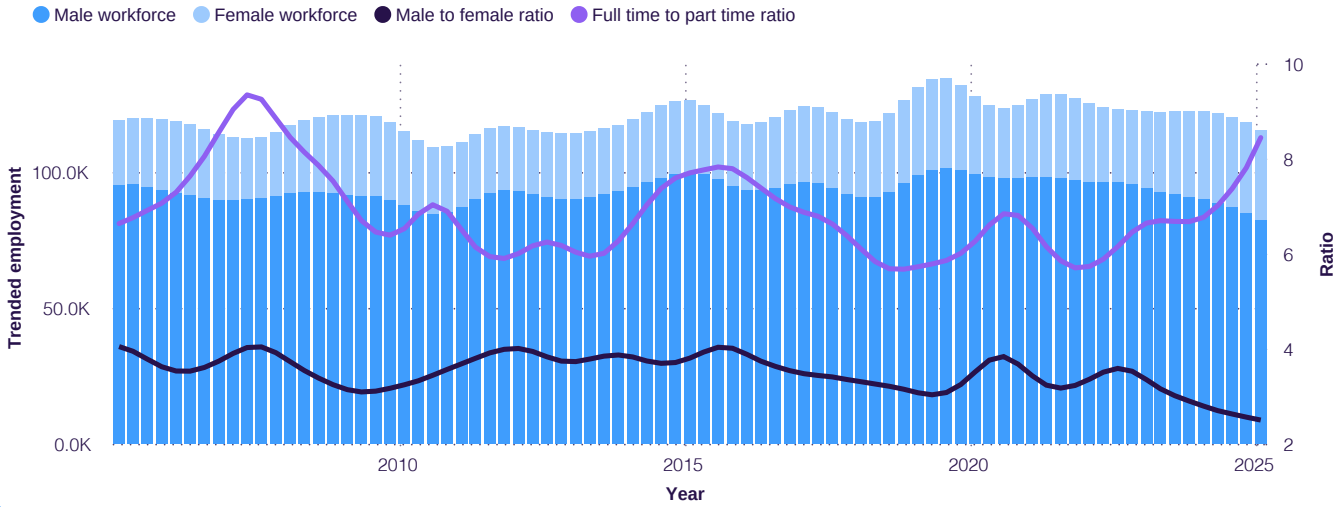
Projected growth over next decade	% female workforce
9%	24%

Median age	% workforce aged 24 or younger	% workforce aged 60 and above
40	14%	11%

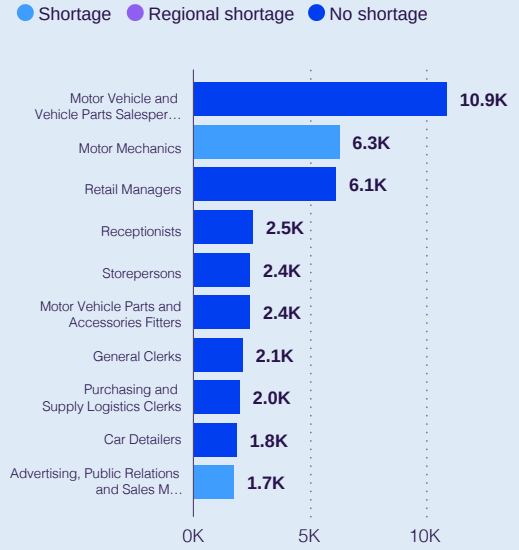
Training package status by state/territory of residence



Trends in employment by gender and work type



Top 10 ANZSCO occupations by workforce number

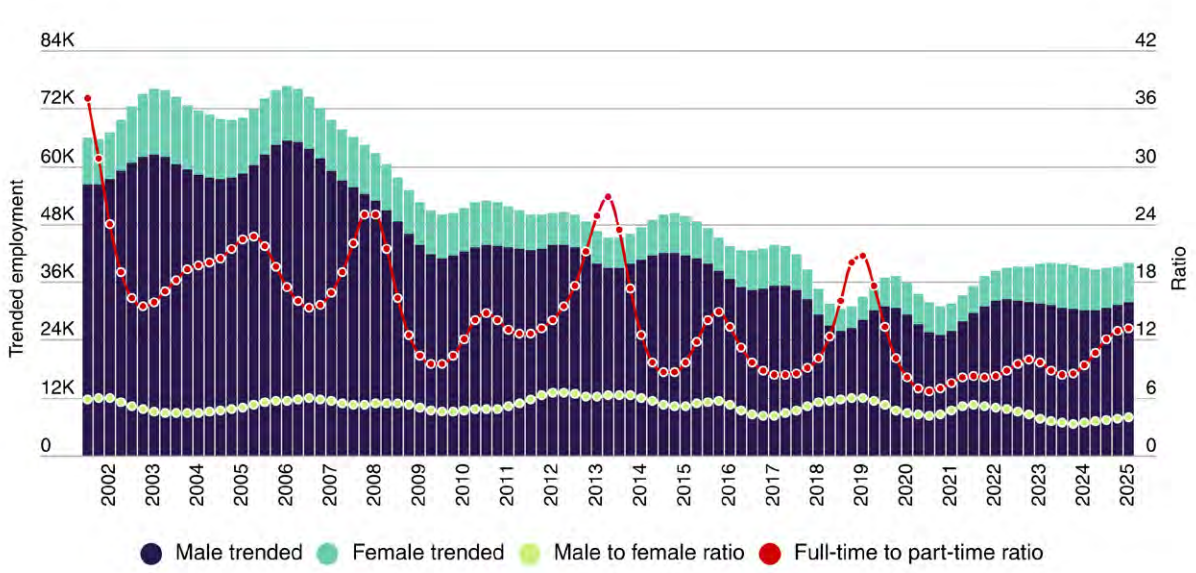


183 List of data source are in the Appendix 'Workforce Data Dashboard'.

Automotive manufacturing

The automotive manufacturing sector, employing 39,900 individuals as of February 2025, has seen a notable increase in female participation (Figure A12). The ratio of male to female workers fell from 6:1 in the early 2000s to 4:1 in 2025.[184] This sector has also shifted towards more full-time employment, which rose by 18% as part-time employment fell by 9%. Despite these positive trends, however, the sector faces challenges with an ageing workforce, as a quarter of employees are over 52 years old, indicating potential future skill shortages as workers retire. Additionally, with VET enrolments and completions remaining stable, the sector will likely require a greater contribution from VET to keep up with demand and support the shift towards specialised vehicle manufacturing and associated skills.

Figure A12: Composition and employment trends in automotive manufacturing, 2001–2025



Source: ABS, Labour Force, Australia, Detailed, Feb 2025. *Data Trended by AUSMASA.*

An ageing workforce

The median age of automotive manufacturing employees went from 43 to 42 between the 2021 and 2016 censuses, compared to the Australian median workers' age of 42 in Census 2021.[185] The stability in the median age indicates robust fill rates in the industry. Across the census years, however, the oldest quarter of the workforce was above 52 – nearing retirement. The sector's shift to manufacturing more specialised vehicles and components has required different skills and training.[186] This creates career path dependence and the potential for a retirement cliff. It also means that replacement workers have higher barriers to entry in terms of training and specialised training needs. As older workers transition into training and mentoring roles, it can affect their work experience and may cause higher attrition rates or lower productivity, causing future skill shortages (Table A6).

184 Please refer to our dashboard for Automotive Manufacturing for an in-depth view on workforce composition and trends, https://ausmasa.org.au/media/k0if0dqc/231-automotive-manufacturing.pdf
185 Australian Bureau of Statistics, "Employment in the 2021 Census | Australian Bureau of Statistics," www.abs.gov.au, 30 November 2022.
186 AUSMASA, "Industry Workforce Plan Moving Ahead Together 2024," 2024.

Table A6: Age distribution of the automotive manufacturing workforce

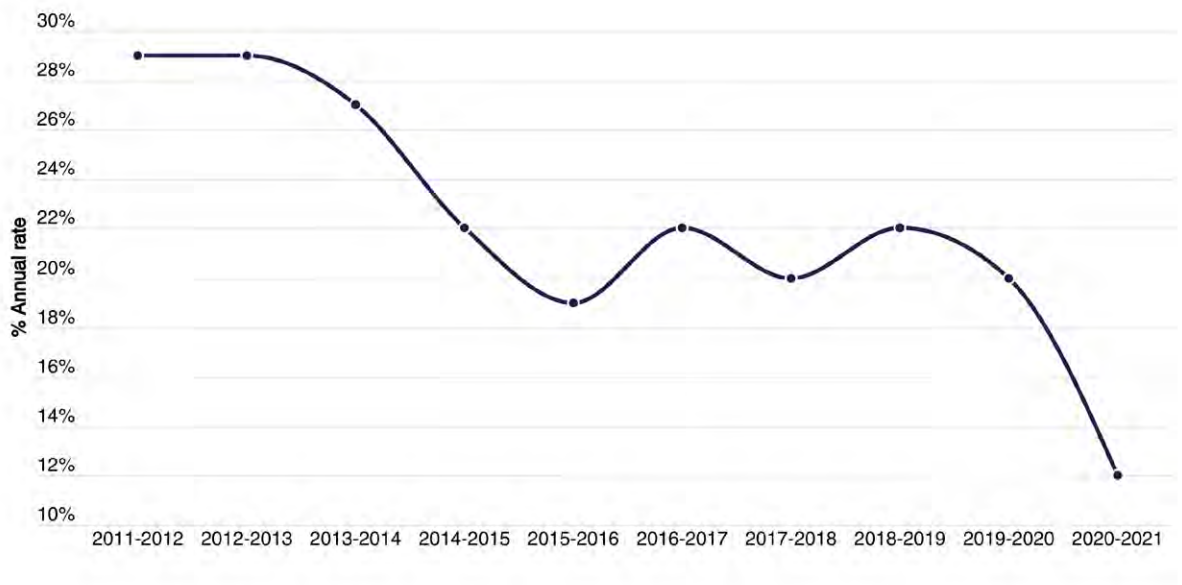
Percentile	2021 Census	2016 Census	Apprentices and trainees in 2024 Age at the completion
25th	31	33	20
50th (median)	42	43	22
75th	52	52	27

Source: 2021 Census – counting persons, 15 years and over; 2016 Census – Counting Employed Persons, POW; NCVER VOCSTATS, Apprentices and trainees – June 2024, Age by type of training by reporting period and training contract status.

Falling labour turnover

Labour turnover in the automotive manufacturing sector has fallen to 12% (-17%) in 2020–21 (Figure A13), representing the largest fall within the automotive industry. Falling labour turnover is a positive sign, particularly in a tight job market, as it indicates that the workforce prefers to stay in the sector, and in this case, in this sector more than the rest of the industry. AUSMASA will continue to research and work with stakeholders to better understand the learnings from this falling trend, which may be activated for the broader industry and used to further reduce turnover.[187]

Figure A13: Turnover in Automotive Manufacturing, 2011–2021



Source: JSA, Data on Occupation Mobility, Jan 2024; Key Occupations by Sub-industry mapped by AUSMASA.

Job adverts for vacancies in the Automotive Manufacturing sector have steadily increased following the COVID-19 pandemic, rising by 13,300 (+77%) from January 2021 to March 2023. Subsequently, vacancies then fell by 6,400 (-21%) from March 2023 to October 2024.

187 Labour turnover is computed from data and research made available by JSA through their publication on Occupation Mobility – the data only goes up to 2020-21.

Table A7: Top 5 automotive manufacturing occupation growth in vacancies

Occupations	Workforce numbers in 2021 Census	5-yr changes in IVI	Included in CSOL?	Shortage
Structural Steel and Welding Trades Workers	3,600	23.42%	Yes	S
Product Assemblers	2,800	27.78%	No	No data
Vehicle Body Builders and Trimmers	1,800	30.38%	Yes	S
Industrial, Mechanical and Production Engineers	1,500	40.07%	Yes	S
Metal Fitters and Machinists	1,300	45.92%	Yes	S

Source: Jobs and Skills Australia, Internet Vacancy Index Oct 2024; Key occupations by sub-industry mapped by AUSMASA; Total workforce numbers are based on the Automotive Manufacturing snapshot *in the workforce plan 2024, including* Core Occupation Skills *and* Occupation Shortage List.

Notes: S: Shortage; NS: Not in Shortage. Our conversations with industry indicate that the Census numbers may be smaller than reality, we welcome the identification of data sources that can paint a more accurate picture.

Enrolments in AUM automotive manufacturing qualifications

Student enrolments and completions for AUM automotive manufacturing qualifications have remained stable over time. From 2016 to 2020, enrolments and completions fell to 391 (-33%) and 78 (-10%), respectively.[188] The fall in completions looks to be driven by changes at the AQF level, with the proportion of students studying Certificate III qualifications that take longer to complete increasing to 91% (+22%) from 2016 to 2018 and remaining stable into 2020.[189] However, from 2020 to 2023, enrolments and completions increased, respectively, by 551 (+41%) to 103 (+31%) students.[190] Although falls in completions may not be positive for more immediate workforce supply, it is worth noting that shifts in favour of longer, Certificate III qualifications mean students are studying at higher skill levels, which will likely be of more benefit to the sector in the long term.

By jurisdiction, Western Australia was well represented in this data, as it accounted for 27% of enrolments and 36% of completions on average from 2016 to 2023.[191] Similarly, New South Wales and Queensland both accounted for 25% of enrolments, and 29% and 26% of completions, respectively, on average from 2016 to 2023.[192] While Victoria also made up 23% of enrolments, it only accounted for 8% of completions on average over this time. In comparison, in 2016, Victoria accounted for closer to half of enrolments, while Western Australia, Queensland, and New South Wales represented closer to one-fifth of enrolments.[193] This change is of interest, as Victoria still accounts for 54% of Australia's automotive manufacturing workforce, followed by Queensland at 21%, New South Wales at 11%, and Western Australia at 9%.[194] The workforce in both New South Wales and Western Australia is smaller than the data on VET students would suggest.

188 VOCSTATS, "Total VET students and courses", August 2024.
189 Ibid.
190 Ibid.
191 Ibid.
192 Ibid.
193 In 2016, Victoria accounted for 47% of enrolments, compared to 19% of enrolments for both New South Wales and Queensland.
194 ABS, "Labour Force, Australia, Detailed", December 2024.

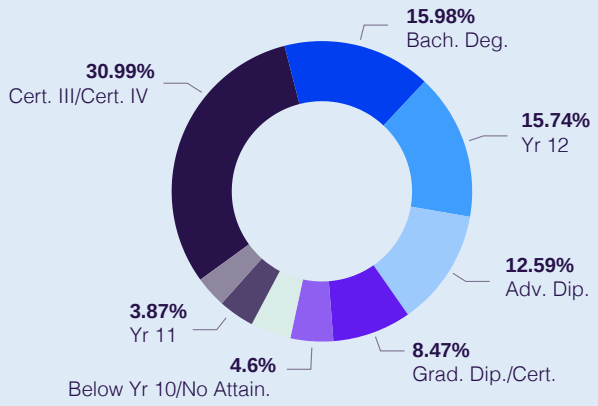
Key issues identified in automotive manufacturing

Australia's adoption of EV technology is creating new automotive manufacturing opportunities and challenges. The sector is also poised to support local EV component manufacturing, including batteries if Australia's Critical Mineral Strategy is fulfilled.[195] This would increase demand for existing skills and require new, advanced skills linked to emerging technologies, ranging from EV technicians to programming and diagnostic experts who lead the implementation and development of complex safety and driving software.

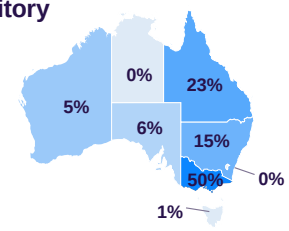
195 Mard Dean, "Rebuilding Automotive Manufacturing in Australia: Industrial Opportunities in an Electrified Future", 2022.

Dashboard 10: Automotive manufacturing[196]

Education level of the workforce



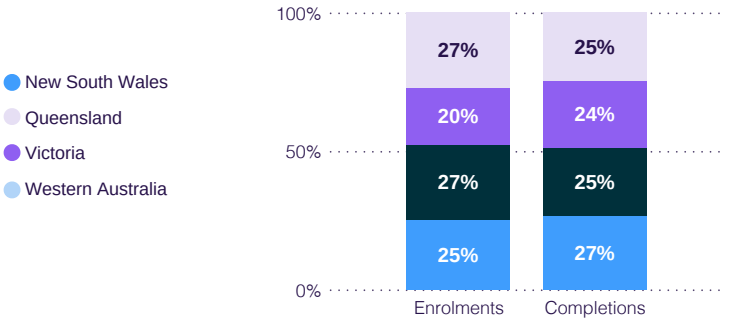
Total workforce by state/ territory



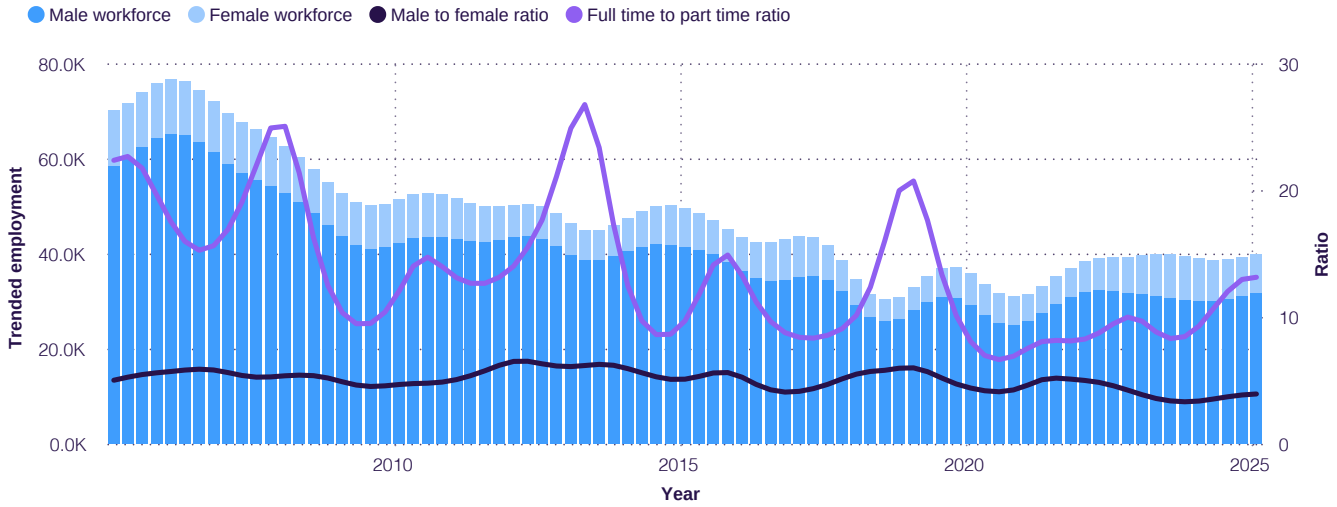
Projected growth over next decade	% female workforce
-3%	13%

Median age	% workforce aged 24 or younger	% workforce aged 60 and above
42	10%	11%

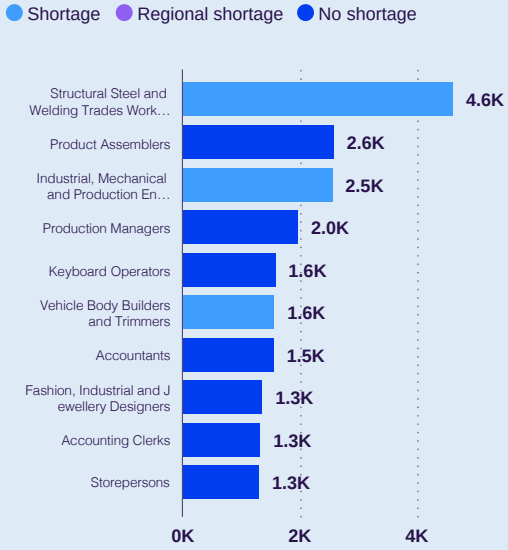
Training package status by state/territory of residence



Trends in employment by gender and work type



Top 10 ANZSCO occupations by workforce number

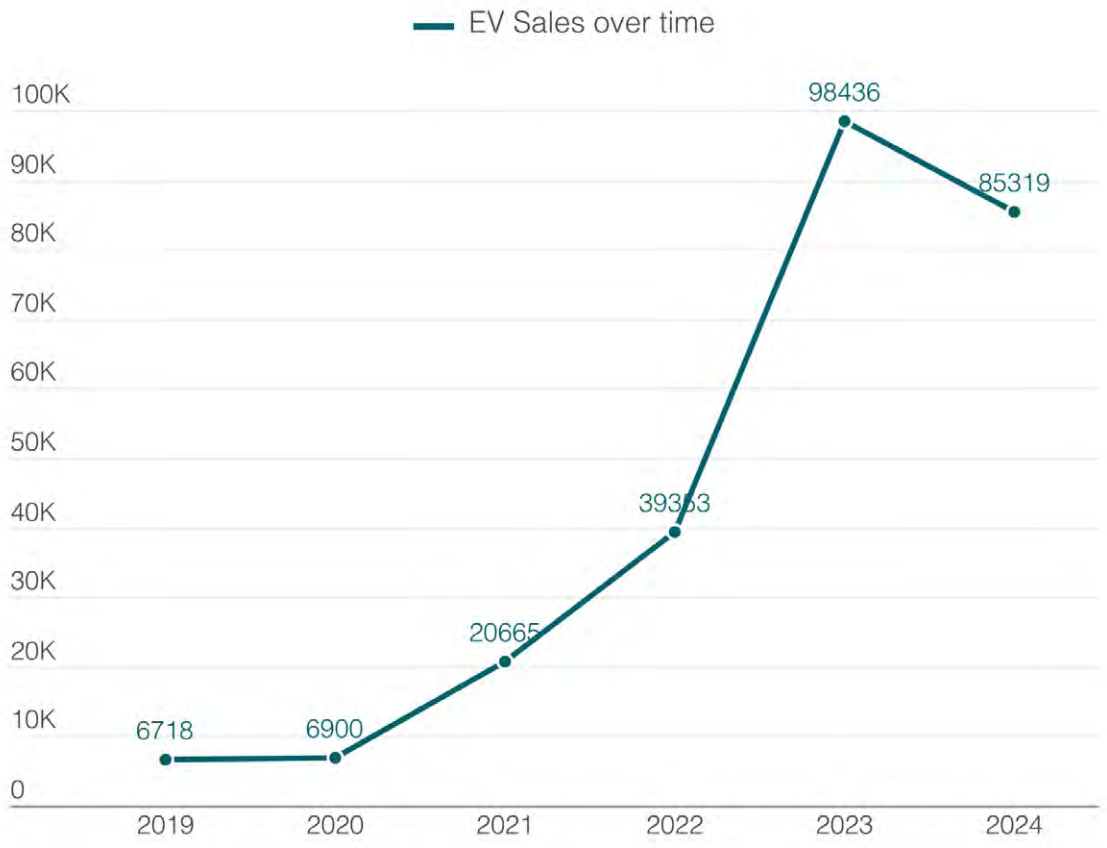


196 List of data source are in the Appendix 'Workforce Data Dashboard'.

Electric vehicles

Approximately 85,319 EVs were sold across Australia in 2024, accounting for 9.53% of all new cars purchased for the year (Figure A14).[197] The automotive industry is seeing a slow but sustained shift towards EVs or hybrid models, which align with global sustainability goals and responds to consumer demand for net zero-aligned transport solutions.

Figure A14: Annual light EV sales, 2024



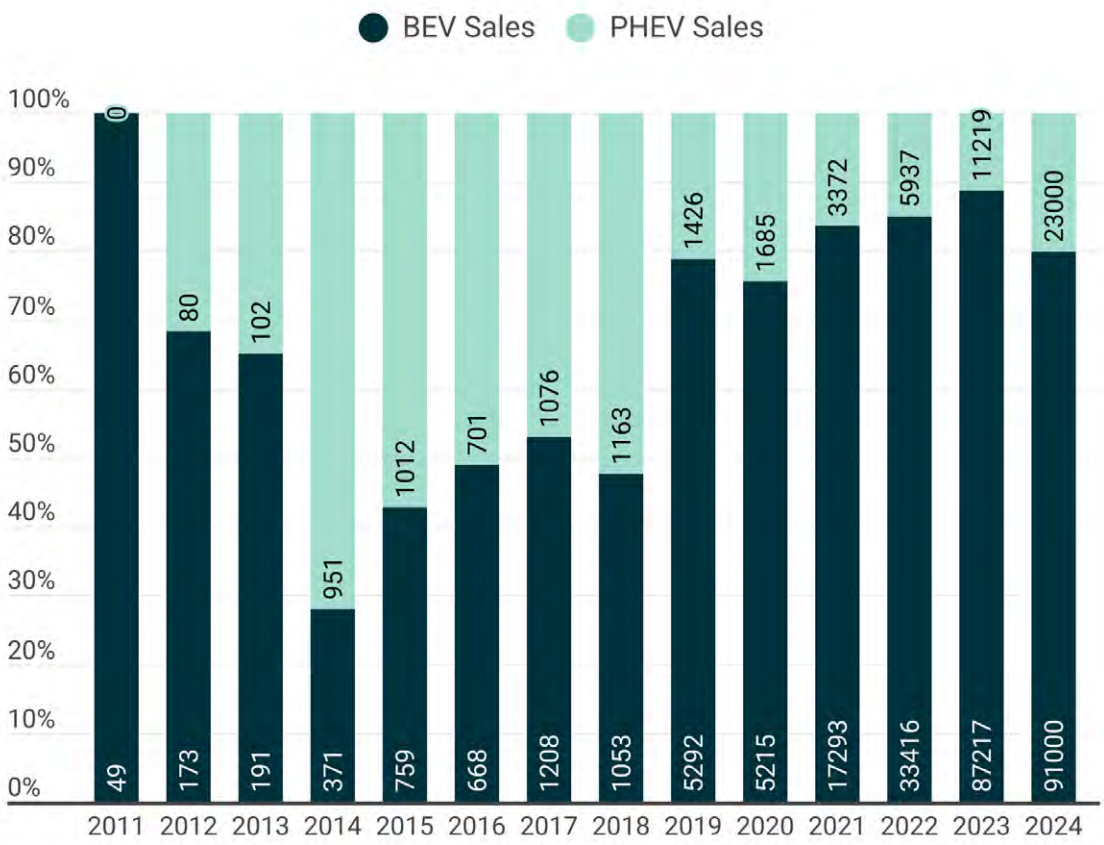
Source: Electric Vehicle Council, 'State of Electric Vehicles,' 2024. Note: the 2024 EV sales does not include data for the fourth quarter of 2024.

According to the Electric Vehicle Council (EVC), electric vehicle sales in Australia reached a record high in 2023, highlighting the growing demand for cleaner and cost-effective transportation. Data from the EVC and public sources show that about 114,000 new BEVs and PHEVs were sold in 2024 (Figure A15). This total includes around 91,000 BEVs and 23,000 PHEVs. As a result, EVs accounted for 9.65% of all new car sales, up from an 8.45% market share in 2023, showing a continuous positive trend towards the greater adoption of EVs and the transition to a lower-emission automotive market (Figure A16).[198]

Approximately 248,000 of the EVs sold to date are BEVs, while around 53,500 are PHEVs.[199] Australians have access to over 120 electric vehicle models and more than 200 variants.[200]

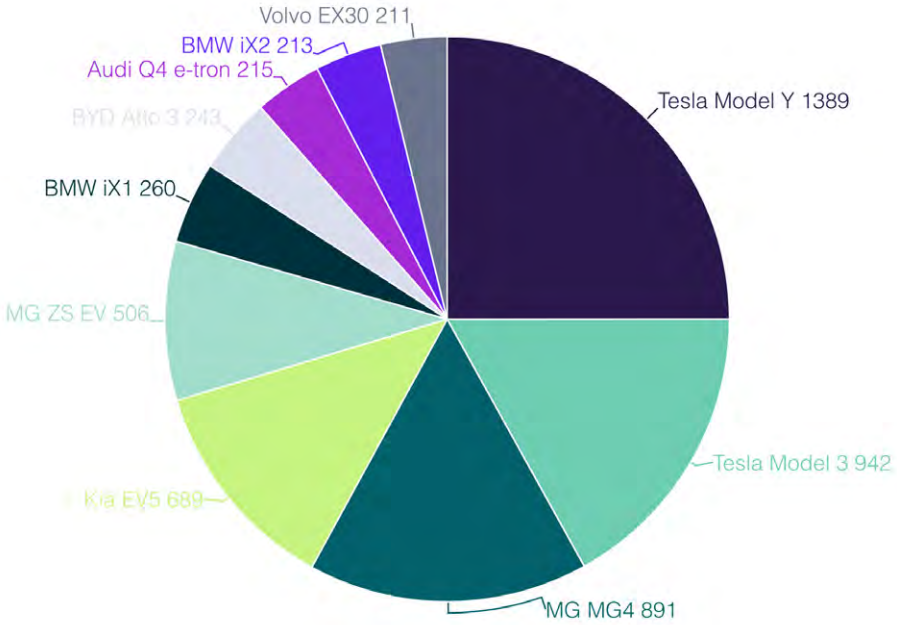
197 Electric Vehicle Council, "State of Electric Vehicles 2024 STATE of EVs | 2024," 2024.
198 Electric Vehicle Council, "2024 sets new record for EV sales in Australia", 6 January 2025.
199 Electric Vehicle Council, "State of Electric Vehicles 2024 STATE of EVs | 2024," 2024.
200 Ibid.

Figure A15: EV sales by category, 2011–2024



Source: Electric Vehicle Council, "State of Electric Vehicles", 2024.

Figure A16: EV sales by brand and model 2025



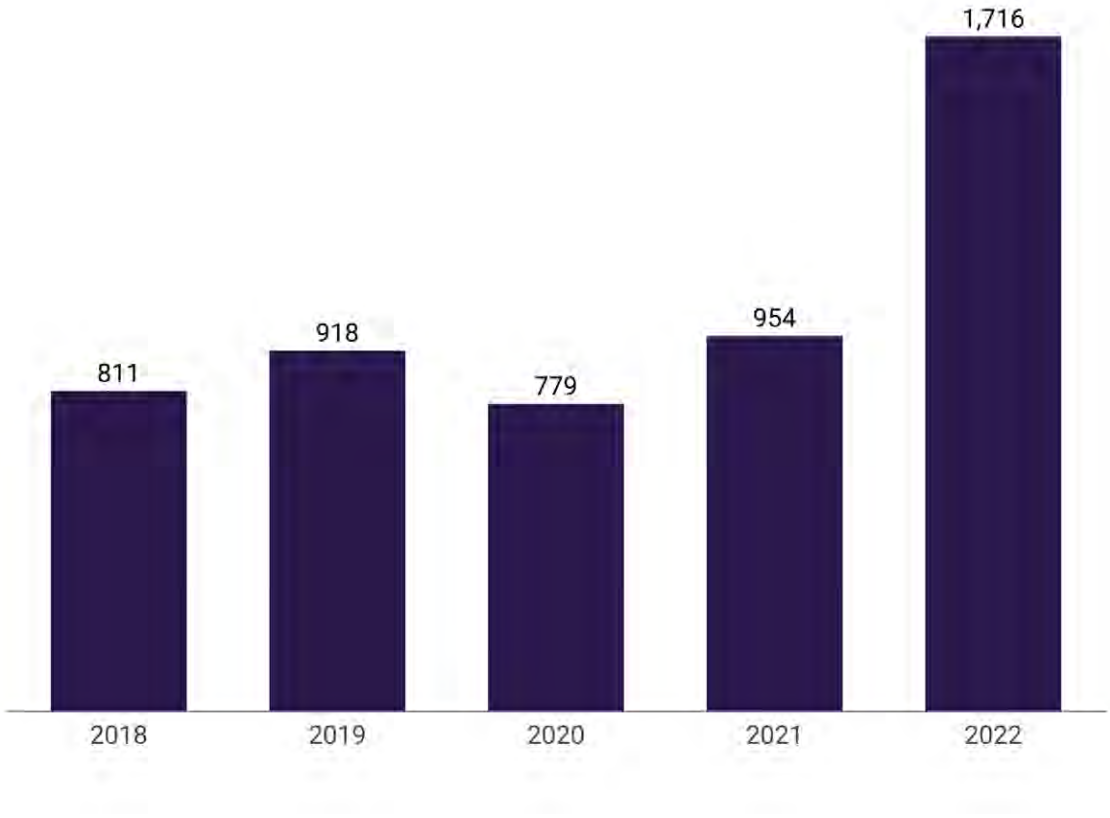
Source: The Driven, 'Australian Electric Vehicle Sales by Month and Model in 2025', 2025.

Tesla, MG, Kia and BYD models led EV sales in 2024 and will continue into 2025. (Figure A16) Collectively, they represent over 50% of annual sales.[201] The Tesla Model Y and Tesla Model 3 have an average range of 511km, while the average range of the top 5 best-selling EV models in 2025 is around 441km after a full charge.[202]

EV technicians

Activities related to EVs currently fall under ANZSCO codes, such as Automotive Electricians and EV Technicians (ANZSCO code 321111 and 233311), rather than having a distinct occupation group. An EV technician, however, is an occupation that is separate from a Motor Mechanic or more traditional technician. EV Technicians require different skills and training, as shown by the occupation's unique national training qualification. Demand for this occupation is rising in line with EV car sales (Figure A17). Under the ABS's OSCA, a separate class for EV Technicians has been introduced. This transition will provide better resolution on the occupation, however, we have summarised our findings relating to the occupation below.

Figure A17: EV technician job advertisements, 2018–2022



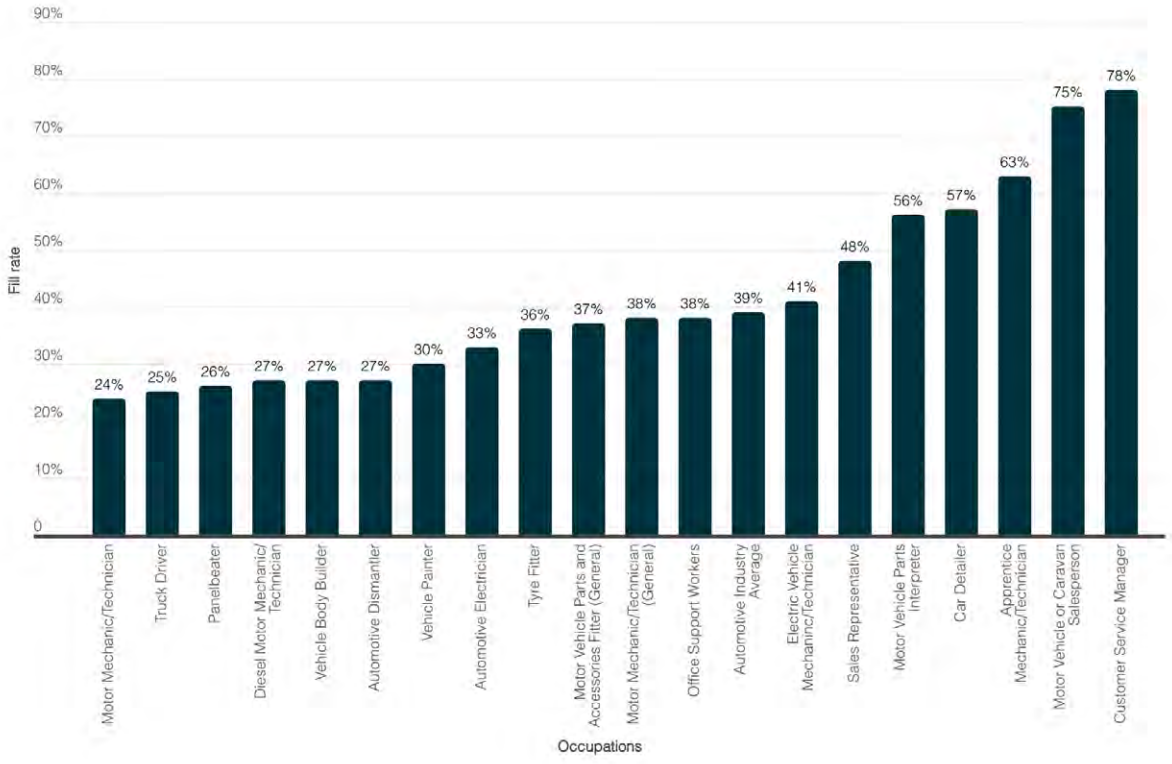
Source: Jobs and Skills Australia, "Electric Vehicle Technician", 2025. Census of Population and Housing 2021, Lightcast data 2022. Note: Workforce data is not available for this role due to small number of Australians reporting in Census 2021.

201 Plugshare. "Plugshare.,"2019.
202 Electric Vehicle Council, "State of Electric Vehicles 2024 STATE of EVs | 2024," 2024.

Occupational fill rates

The fill rates for EV Technicians (41%) also suggest that automotive businesses are having difficulties finding employees in these occupation groups (Figure A18). This means there is a growing demand for skilled workers in the EV sector, which highlights the need for targeted training and workforce development initiatives.[203]

Figure A18: Vacancy fill rates by occupation, 2024



Source: Deloitte, "Skills shortages in the Australian automotive industry - MTAA member survey findings 2024", 1 March 2024

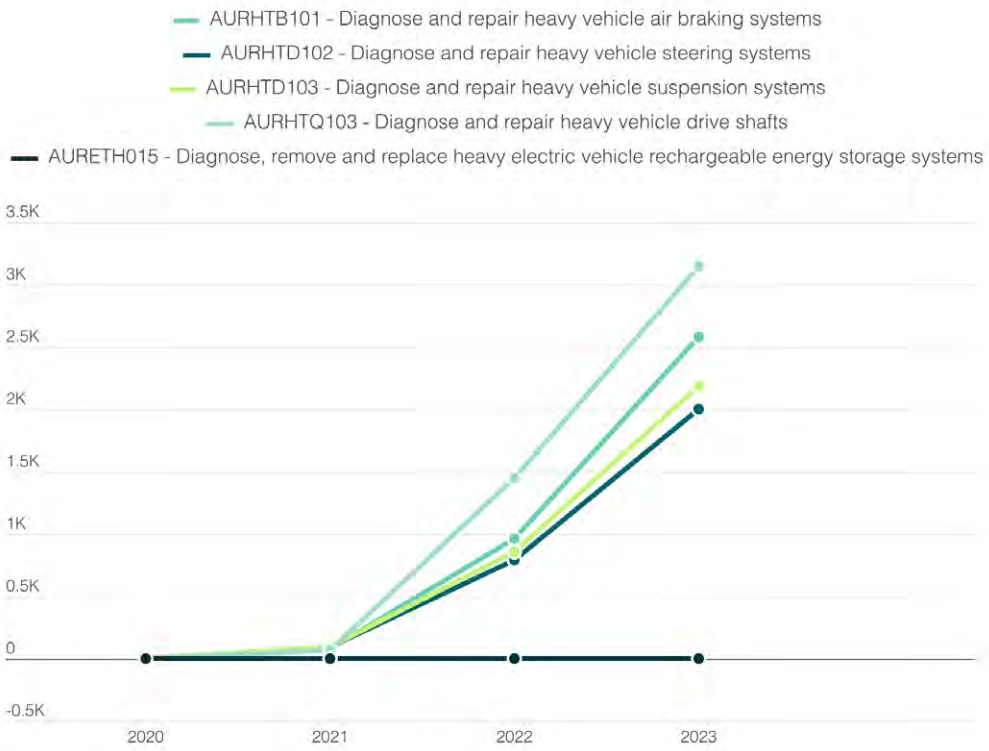
In response to the surge in the demand for EVs and the associated workforce, the Australian Government rolled out major changes to the New Energy Apprenticeships Program (NEAP) in 2022.[204] The new program is designed to equip the automotive workforce for the future and ensure the sector remains competitive amid the global transition to sustainable technologies.[205] According to the National Register on VET in Australia, these EV qualifications reflect the role of individuals who service, diagnose and repair BEVs and components in the automotive, service and repair industry and who carry out work according to Australian Standards (AS) 5732 Electric Vehicle Operations – Maintenance and Repair.

The apprenticeship vocations are[206]:

- AUR32721 Certificate III in Automotive Electric Vehicle Technology (Heavy Vehicle)
- AUR32721 Certificate III in Automotive Electric Vehicle Technology (Light Vehicle)

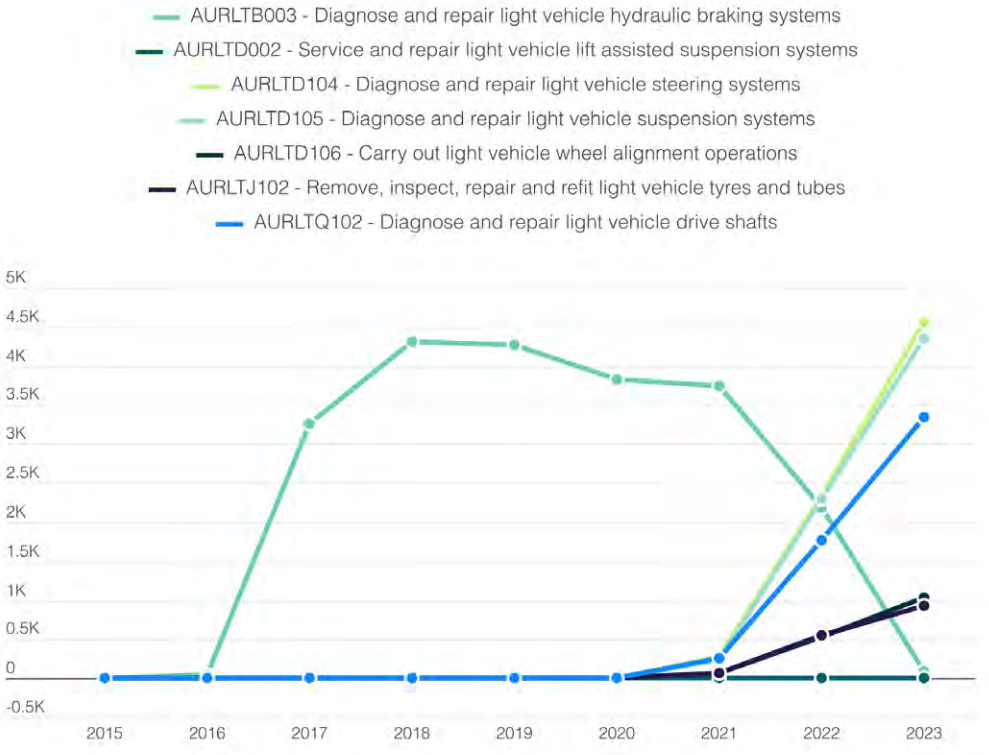
203 Deloitte, "Skills shortages in the Australian automotive industry - MTAA member survey findings 2024", 1 March 2024.
204 MTANSW, "New Electric Vehicle Apprenticeship Qualifications | MTA NSW," 17 December 2024.
205 MTANSW, "Apprenticeship program changes the right step in creating a future EV workforce', 2024.
206 MTANSW, "New Electric Vehicle Apprenticeship Qualifications | MTA NSW," 17 December 2024.

Figure A19: AUR32721 Certificate III in Automotive Electric Vehicle Technology (Heavy Vehicle) unit enrolments, 2020–2023



Source: VOCSTATS, "Total VET students and courses", August 2024.

Figure A20: AUR32721 Certificate III in Automotive Electric Vehicle Technology (Light Vehicle) unit enrolments, 2015–2023



Source: VOCSTATS, "Total VET students and courses", August 2024.

Other training and skills relevant to EVs

Below are the current qualifications and units that are becoming widely used in the EV space. In particular, AURETH101 and AURETH102, are used to upskill technicians to safely depower and reinitialise vehicles before work and after work, respectively.

National qualifications/skill sets:

AUR32721 Certificate III in Automotive Electric Vehicle Technology

AURSS00063 Battery Electric Vehicle Diagnose and Repair Skill Set[207]

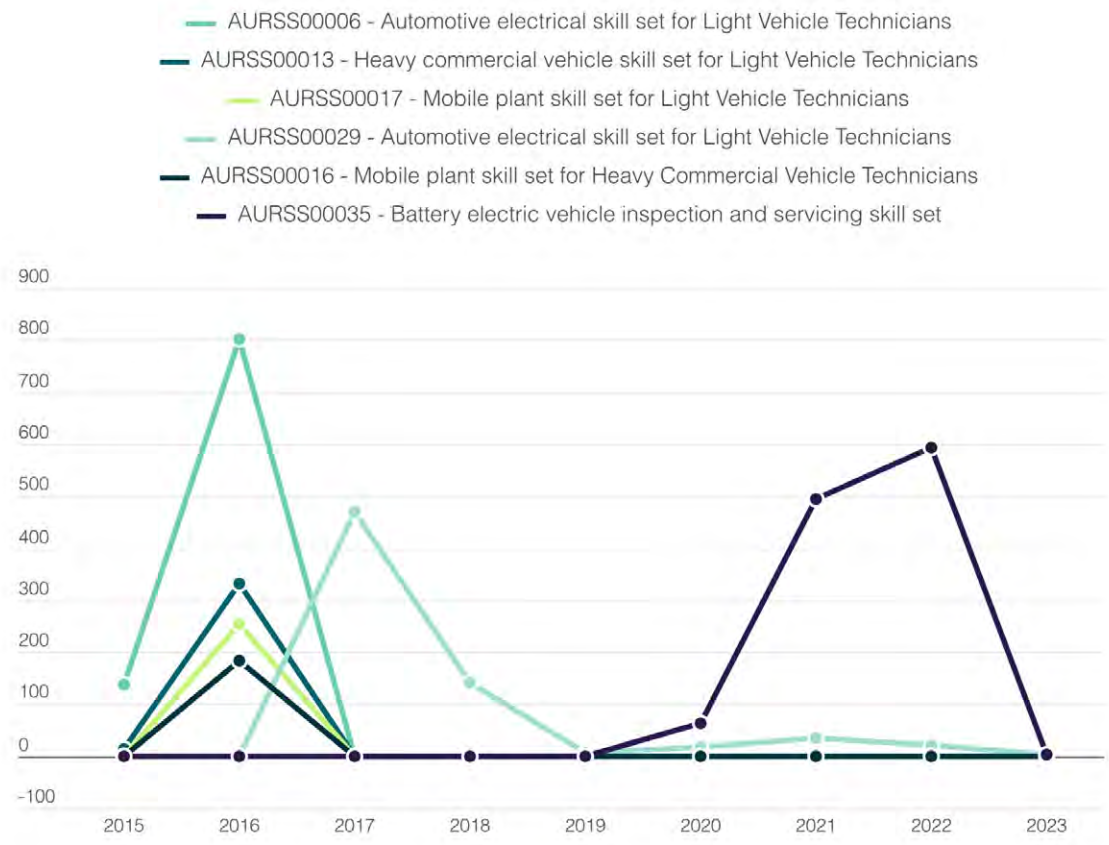
AURSS00064 Battery Electric Vehicle Inspection and Servicing Skill Set[208]

Individually delivered units:

AURETH101 Depower and Reinitialise Battery Electric Vehicles (This unit cites the AS5732:2022 Standard)

AURETH102 Inspect and Maintain Battery Electric Vehicles

Figure A21: AUR skills set enrolments, 2015–2023



*Source: VOCSTATS, "Total VET students and courses", August 2024; *AURSS00035 superseded by and equivalent to AURSS00064 in 2022.*

207 Superseded AURSS00034 Battery Electric Vehicle Diagnose and Repair Skill Set.
208 Superseded AURSS00035 Battery Electric Vehicle Inspection and Servicing Skill Set.

Licensing

In Western Australia and New South Wales, Automotive Technicians require a motor trade certificate to operate their own business. None of the above national qualifications or units are on the list of trades accepted for a New South Wales trade certificate. The Western Australia process is carried out on a case-by-case basis.

Technicians working on EVs are required to hold a motor trade certificate. The Williams review in 2020 in Queensland recommended that work on EVs be included under the *Electrical Safety Act 2002 (QLD)* and require that appropriately licensed electrical workers carry out the electrical work on the electrical components.[209] Restricted electric licencing does classify Electric Motors and HV propulsion.[210] These are not widely used in industry, however, and are not regulated as a requirement beyond Queensland.[211] To access OEM-level information under the new Motor Vehicle Service and Repair Information Scheme, receiving information for EVs requires that the technician complete that AURETH101 unit (or equivalent) and upload the evidence to the Australian Automotive Service and Repair Authority (AASRA).

Qualifications and skill sets needed to maintain charging stations:

- AUR20420 Certificate II in Automotive Electrical Technology
- AURSS00063 Battery Electric Vehicle Diagnose and Repair Skill Set
- AURSS00064 Battery Electric Vehicle Inspection and Servicing Skill Set
- AUR20820 Certificate II in Outdoor Power Equipment Technology.

Table A8: AUR qualification enrolments, 2022–2023

Qualification enrolments	2022	2023
AUR20820 – Certificate II in Outdoor Power Equipment Technology	75	113
AUR20420 – Certificate II in Automotive Electrical Technology	228	1721
AUR32721 – Certificate III in Automotive Electric Vehicle Technology	3	67

Source: VOCSTATS, "Total VET students and courses", August 2024.

209 Office of Industrial Relations. "Electrical Safety Act 2002 Review | Office of Industrial Relations," 2020.
210 The Queensland government has released their response to the Review of the Electrical Safety Act (The Williams Review) and chose not to proceed with the review's proposal to require EV-related work to be included under the Electrical Safety Act and require a restricted electrical licence (AADA, Dealer Bulletin, 2024).
211 Including in the most relevant Australian standard (AS5732:2022), which does not require a regulator. The AS 5732:2022 Electric vehicle operations – maintenance and repair is currently the most applicable in the bulk of training delivered in Electric vehicles: "1.1 Scope (C) Handling procedures and storage precautions are required in the event the vehicle's structural integrity has been compromised and the REESS (rechargeable electric energy storage system) is to be removed from it".

Figure A21a: Occupations relevant to EV and charging station life stages

Setting up charging stations

- Electrician
- EV Technician
- Concreter
- Welder
- Carpenter

Repair and Maintenance (charging stations)

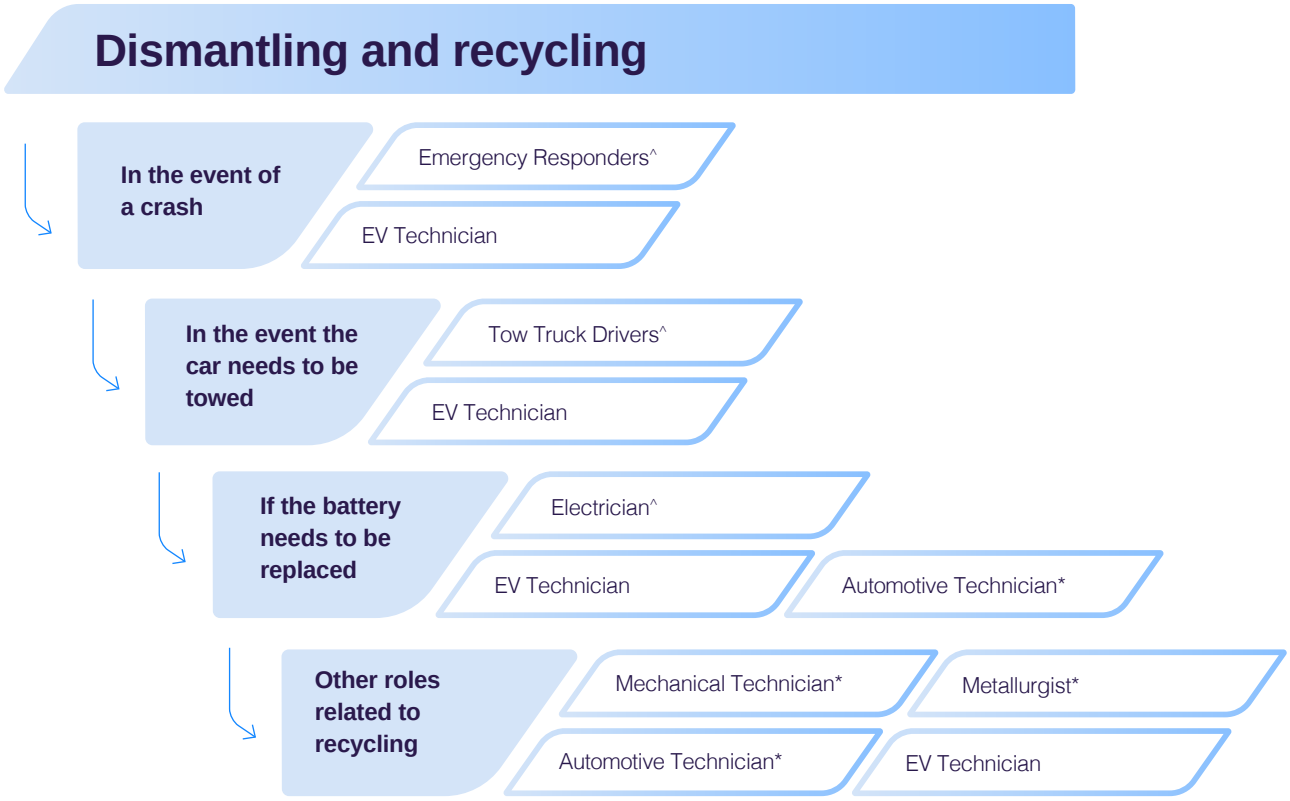
- Electrician
- Automotive Electrician*
- EV Technician

Repair and Maintenance (EVs)

- Tow Truck Driver
- Automotive Electrician*
- Electrician
- EV Technician

*Notes: * designates that the occupation is in AUSMASA's remit and in shortage.*

Figure A22: Occupations relevant to EV recycling



*Note: ^designates occupations beyond AUSMASA's remit. In order to support the EV ecosystem AUSMASA will continue to coordinate efforts with the respective JSCs to ensure optimal solutions for the automotive industry; * designates the occupation is within AUSMASA's remit and in shortage.*

Depowering, isolation, and OEMs

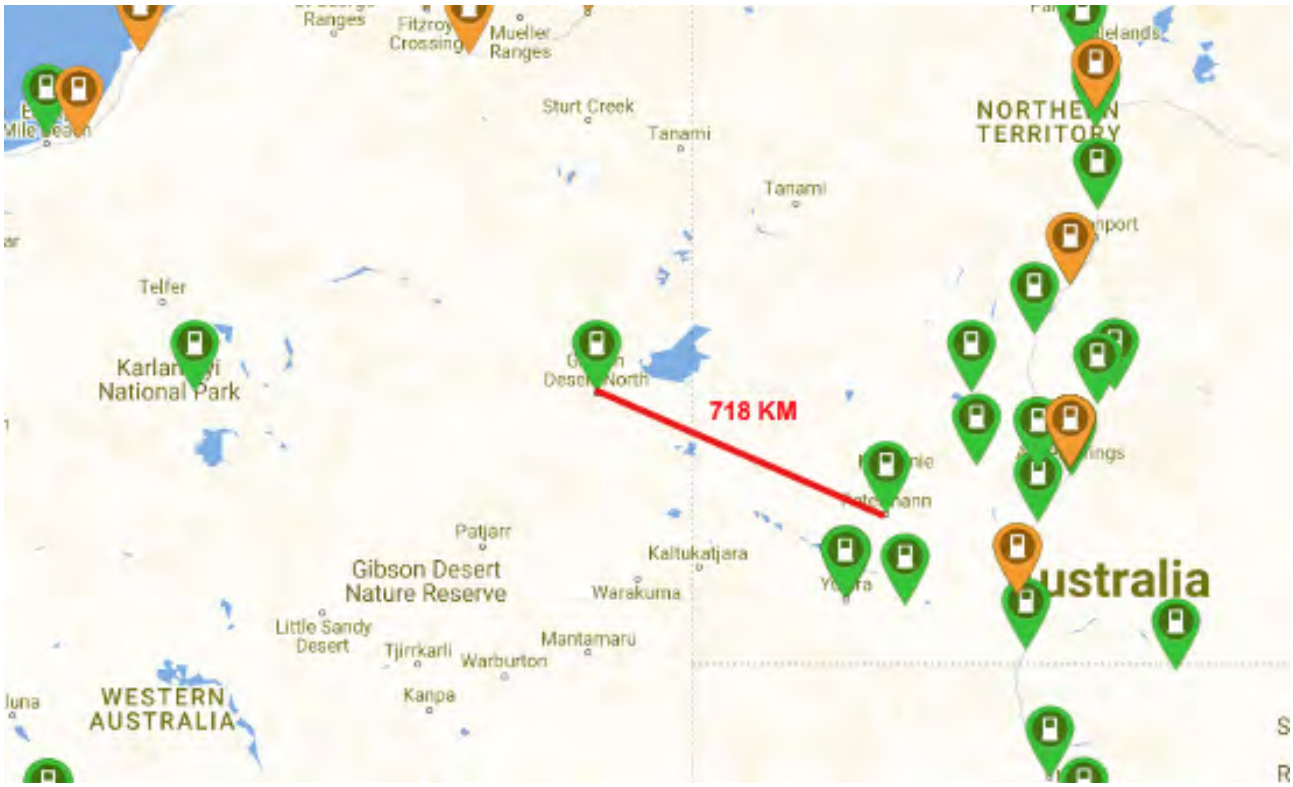
There is information about decommissioning, reuse and recycling in the standard (AS5732) which specifically singles out the battery packs and follows OEM and/or local and state government regulations for disposal, recycling or reuse. Automotive Technicians (with the appropriate skill set) can depower and remove the battery unit, but cannot open it up for service and repair or disposal, recycling or reuse. OEMs said that their internal training and, indeed, their scope of work, stops where the OEM training manuals stop. The normal limit of work is that technicians would not open a battery pack or any piece of high-voltage equipment, including inverters and motors. These would be returned to the OEM for disposal or recycling, and the high-voltage components would be replaced with new ones.

There are other standards that have definitions of electrical work, such AS/ANZ 3000:2018, and the definitions of voltages do differ. This has added complexity in the mobile plant and heavy vehicle space, with some large trucks using voltages as high as 2,800 VAC, which fall outside the scope of AS5732.

How are EVs maintained in remote areas?

Australian drivers on average travel around 33km a day.[212] With an average range of 400 kilometres, EVs available in the Australian market can generally meet the driving needs of many regional commuters.[213] A significant number of EV owners reside in regional areas of Australia, yet despite there being 280 public charging stations nationwide, not all regional areas are serviceable by the existing charging station network. The lack of complete charging station coverage can result in barriers to the wider adoption of EVs in regional areas.

Figure A23: Illustration of EV charging hindrances associated with remoteness



Source: PlugShare

212 Green Vehicle Guide. "Electric Vehicle Information | Green Vehicle Guide," 2024.
213 Electric Vehicle Council. "State of Electric Vehicles 2024 STATE of EVs | 2024," 2024.

For instance, the Kiwirrkurra Community in Western Australia is widely regarded as one of the most remote locations in the country. Its only charging station is located approximately 718 km (see Figure A23 on page 120) from the nearest alternative in Kings Canyon Resort. Regular breaks every 2 to 2.5 hours are essential for road safety, as prolonged driving increases the risk of accidents due to fatigue, especially in remote areas. As the average EV lasts around 400 km from a full charge, infrastructure and charging stations need to be in closer proximity to each other to sustain longer trips.

The rollout of fast charging stations in regional areas is managed by a combination of government initiatives, private investment, and partnerships in preparation for the surge of EV use.[214] The state and territory governments have agreed to 6 key areas of collaboration with the Australian Government to enable the transition to EVs:[215]

- national standards
- data sharing
- EV affordability
- remote and regional EV charging infrastructure
- fleet procurement
- education and awareness.

Potential actions:

- Research to map out skills and occupation needs around the EV ecosystem.
- Stakeholder engagement to investigate how the current pathways system services the skills and occupation needs of the EV ecosystem.
- Research to identify current best practices for alleviating skilled shortages.
- Training product gap analysis to identify optimal pathways for EV-related training.

214 Department of Climate Change, Energy, the Environment and Water. "Australia's National Electric Vehicle Strategy | Energy.gov.au." April 19, 2023.
215 Ibid.

Artificial intelligence in the automotive industry

Similar to the mining industry, AI is being used across the automotive industry, for example to assist drivers and improve manufacturing processes.

Enhancing vehicle safety with ADAS

Many automotive manufacturers are incorporating AI-powered ADAS to elevate vehicle safety. These systems include features like adaptive cruise control, traffic sign recognition, forward-collision warning, and drowsiness detection. ADAS help to ensure better vehicle control even in challenging driving conditions, minimising the risk of road accidents.[216]

Predictive maintenance

AI is also used for predictive maintenance in the automotive industry. By analysing data from vehicle sensors, AI can predict when parts are likely to fail and schedule maintenance before a breakdown occurs. This can reduce unexpected downtime and extend the lifespan of vehicles.[217]

Challenges in adopting AI in the industry

The emergence of new technology also leads to new challenges. As AI and automation take over tasks traditionally performed by humans, there is a risk of job losses, particularly in roles that involve repetitive or hazardous tasks.[218] This can lead to significant social and economic impacts, especially in regions that are heavily dependent on this type of employment.[219]

Implementing AI in industries requires a workforce with the necessary skills and expertise in AI-related disciplines, such as data science and machine learning. Consequently, there may be a shortage of talent with these specialised skills, highlighting the need for extensive training within the industry. Original equipment manufacturers could play a crucial role in bridging this gap by providing training and support.[220]

Potential actions:

- Stakeholder engagement to understand skills and occupations that can benefit from AI and AI integration.
- Stakeholder engagement to map occupations relying on AI tools.
- Research to understand industry needs relating to AI.
- Research to identify occupations at risk from AI.
- Training product gap analysis to establish whether AI deployment, diagnosis, and maintenance capabilities are required in training packages in our remit.

216 Itransiton, "AI in Automotive: Use Cases, Examples, and Guidelines,"2025.
217 Evox Images, "9 Examples of Artificial Intelligence in the Automotive Industry," 2021.
218 Mining Doc, "Ethical and operational challenges in AI adoption in mining - Mining Doc," 2025.
219 Itransition, "AI in Automotive: Use Cases, Examples, and Guidelines," 2025.
220 International Society of Automation,"ISA-Mining-AI-whitepaper-Dec-2024_final.pdf,"2024.

Heavy automotive

With continued growth in freight and other applications, heavy vehicles are an important part of Australia's automotive industry.[221] In particular, with the decline of large-scale passenger car manufacturing, heavy vehicles like buses and trucks have helped sustain the automotive industry's revenue. Higher domestic freight has provided work via fitting and maintaining new and existing components, parts, and accessories for the Repair and Maintenance sector.[222] In the retail and wholesale sector, the post-COVID-19 economic recovery has also supported specialised dealers that provide heavy vehicles for freight and other commercial purposes.[223]

Each sector and the wider industry rely on qualified tradespeople with expertise in heavy vehicles, which in turn creates a reliance on the VET system.[224]

Within the VET system, there are only 2 current qualifications that are specific to heavy vehicles. Both are specific to the Repair and Maintenance sector:

- Certificate III in Heavy Commercial Vehicle Mechanical Technology
- Certificate III in Heavy Commercial Trailer Technology.

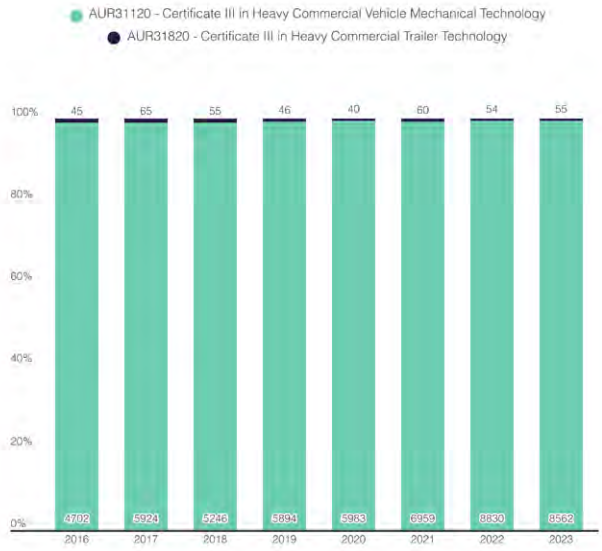
The first is linked to Motor Mechanic (General) in ANZSCO,[225] and the second is linked to Diesel Motor Mechanic in ANZSCO.[226] Unfortunately, the generic nature of Motor Mechanic (General) makes it difficult to compare the qualification's enrolments and completions to related employment trends. In contrast, the second occupation's focus on 'motors and the mechanical parts of trucks, buses and other heavy vehicles' in ANZSCO provides a high degree of confidence that the qualification's enrolments and completions can be compared to related employment trends in the Diesel Motor Mechanic occupation.

From 2016 to 2023, the Certificate III in Heavy Commercial Vehicle Mechanical Technology accounted for 99.17% of enrolments on average for the 2 heavy vehicle VET qualifications. It is a sharp contrast to the 0.83% for the Certificate III in Heavy Commercial Trailer Technology (Figure A29). Enrolments for the former qualification also increased to 8,562 over this period (+82%), while those for the latter qualification only increased to 55 (+22%). At the same time, only the Certificate III in Heavy Commercial Vehicle Mechanical Technology had any female enrolments, rising from 1.5% in 2016 to 4.2% in 2023.

From 2016 to 2023, the Certificate III in Heavy Commercial Vehicle Mechanical Technology accounted for 98.89% of completions on average for the 2 heavy vehicle VET qualifications, compared to only 1.02% for the Certificate III in Heavy Commercial Trailer Technology (Figure A30). Completions for the former qualification also increased to 1,957 over this period (+72%), while those for the latter qualification fell to 2 (-90%). With respect to gender, only the Certificate III in Heavy Commercial Vehicle Mechanical Technology had any female completions, at 1.5% in 2016 and 1.4% in 2023.

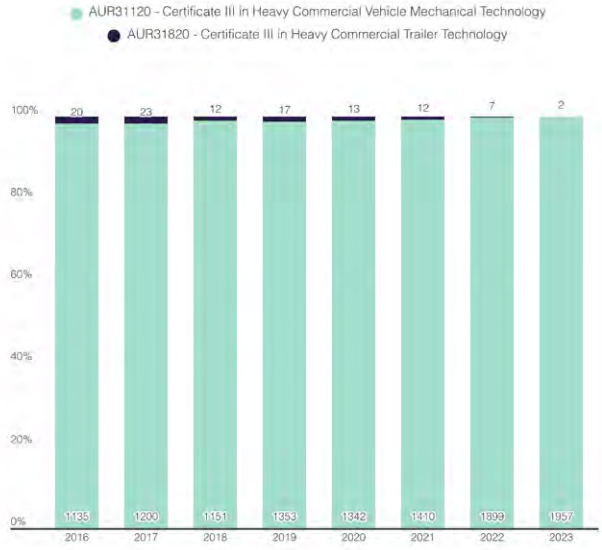
221 IBISWorld, and Misaki Lishi. "Automotive Industry in Australia," August 2024.
222 Ibid.
223 IBISWorld, and Misaki Lishi."Motor Vehicle New Parts Wholesaling in Australia," April 2025.
224 AUSMASA. 'Workforce Plan', 2024.
225 Training.gov.au. "Qualification: AUR31120 Certificate III in Heavy Commercial Vehicle Mechanical Technology," 2020.
226 Training.gov.au. "Qualification: AUR31820 Certificate III in Heavy Commercial Trailer Technology," 2020.

Figure A29: Enrolments for the Certificate III Motor Mechanic (General) and Diesel Motor Mechanic qualifications, 2016 – 2023



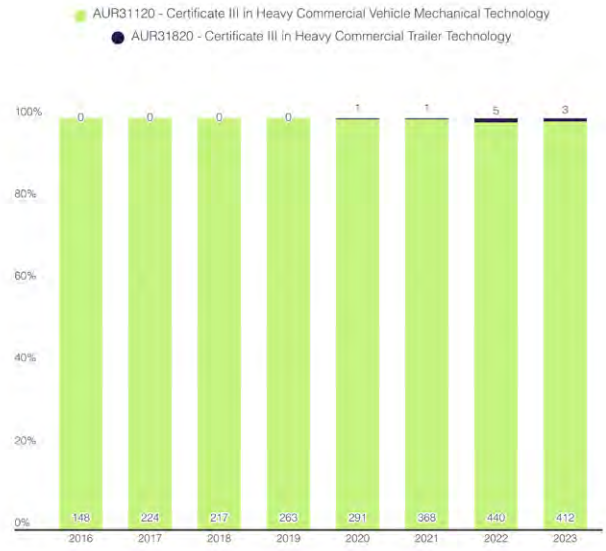
Source: VOCSTATS, 'Total VET students and courses 2023', 2024.

Figure A30: Completions for the Certificate III Motor Mechanic (General) and Diesel Motor Mechanic qualifications, 2016 – 2023



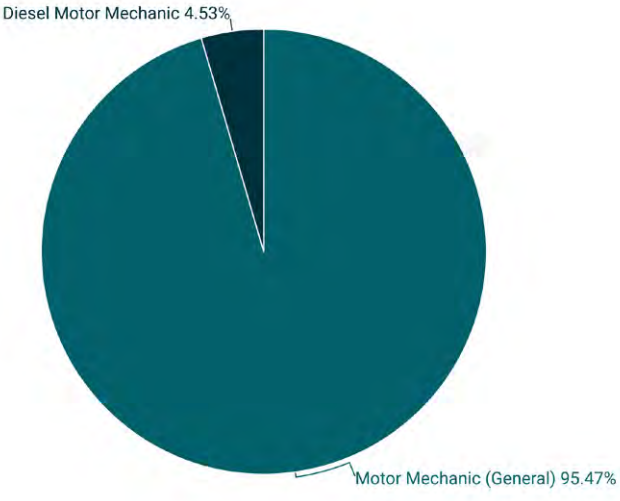
Source: VOCSTATS, 'Total VET students and courses 2023', 2024.

Figure A31: Enrolments for the Certificate III Motor Mechanic (General) and Diesel Motor Mechanic qualifications for Indigenous students, 2016 – 2023



Source: VOCSTATS, 'Total VET students and courses 2023', 2024.

Figure A32: Employment in Light Vehicle and Heavy Vehicle Mechanics, 2021



Source: Australian Bureau of Statistics, "Table Builder 2021 Census – INDP Industry of Employment, OCCP Occupation", 2022.

Indigenous representation

In Certificate III in Heavy Commercial Vehicle Mechanical Technology, Indigenous enrolments increased to 5.37% (+1.9%) in 2023 (Figure A31). Meanwhile, enrolments in Certificate III in Heavy Commercial Trailer Technology fell to 8.93% (-11.07%) in 2023. There were no Indigenous student enrolments from 2017 to 2020. At the same time, only the Certificate III in Heavy Commercial Vehicle Mechanical Technology had any Indigenous completions, which rose to 3.76% (+0.28%).

Unit group – Motor Mechanics

The unit group of Motor Mechanics is a broad category that further represents 4 occupations:

- 321211 Motor Mechanic (General)
- 321212 Diesel Motor Mechanic
- 321213 Motorcycle Mechanic
- 321214 Small Engine Mechanic.

The second occupation, Diesel Motor Mechanic, has a specialisation stream – automotive heavy mechanic. This occupation would be most relevant to the heavy automotive sub-industry, however, data availability prohibits analysis at this granular level.[227] Currently, we are restricted to analysing trends at the occupation and unit group level, where possible. We welcome insight from industry on obtaining better resolution for the heavy automotive sub-industry.

In 2021, Motor Mechanic (General) made up the vast majority of the automotive Repair and Maintenance workforce, accounting for 95.47% of workers.[228] In contrast, Diesel Motor Mechanic comprised 4.53% of the workforce. There were 2,028 Diesel Motor Mechanics employed. Meanwhile, 1,422 students completed heavy vehicle-related qualifications (Figure A30). This suggests that while the number of Diesel Motor Mechanics in the workforce is relatively small, the VET completion rate is proportionally high, highlighting a strong training pipeline to support the heavy vehicle sector's workforce needs. With over 1,900 job listings for Heavy Diesel Mechanics posted on Seek (as at publication date), the demand for skilled workers is urgent.[229]

227 A forthcoming AUSMASA Research Bulletin will further explore the heavy automotive sub-sector in greater detail.
228 Australian Bureau of Statistics, "Table Builder 2021 Census – INDP Industry of Employment, OCCP Occupation", 2022.
229 Seek, "Heavy Diesel Mechanic jobs", 28 April 2025.

Industry voice

Industry has expressed concerns around the shortage of skilled professionals in the sector. To address this, there is a pressing need for a consistent talent pipeline to meet the growing demands of the industry. Industry feels that the shortage is exacerbated by the current educational landscape, as VET is de-prioritised despite delivering higher income outcomes for its graduates.

To address this, the Heavy Vehicle Industry Association (HVIA) is actively promoting careers in the heavy vehicle industry through initiatives such as the National Apprentice Challenge and the 'Much More Than Just a Job' campaign. These efforts aim to attract young talent to the industry, reshape perceptions of VET, and encourage a diverse range of individuals to pursue rewarding careers in heavy vehicle trades.[230] The findings from AUSMASA's research into youth perceptions of automotive careers can aid in these efforts.

Potential actions:

- Research to better understand the scope of the heavy automotive sub-industry.
- Training pathway gap analysis to identify streams into the sub-industry.
- Stakeholder engagement to better understand competing forces applying pressure to skills demands.
- Research to better map out underlying supply and demand forces affecting the sub-industry.

230 HVIA, "Critical shortages highlighted during National Skills Week", 21 August 2023.

Figure A33: Summary of stakeholder comments from national roundtables and potential actions

 **EV transition and electrification of the workforce**	**Keywords:** EV technician pathways, connect/ disconnect licences, high voltage safety, AUR/ UEE crossover, hydrogen safety, restricted licences, electrification automation.	Huge demand for skilled EV technicians- formal pathways, pre-apprenticeships (Cert I/II), and upskilling programs are urgently needed. Skills around high-voltage isolation, hydrogen safety, and battery systems (for both vehicles and mobile machinery) are critical.	Restricted electrical licences for auto and mobile plant techs are needed to safely work on EV systems. Better alignment of AUR and UEE to growing electrification.
 **Cross-skilling and convergence of trades**	**Keywords:** AC, refrigeration, electrical merging with auto, marine mechanics, bicycle/e-bike qualifications, remote area mechanics.	Trades are blending – refrigeration, electrical, and AC skills can cross into automotive and EV servicing. Needs identified for remote area mechanics qualifications (Cert I/II), including bike and e-bike mechanics.	Opportunities exist to build flexible pathways that recognise overlapping foundational knowledge across trades.
 **Training system challenges**	**Keywords:** outdated qualifications (e.g. AUR40116), low VET trainer supply, digital literacy, micro-credentials, RPL via AI.	Many qualifications (especially in AUR) are outdated, and new ones must reflect emerging tech (e.g. 3D printing, AI, composite materials). Trainer shortages in VET, particularly with EV-relevant skills, is a barrier to delivery.	Growing support for micro-credentials, stackable units, and AI-assisted RPL to improve agility and reduce barriers to qualification updates.
 **Safety and regulatory requirements**	**Keywords:** ageing workforce, school placements, retention challenges, pre-apprenticeships, buddy systems, workplace mentoring.	The ageing automotive workforce and low retention in remote areas are critical risks. Programs like school-based apprenticeships, buddy systems, and mentoring (TAESS00017) are seen as key to retaining talent and rehabilitating the industry's image.	Formal support structures and career exposure at earlier education stages are vital to recruitment and retention.
 **Operational evolution and role changes**	**Keywords:** ICT skills, networking, programming, AI for RPL, digital tools, immersive learning, communications.	EV and advanced vehicle systems require ICT knowledge (networking, database management, control systems). Digital literacy gaps, especially among older workers, need targeted support.	Use of AI for qualification mapping, RPL, and immersive/VR tech is seen as a solution to improve training quality and access.

EV transition and electrification of the workforce

Potential actions:

Stakeholder engagement to investigate and better understand demand for skilled EV technicians.
Research to better understand skills needs around high-voltage isolation, hydrogen safety, and battery systems (for both vehicles and mobile machinery).
Stakeholder engagement to report on the need for restricted electrical licences for auto and mobile plant techs.

Training products analysis to investigate opportunities for the better alignment of AUR and UEE regarding electrification.

Cross-skilling and convergence of trades

Potential actions:

Research to map out how trades are evolving.
Stakeholder engagement to better understand needs around remote area technical qualifications.

Stakeholder engagement to understand in-streams and underlying demand and supply forces around regional automotive workforces.

Training product analysis to investigate flexible pathways that recognise overlapping foundational knowledge across trades.

Training system gaps and qualification reform

Potential actions:

Gap analysis to investigate whether qualifications are outdated.
Research to identify opportunities for new training solutions around emerging tech (e.g. 3D printing, AI, composite materials).

Stakeholder engagement to better understand the need for micro-credentials, stackable units, and AI-assisted RPL to improve agility and reduce barriers to qualification updates.

Research to investigate trainer shortages in VET, particularly with EV-relevant skills, is a barrier to delivery.

Workforce attraction and retention

Potential actions:

Research to better understand the ageing automotive workforce and low retention in remote areas.

Stakeholder engagement to identify successful retention strategies in remote areas.
Workforce planning to report on the success of succession planning and retention strategies.

Research to better understand the ongoing and evolving needs around formal support structures and career exposure at earlier education stages.

Digital, ICT, and AI integration

Potential actions:

Research to identify skills needs around EV and advanced vehicle systems require ICT knowledge (networking, database management, control systems).

Stakeholder engagement to identify current and emerging skills streams around above skills.
Research to investigate digital literacy gaps, especially among older workers.

Research to investigate the use/incidence of AI for qualification mapping, RPL, and immersive/VR tech.

Mining and Automotive Skills Alliance

Jobs and Skills Councils
An Australian Government Initiative

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