

Mining Industry

Workforce Plan 2024



Contents

CEO foreword	3
Mining industry overview	4
Workforce insights	8
Industry-wide trends and priorities	11
Coal mining overview	34
Coal mining workforce demographics insights	36
Metal ore mining overview	43
Metal ore mining demographic insights	45
Non-metallic mineral and quarrying overview	55
Non-metallic mineral and quarrying workforce demographics insights	56
Oil and Gas Extraction Overview	60
Oil and gas extraction workforce demographic insights	63
Exploration and other mining support services overview	67
Exploration and other mining support services workforce demographic insights	70
Appendix	76
Key stakeholders and engagement strategies	76
Existing engagement activities	77
Planned engagement activities	78
SWAP members	81
Key Stakeholders	83
Summary of identified areas of focus	86
Mining industry	86
Update on 2023 Identified Opportunities	91
Data Methodology	98
Enrolment data tables	100
References	104

Acknowledgement of Country

In delivering our 2024 Workforce Plan 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.

CEO foreword

Building on our Initial Workforce Plan 2023 – *The Future is Now*, I am proud to present AUSMASA’s Workforce Plan for 2024 – *Moving Ahead Together*. This plan brings together our key activities, projects, and priorities and explores a range of new economic insights and contemporary workforce data in support of the mining and automotive industries.

The mining and automotive industries have a long and rich history in Australia. They are innovative industries that are actively engaging in initiatives to support Australia’s net zero ambitions and establish new sustainable pathways to strengthen and secure domestic supply and value chains. Challenges such as these and their associated innovative solutions will not be realised without fit-for-purpose vocational education and training (VET) and workforce planning. Without this, we risk further skills shortages in these (and associated) industries.

AUSMASA is enthusiastically and impactfully tackling challenges faced by the VET sector, employers, and unions. Within this work, our 10-point Strategic Plan developed at our *Critical Minerals and Electric Vehicle Skills Forum 2023* stands out as a combined, future-focused example of how we can progress innovative solutions to key challenges common to the mining and automotive workforces. We build on this success in this Workforce Plan.

Our stakeholder work needs to be underpinned by up-to-date data and evidence to identify and meaningfully address workforce challenges – which is the role of this Workforce Plan. This year’s plan includes updated and deeper industry-level workforce data on demographics, educational attainment, occupation types, and improved time series data on workforce size and projections out to the 2030s. Coupled with existing VET data on specific training packages, this plan provides a broader and more granular evidence base of workforce and student-level data to identify and help propose solutions to workforce challenges faced by our industries.

As AUSMASA continues to deepen its workforce planning, stewardship, and other functions, the team and I look forward to continuing our work with our education, industry, and workforce stakeholders to address critical and emerging issues for these important industries.

I hope you find this workforce plan valuable in your work. Thank you for your ongoing commitment and support; we look forward to moving ahead together!

Dr Gavin Lind

Chief Executive Officer



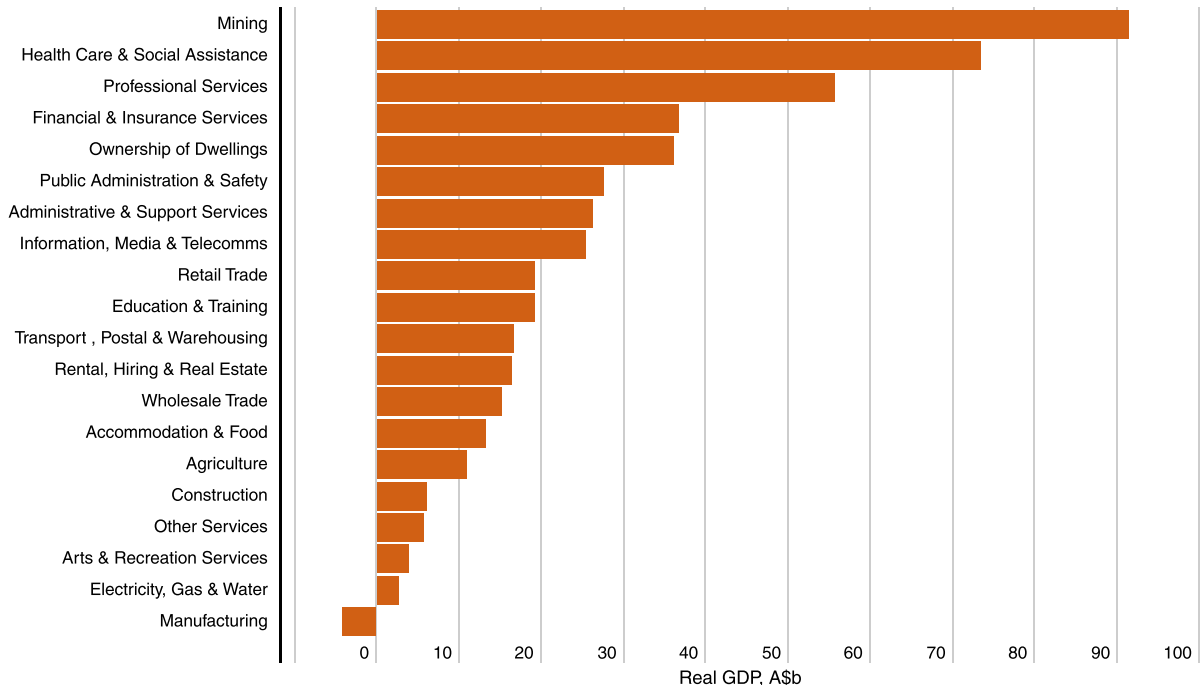
Mining industry overview

The mining boom of the 21st century has significantly redefined Australia’s industrial landscape. In response to the rapidly rising demand for industrial and energy commodities in emerging nations over the last 20 years, Australia’s mineral and energy commodity production has surged. Proximity to emerging markets and favourable geology have played their part, but the success of the Australian mining industry goes much deeper than this. Its competitive advantage over rival mineral-rich nations has been built through the development of a highly skilled workforce, investment in innovative technologies and a stable policy environment.

The mining industry workforce has more than tripled in size in the 20 years since the start of the mining boom which, combined with over \$380 billion of capital investment since 2008, have led to significant increases in mining output.^{1,2} Today, Australia is the world’s largest source of iron ore, bauxite, and lithium; the second largest gold producer; and a key source of critical minerals, coal and industrial commodities. With 348 operating mines producing 19 different mineral commodities, Australia is widely recognised as a world leader in mining production, technology, and sustainability.³

The effect of the mining boom on the broader Australian economy has been profound. Mining has been the largest source of economic growth in the last decade, and in 2022–23 directly provided 13.3% of Australia’s GDP – while employing only 2% of Australia’s workforce.^{4,5}

Figure 10: Contribution to GDP growth by industry, 2012-13 to 2022-23



Source: Australian Bureau of Statistics, Australian System of National Accounts, released 27 October 2023

1 Australian Bureau of Statistics, *Labour Force, Australia*, released 15 February 2024.
 2 Australian Bureau of Statistics, *Private New Capital Expenditure and Expected Expenditure, Australia*, released 29 February 2024.
 3 Geoscience Australia, *Australian mineral facts*, released 11 September 2023.
 4 Australian Bureau of Statistics, *Australian System of National Accounts*, released 27 October 2023.
 5 Australian Bureau of Statistics, *Labour Force, Australia, Detailed*, released 22 February 2024.

Australia is highly regarded as a destination for mining investment. In 2023, 22 of the largest 50 mining companies in the world had operating assets or exploration projects in Australia and the nation consistently rates as one of the highest in the Fraser Institute's annual survey of mining company executives for both geological potential and policy.^{6,7}

The Minerals Council of Australia estimates that for every job created in the mining industry, another 6 jobs are created throughout the economy via supply chain impacts.

Beyond its direct economic contributions, the mining industry supports an extensive domestic supply chain that provides advanced equipment, fuels, transportation, and IT services. The Minerals Council of Australia estimates that for every job created in the mining industry, another 6 jobs are created throughout the economy via supply chain impacts.⁸ In addition to the direct needs of the mining industry, this broader Mining, Equipment, Technology and Services (METS) sector also requires a highly trained workforce with broad skills including in the fields of engineering, IT, healthcare and environmental science, to name just a few.

Mining's significant contributions to the Australian economy are derived from the export revenue it generates. Revenue from Australia's export of mineral, metal and energy commodities hit a record high \$467 billion in 2022–23,⁹ and accounted for 70% of Australia's total export income.¹⁰ Record-high commodity pricing was the principal driver of this outcome, with several key mineral and energy commodities experiencing record pricing over the last 18 months. Australia was able to benefit from this latest price cycle because of the massive investment and workforce expansion of the past decade.

The mining investment boom has transformed both the mining industry and the broader economy. In the 10 years from 2008 to 2018, nominal mining industry investment (including the oil and gas sector) totalled \$589 billion and accounted for 42% of all capital expenditure in Australia.¹¹ Consequently, the real net capital stock of the mining industry has more than doubled in size to \$995 billion in 2022–23 and now accounts for 20% of the productive capital stock in the Australian economy.¹²

6 AUSMASA analysis based on Mining.com website, *The top 50 biggest mining companies in the world*, released 12 January 2024.

7 Fraser Institute, *Annual Survey of Mining Companies, 2022*, released 4 May 2023.

8 Minerals Council of Australia, *Pre-Budget Submission 2024-25*, released 25 January 2024.

9 Department of Industry Science and Resources, *Resources and Energy Quarterly, September 2023*, Published 3 October.

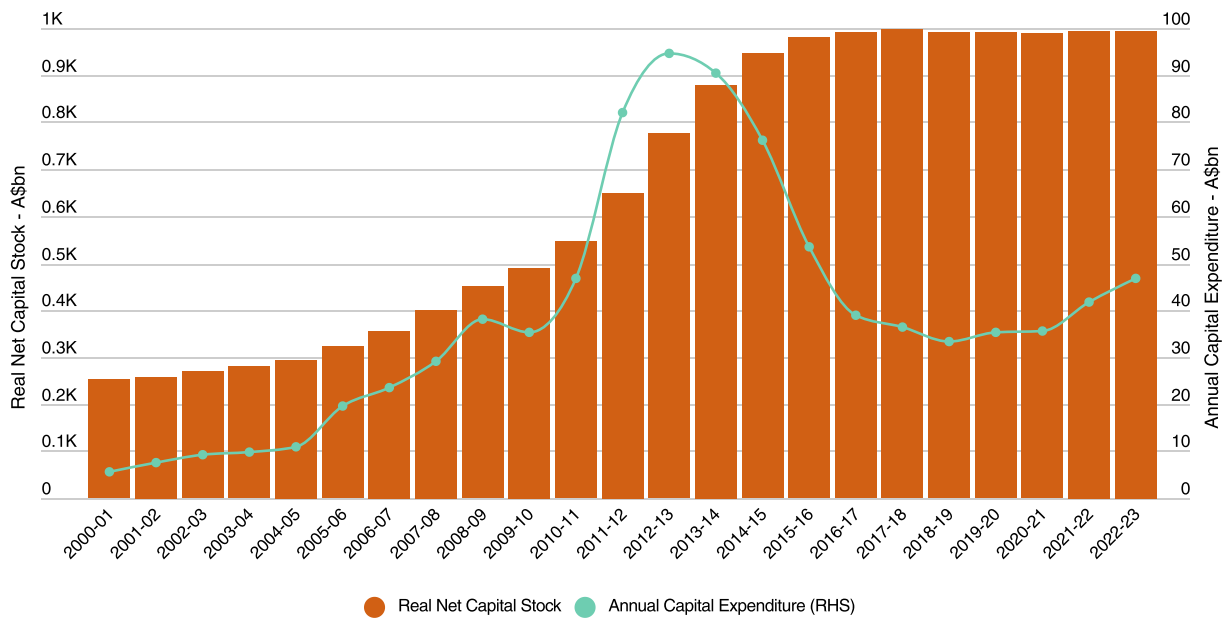
10 Australian Bureau of Statistics, *International Trade in Goods*, released 7 March 2024.

11 Australian Bureau of Statistics, *Private New Capital Expenditure and Expected Expenditure*, released 30 November 2023.

12 Australian Bureau of Statistics, *Australian System of National Accounts*, released 27 October 2023



Figure 11: Mining industry capital expenditure and capital stock



Source: Australian Bureau of Statistics, Australian System of National Accounts; Private New Capital Expenditure and Expected Expenditure.

While the mining industry expanded substantially in this time, directly creating over 200,000 new jobs in the process (97,600 in February 2004 to 311,100 in February 2024),¹³ the capital growth period has come to a noticeable halt. In nominal terms, annual capital expenditure has fallen more than half since peaking in 2012–13 and the mining industry capital stock has exhibited no growth in the last eight years. Few major mining projects have been initiated in the last 5 years and of those that have started, most have tended to be projects to sustain existing production levels, such as BHP’s South Flank¹⁴ and Rio Tinto’s Gudai-Darri¹⁵ iron ore mines.

Several greenfield mining projects are currently under development and will create new job opportunities within the minerals sector, including Liontown’s Kathleen Valley lithium mine,¹⁶ Iluka’s Balranald mineral sands mine¹⁷ and BCI’s Mardie salt and potash mine.¹⁸ There remain many prospective projects in the early stages of development, but rising construction costs¹⁹ have increased the challenge mining project proponents face in developing new mines and new jobs.

Rather than build new mines, the industry is more likely to invest in new technologies that boost performance at existing mines in terms of productivity and environmental outcome. The former has been a particular challenge within the mining industry over the last two decades. Despite record investment and workforce growth, mining has been one of the worst-performing industries in terms of labour productivity over the last 20 years. According to the ABS, in 2022–23, labour productivity in the mining industry was lower than 20 years ago on a quality-adjusted hours worked basis.²⁰

13 ABS, *Labour Force Survey*, Detailed, February 2023, seasonally adjusted. Access via Jobs and Skills Australia.

14 BHP, *South Flank*.

15 Rio Tinto, *Rio Tinto Opens Gudai-Darri, its Most Technologically Advanced Mine*. 21 June 2022

16 Liontown, *One year anniversary of the first blast at Kathleen Valley*, January 2024.

17 Iluka, *Balranald minerals sand mine*.

18 BCI Minerals, *Mardie Salt and Potash*.

19 ABS, *Producer Price Indexes, Australia*, released April 26, 2024.

20 Australian Bureau of Statistics, *Estimates of Industry Multifactor Productivity*, released 13 December 2023.

Two possible explanations for this are the decline in mineral ore grades across Australian mines, which ultimately weighs on the volume of payable mineral produced per tonne of extracted ore, and the rapid deployment of a new workforce that needed time to optimise its performance. Little can be done to manage the former so there is a clear need for the Australian mining industry to focus on skills development, workforce retention and re-skilling in the future.



21st century mining boom has redefined Australia's industrial landscape



20 years since the start of the mining boom the industry workforce has more than tripled



Mining has been the largest source of economic growth in the last decade



Australia is highly regarded as a destination for mining investment



The mining industry supports an extensive domestic supply chain



Mining export revenue significantly contributes to the Australian economy



Mining industry capital stock has exhibited no growth in the last 8 years



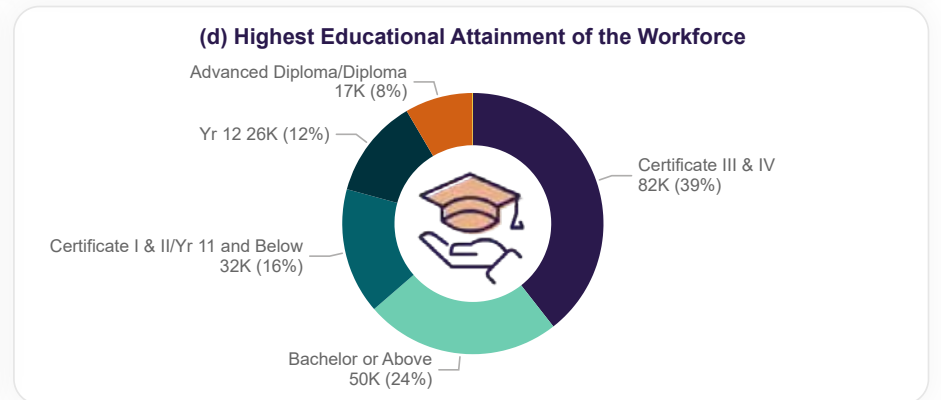
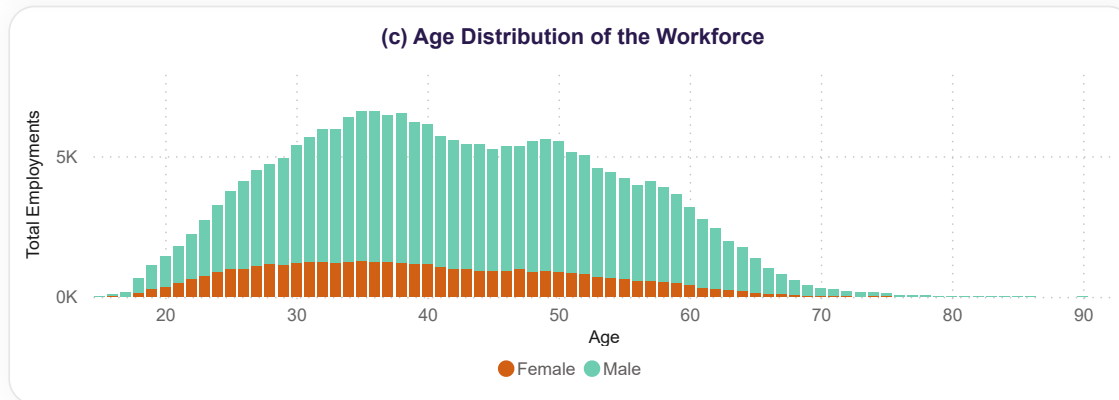
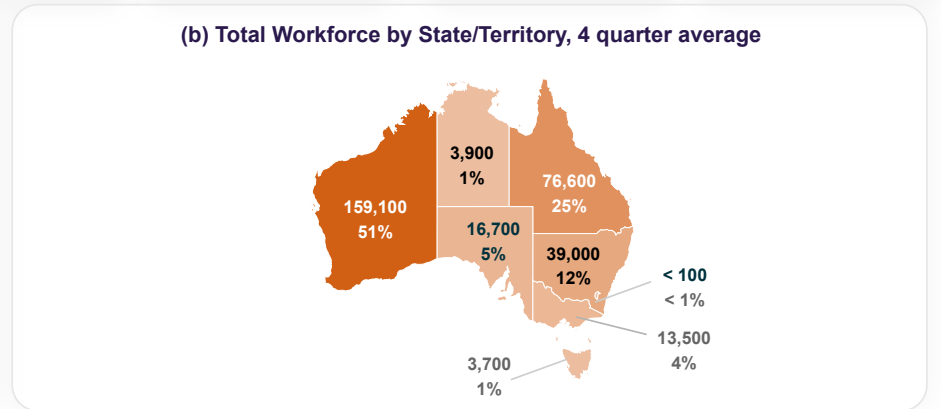
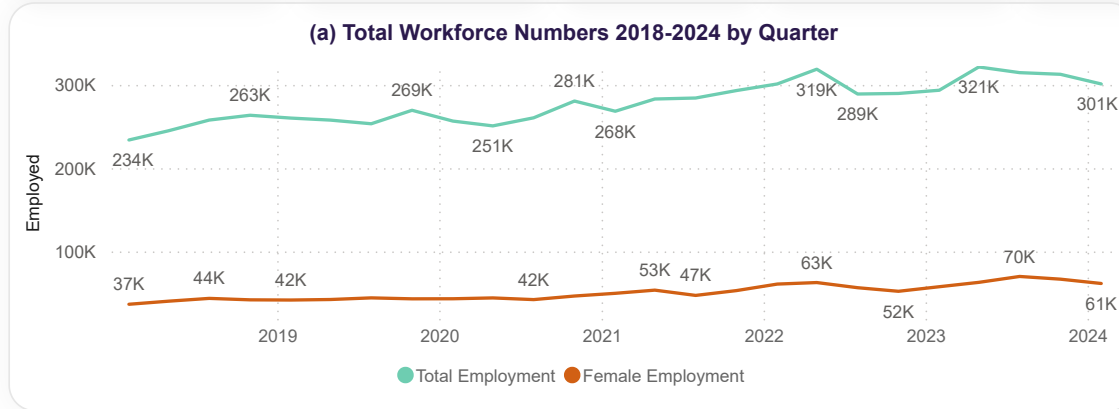
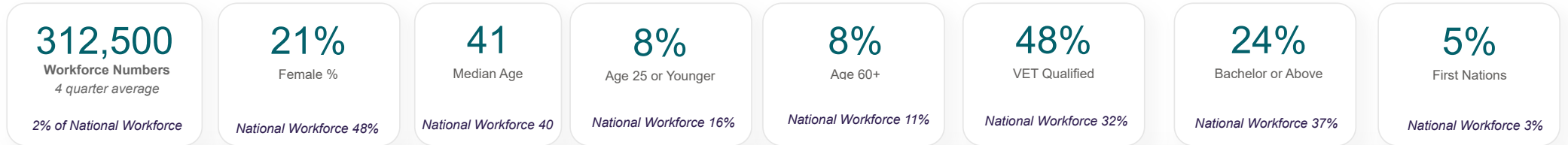
Greenfield mining projects currently under development will create new job opportunities within the minerals sector



Investment in new technologies likely to boost performance

Workforce insights

Figure 12: Mining Insights Dashboard 1

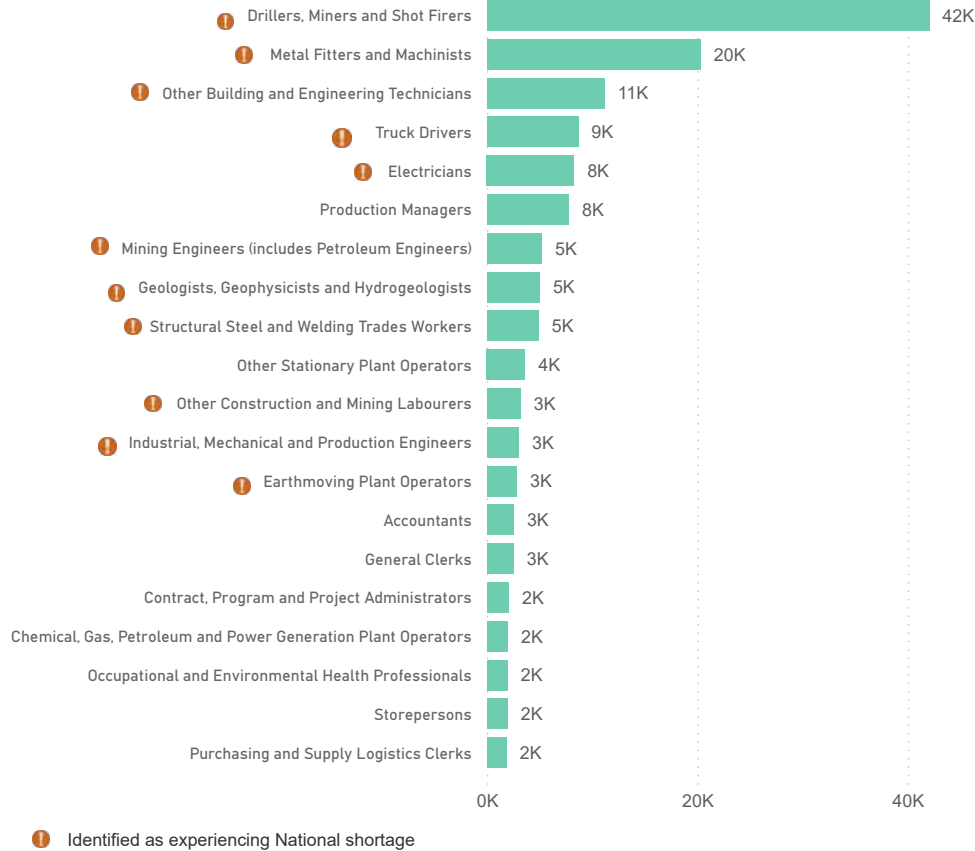


Sources: **(Top row)** Workforce Numbers and Female %: ABS Detailed Labour Force Survey (Table EQ06, 4-Quarter Average), May 2023 - February 2024 | Median Age, Age 25 or Younger, Age 60+, VET Qualified, Bachelor or Above and First Nations: ABS Table Builder 2021 Census - counting persons, 15 years and over by 2-digit level INDP Industry of Employment **(a)** ABS Detailed Labour Force Survey (Table EQ06, Original), Reference Period: February 2024 **(b)** ABS Detailed Labour Force Survey (Table EQ06, 4-quarter Average), Reference Period: February 2024 **(c)** Census of Population and Housing (AGEP Age and SEX Sex), 2021, TableBuilder **(d)** Census of Population and Housing (HEAP Level of Highest Educational Attainment), 2021, TableBuilder Notes: Workforce Numbers are rounded to the nearest 100

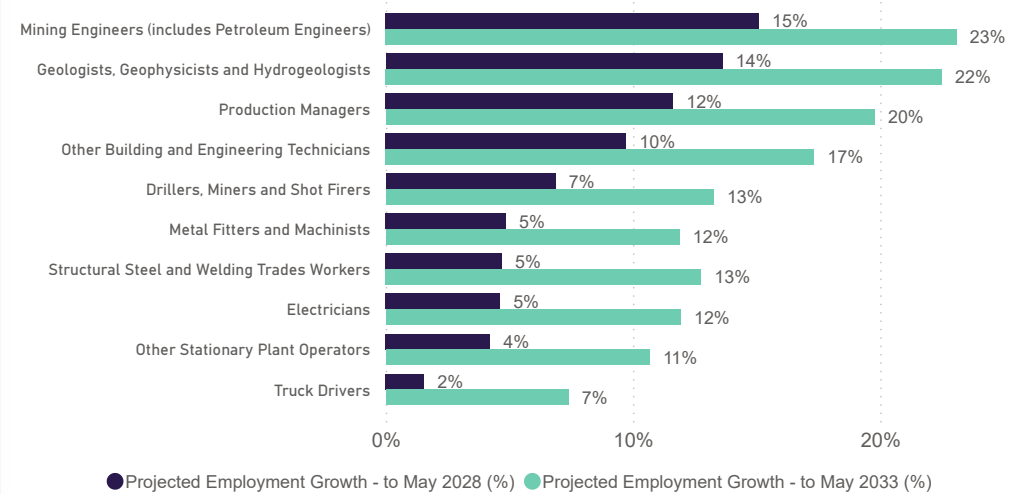
Workforce insights

Figure 13: Mining Insights Dashboard 2

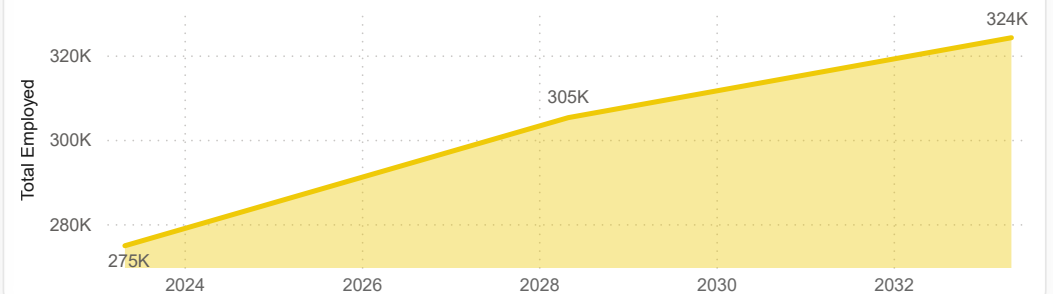
(e) Top 20 ANZSCO Occupations by Workforce Numbers



(f) Employment Projections by ANZSCO Occupations



(g) Employment Projection of Mining Industry

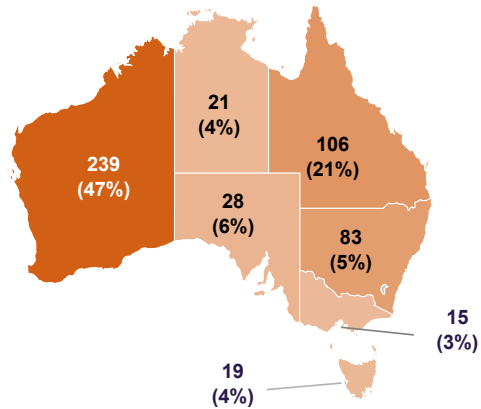


Sources: (e) ABS Table Builder 2021 Census - employment, income and education | JSA Skills Priority List 2023. 4-dig SPL (ANZSCO 2013) (f) Employment Projections produced by VU for JSA (May 2023 to May 2033) (g) Employment Projections produced by VU for JSA (May 2023 to May 2033)

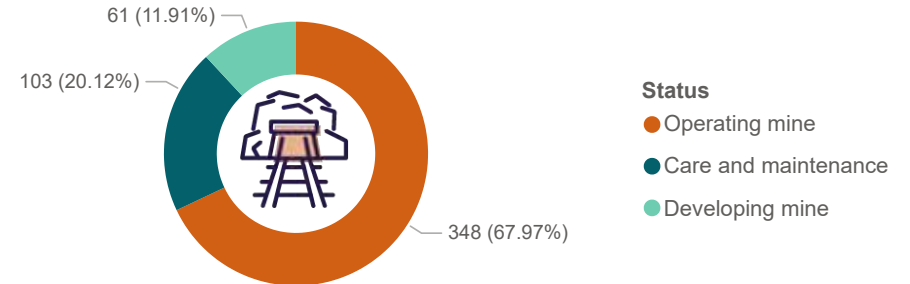
Workforce Insights

Figure 14: Mining Insights Dashboard 3

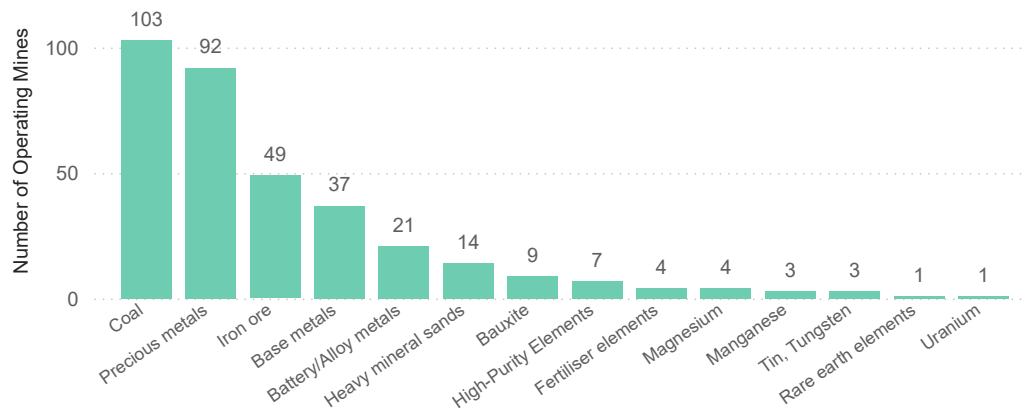
(h) Number of Mine Sites by States and Territory



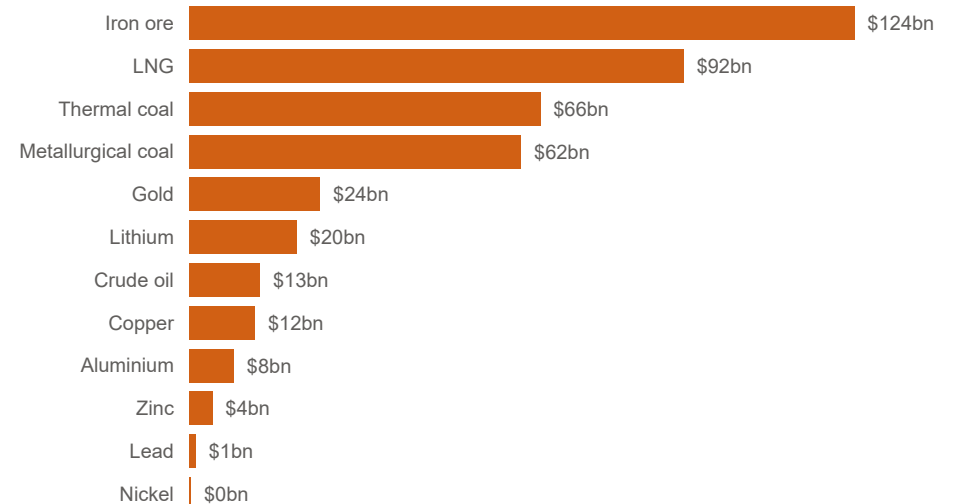
(i) Mines by Operating Status



(j) Operating Mines by Commodity Group



(k) Australia's Major Resources and Energy Exports, 2022-23



Sources: (h) Australian Operating Mines Map 2023 (twenty-fifth edition). Geoscience Australia. February 2024 (i) Australian Operating Mines Map 2023 (twenty-fifth edition). Geoscience Australia. February 2024 (j) Australian Operating Mines Map 2023 (twenty-fifth edition). Geoscience Australia. February 2024 (k) Department of Industry, Science and Resources, Commonwealth of Australia, Resources and Energy Quarterly, March 2024.
 Note: Developing mines are deposits where the project has a positive feasibility study, development has commenced, or all approvals have been received. Mines under care and maintenance have known resource estimations and may be mined or developed in the future.

Industry-wide trends and priorities

For the mining industry to continue making a significant positive impact on the Australian economy, it must continue to field a highly skilled, motivated, and efficient workforce. Achieving this goal is influenced by several factors, some shared with the broader economy and some unique to the mining industry itself.

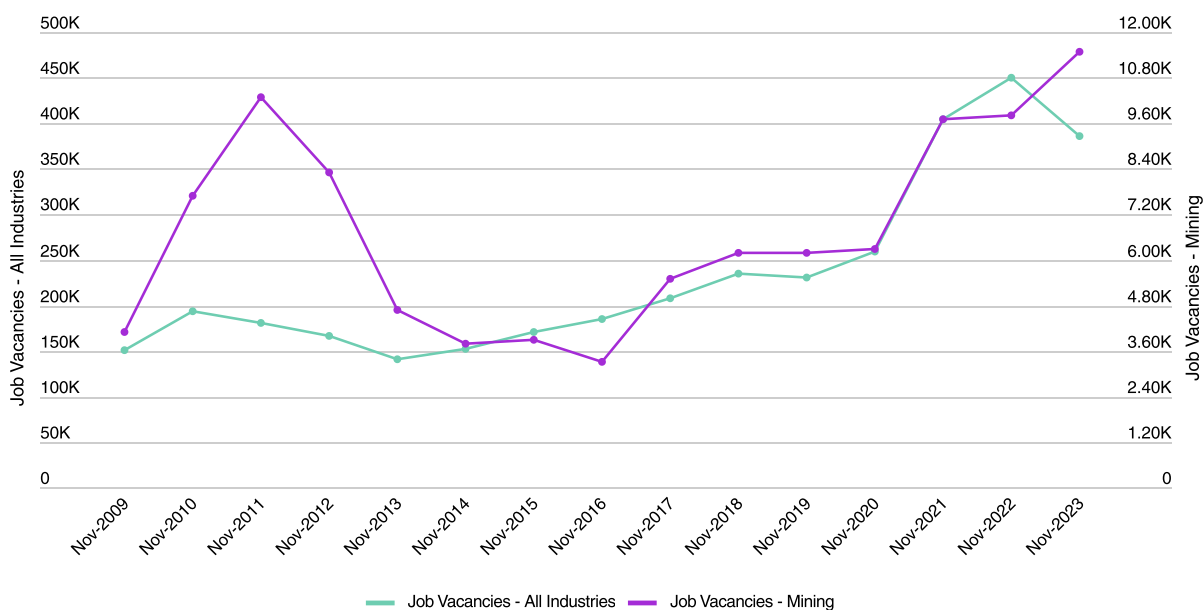
The mining industry's workforce is under significant pressure, with 11 of the industry's top 20 occupations, by employee numbers, listed as experiencing a shortage according to the Skills Priority List

Skills shortages

Near record low unemployment and high job vacancies is an unusual combination indicating that demand for high-skilled workers remains unfilled, [Figure 6](#). This combination is impacting the mining industry, which has not had the decline in job vacancies experienced in most other sectors. Instead, job vacancies within the mining industry remain at record levels and are above the peaks seen during the mining investment boom of 2011 to 2012, [Figure 15](#). This sustained high level of job vacancies is also coinciding with mining industry employment at record high levels, although neither is occurring with a commensurate increase in mineral output for most commodities.²¹

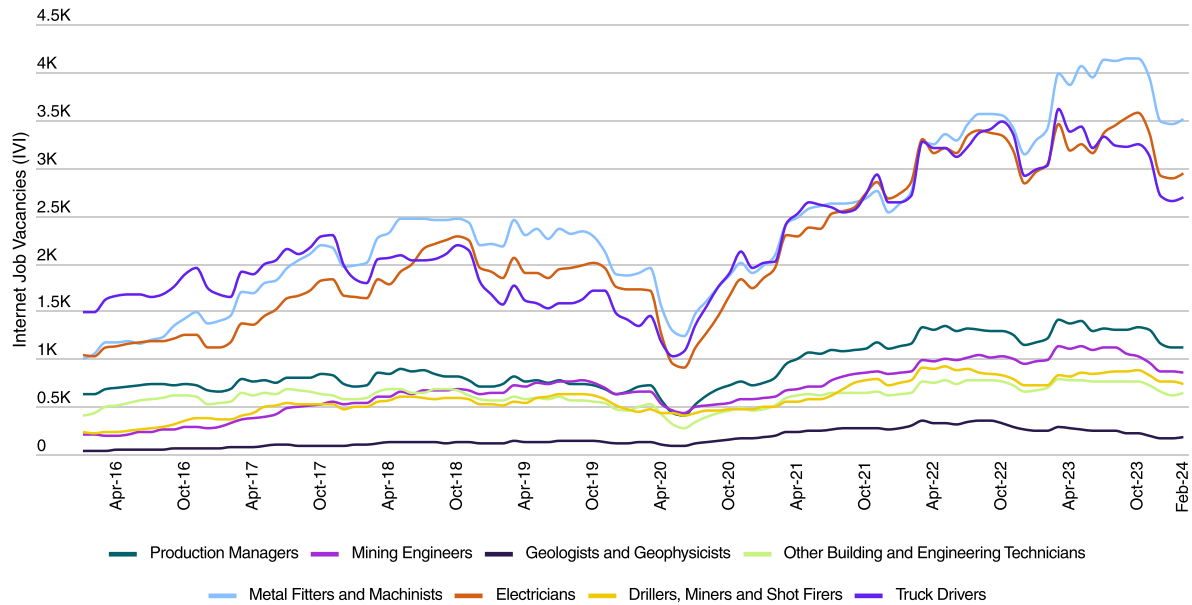
²¹ Department of Industry, Innovation and Science, *Resources and Energy Quarterly: December 2023*, released 18 December 2023.

Figure 15: Job vacancies – Mining compared with all industries



Source: Australian Bureau of Statistics, November 2023 - Job Vacancies, Australia (Seasonally adjusted).

Figure 16: Internet Vacancy Index (Top 8 Mining Occupations)



Source: Jobs and Skills Australia. Internet Vacancy Index, ANZSCO4 Occupations, States and Territories – Feb 2024(4-quarter average).2024.

The mining industry’s workforce is under significant pressure, with 11 of the industry’s top 20 occupations, by employee numbers, listed as experiencing a shortage according to the Skills Priority List.²² The industry requires its workforce to grow even more in the coming years, making worker attraction and retention key priorities.

While data from JSA’s Recruitment Experiences and Outlook Survey shows that recruitment difficulty has been gradually easing since its peak in July 2022, 52% of recruiting employers still reported difficulties in filling the roles they needed.²³ This phenomenon is industry-wide and impacts both the mining and automotive industries equally.

Data from JSA’s Internet Vacancy Index (IVI) shows that, especially for key occupations in the mining industry, demand for workers is high, higher in fact than pre-COVID, [Figure 16](#).²⁴ Employer recruitment activity has grown markedly for key occupations such as metal fitters and machinists, electricians, and truck drivers. Other key occupations, such as mining engineers and geologists, have also seen a steady increase in recruitment activity.

²² Jobs and Skills Australia. ‘Skills Priority List’. 2023.

²³ Jobs and Skills Australia. *Recruitment Experiences and Outlook Survey*. 2024.

²⁴ Jobs and Skills Australia. *Internet Vacancy Index*. 2024.





Higher education and pathway opportunities

Mining engineers and geologists, geophysicists and hydrogeologists rank as the two occupations with the strongest forecasted growth within the mining industry, [Figure 13 \(f\)](#). Worryingly, against this backdrop of growth is the fact that national enrolments in engineering-related higher education degrees have been steadily declining since 2019, with data from the Australian Geoscience Council showing a similar decline for studies in earth sciences.^{25 26}

The use of higher apprenticeships has been gaining industry attention to address skills shortages and bridge the gap between VET and university-level skills and knowledge. The term ‘higher apprenticeship’ entered the VET lexicon in Australia around 2017, partly because of the 2018 ‘Apprenticeships training — alternative delivery pilots’ program. It defined a higher apprenticeship as “*higher apprenticeships combine a program of structured on-the-job training with formal study, with the study component leading to the award of a VET qualification at the Australian Qualifications Framework level 5 (diploma) or level 6 (advanced diploma)*”²⁷

For the mining industry, higher apprenticeships could offer the opportunity to create para-professional occupation pathways for streams such as mining engineering. This would not only help create additional candidate pipelines for higher education but also reduce the pressure on the existing workforce.

Degree apprenticeships, where students work directly within the industry aligned to their studies at the same time as completing higher education courses are used heavily in the United Kingdom.²⁸ In the 2023-24 UK Academic year, there were 32,500 Level 6 and 7 commencements (Bachelor and Masters equivalent).²⁹

The concept is beginning to get traction within Australia, albeit adjusting for the difference in funding and government subsidies that exist here as compared to the United Kingdom. Notably, the University of South Australia, in partnership with employers BAE Systems Australia, ASC and Consunet, recently became the first Australian university to launch a degree apprenticeship program focussed on software engineering to support the defence industry.³⁰

25 Department of Education. *Student Enrolments Pivot Table 2022*. 2023.

26 Australian Geoscience Council Inc. *Australian Tertiary Geoscience Education Profile*. 2022.

27 National Centre for Vocational Education Research. *Higher apprenticeships in Australia: what are we talking about?*. 2019

28 Ratemyapprenticeship, *Apprenticeship Levels and Career Options*.

29 UK Government - Explore education statistics, *Academic year 2023/24 – Apprenticeships*, published 9 May 2024.

30 University of South Australia. *All systems go for Australia’s first software degree apprentices*. 2024.

In December 2023, South Australia's Skills Commission approved the country's first declared tertiary traineeship for the vocation of Associate Engineer. The traineeship aims to address workforce demands in the resources and infrastructure sectors by providing a pathway for traditional trades and technical personnel to advance into tertiary engineering roles. This pathway is facilitated through Central Queensland University's Associate Degree in Engineering, with specialisations in Civil, Electrical, Mechanical, Geology, or Mining Engineering, supported by Uni Hub – Spencer Gulf.

Another example of innovation in this space is within the School of Business and Law at Edith Cowan University, where students can elect to complete their Commerce degrees via an initiative called the ECU Extended Internship Program.³¹ This program replaces four semesters of the degree with fully paid part-time work in roles directly aligned to the student's field of study.

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Reversing the trend of declining enrolments in engineering (especially mining-related) and Earth Sciences degrees is key. Initiatives such as Degree Apprenticeships may assist the higher education sector, and industry, to attract, support and retain students into such specialised fields. Industry would be well placed to work closely with the higher education sector in exploring how Degree Apprenticeships could be adopted.

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AUSMASA will investigate initiatives such as higher apprenticeships. This work, coupled with ongoing work to identify the skills needs and career progression pathways for critical roles within the mining and automotive industries, will aim to offer innovative solutions for industry.

Against this backdrop of industry-led initiatives is the Australian Government's reform agenda for higher education, highlighted through the Universities Accord and Tertiary Harmonisation initiatives. These set forth a comprehensive plan to enhance equity, accessibility, and integration within the tertiary education system. These reforms, coupled with specific measures from the 2024-25 budget announcements, aim to create a more inclusive and fair educational landscape.

The Universities Accord is the result of a comprehensive review conducted by an expert panel chaired by Professor Mary O'Kane AC. This review included extensive public consultations and stakeholder engagements, ensuring that a wide range of perspectives and insights were considered. The recommendations from the Accord provide a detailed blueprint for the future of higher education in Australia, focusing on creating a more equitable, accessible, and integrated system that benefits all Australians.³²

³¹ Edith Cowan University. *Work-Integrated Learning*. 2024

³² The Hon Jason Clare MP, *Release of the Australian Universities Accord*, February 2024

The Universities Accord lays out ambitious targets to significantly increase the tertiary education attainment rate. Currently, 60% of the workforce holds a tertiary qualification, and the goal is to raise this to at least 80% by 2050. This includes increasing the proportion of university-educated Australians aged 25 to 34 from 45% to 55% and boosting the number of individuals with vocational or technical qualifications to 40% by the same year. The Accord emphasises the need for a more integrated system where the barriers between vocational education and training (VET) and higher education are minimised, facilitating smoother transitions for students.³³

Equity and accessibility are at the forefront of these reforms. The Accord and related budget measures aim to make higher education more attainable for Australians from diverse backgrounds, including those from outer suburbs, regional areas, disadvantaged communities, and Indigenous populations. Specific initiatives are designed to support marginalized and disadvantaged students, ensuring they have the resources and opportunities needed to pursue higher education. This approach seeks to reduce socio-economic and geographic disparities in education access.³⁴

Financial support for students is a critical component of the reform agenda. The introduction of the Commonwealth Prac Payment, starting in July 2025, allocates \$427.4 million to support eligible students in teaching, nursing, midwifery, and social work during their practical placements. Additionally, the budget includes reforms to the Higher Education Loan Program (HELP) to make it more equitable by improving the indexation calculation method. This change aims to align HELP debt growth with wage growth, thereby reducing financial pressures on students and preventing excessive debt accumulation.³⁵

Increased funding and infrastructure investments are also highlighted in the 2024-25 budget. These investments aim to enhance educational infrastructure and support services, particularly in outer suburban and regional areas, furthering the goal of reducing geographic disparities in education access. By improving facilities and resources, the government aims to provide a better learning environment for all students.³⁶

The implementation of these reforms will be staged, ensuring a gradual and sustainable transformation of the higher education system over the next decade and beyond. This phased approach allows for continuous assessment and adjustment of the reforms to meet the evolving needs of

33 The Hon Jason Clare MP, *Release of the Australian Universities Accord*, February 2024

34 The Hon Jason Clare MP, *Release of the Australian Universities Accord*, February 2024

35 Australian Government 2024/25 Budget, *Department of Education - Higher Education*, May 2024

36 Australian Government 2024/25 Budget, *Department of Education - Higher Education*, May 2024





the educational landscape. The ultimate vision is to prepare the Australian workforce for future challenges by increasing the proportion of highly educated and skilled individuals, aligning with the broader goal of a “Future Made in Australia” where the domestic workforce can meet the demands of emerging industries and technologies.³⁷

These reforms represent a significant effort by the Australian Government to transform higher education, ensuring that it is inclusive, fair, and responsive to future economic and social needs. By addressing financial, structural, and accessibility issues, the government aims to build a more skilled and equitable workforce, ultimately benefiting various stakeholders, including students from regional and disadvantaged backgrounds.

Vocational Education and Training

In addition to the important role played by the higher education sector for degree-qualified occupations, the vocational education and training sector is crucial for the mining industry’s success. [Appendix I](#) highlights key enrolment and graduation data for qualifications within the RII training package in support of the mining industry and whose custodianship is with AUSMASA.

While the majority of the VET training within the RII package is delivered via a fee-for-service arrangement, it is important to note that many of the top occupations within the mining industry require a trade qualification, thereby being delivered via an apprenticeship and whose training package (and subsequent reporting) falls within the remit of other JSCs (except AUM and AUR training package qualifications, which are supported by AUSMASA). Examples would include Metal Fitters and Machinists (trained under the MEM package, supported by the Manufacturing Industry Skills Alliance) and Electricians (trained under the UEE package, supported by Powering Skills Organisation).

The industry’s success depends on the attraction and retention of these apprentices, and employers play a pivotal role in supporting apprentices to maximise their learning and success. An area of concern across the whole apprenticeship and traineeship sector, with mining being no exception, is the persistently high drop-off rates.

NCVER completion data for apprenticeships and traineeships that commenced in 2018 reflect a national average completion rate of 55.8% across all occupations within 3–4 years. The automotive trades cohort, many of which are important contributors to the mining workforce, fared slightly better, with 58%, compared to an average rate of 53% for all trade apprenticeships. Mining traineeships in areas such as mobile and

³⁷ Australian Government 2024/25 Budget, [Department of Education - Higher Education](#), May 2024

fixed plant operations recorded completion rates of 58% and 61% respectively.³⁸

*national average completion rate of
55.8% across all occupations
within 3–4 years*

Given the effort that is expended to attract new entrants to the industry, minimising losses from the training system must be a priority.

Feedback from numerous mining industry stakeholders has raised the concern that, because of the skills shortages being felt by the industry, the level of mentoring and coaching being provided to apprentices has suffered. It was noted by these stakeholders that the same applied to newly promoted workers too, with the view being that skills shortages were seeing people get promoted more rapidly but perhaps without sufficient levels of mentoring and support required to ensure success.

Further complicating the training landscape is the fact that training providers (TAFEs and private RTOs) and the industry have both indicated that trainer shortages are impacting their ability to support the industry's full training needs and desires.

In recognition of these pressures, DEWR enacted early changes to the standards for RTOs in relation to trainer qualification requirements. As part of these changes, people who hold an education degree can now be engaged as trainers while also enabling those who were actively working toward a Certificate IV or Diploma from the TAE training package to deliver training and contribute to assessments.³⁹ These changes, along with the broader use of industry experts, have been welcomed as a practical government approach to assisting industry in an ongoing issue.

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AUSMASA will monitor the changes to trainer qualification requirements in addressing trainer shortages and accessibility of vocational education and training, while also working closely with other JSCs to explore broader strategies required to encourage more people to consider engaging with the VET sector as a trainer and assessor.

³⁸ NCVET. Completion and attrition rates for apprentices and trainees 2022: data tables. Adelaide, November. 2024.

³⁹ Department of Employment and Workplace Relations. *Early Changes to the Current Standards for RTOs*. 2024.



Community perceptions of the mining industry

The public perception of the mining industry is impacted by changing societal expectations regarding workplace culture and an increased focus on the environmental and social impacts of extractive industries on communities, human health, and cultural heritage.

Degradation and the unintended destruction of sites sacred to Indigenous people have come at a high reputational cost to the mining industry and certain mining organisations. Following the Juukan Gorge incident, which resulted in the destruction of 2 ancient and sacred rock shelters in the Pilbara region of Western Australia dating over 46,000 years, a parliamentary senate enquiry was established to enquire into and report on the events that led to the incident.

Media coverage of such incidents is likely to have lowered the public's perception of mining as a sector, thereby reducing the appeal of the industry and impacting efforts to attract and retain talented workers.

The number of younger people who are choosing to work within the mining industry is barely keeping up with those who are approaching retirement. To facilitate the workforce growth that the industry needs, it is critical for the mining industry to address and reverse this trend.

Generation Z, which refers to those born between the late 1990s and early 2010s, is projected to represent 27% of the global workforce by 2025⁴⁰. This generation is more connected to digital platforms than any generation before it. From earliest youth, they have been exposed to the internet, to social networks, and to mobile systems.⁴¹ Unlike previous generations of workers, Generation Z is the first generation to not rank remuneration as one of the top two reasons for choosing a career path or industry, instead ranking workplace flexibility and purpose higher.⁴²

Research commissioned by AUSMASA provides insight into what Generation Z thinks of mining in Australia. More than 1,000 young people responded to the commissioned survey. Responses showed that nearly three-quarters of respondents felt that the mining industry did more harm than good, 56% would prefer to see the industry decrease in size and, while 87% knew Australia mined coal, only 27% knew that the industry also mined lithium, a key and necessary mineral for a decarbonised future.⁴³

⁴⁰ World Economic Forum. *How Gen Z employment levels compare in OECD countries*. 2021

⁴¹ McKinsey & Company. *What is Gen Z?*. 2023

⁴² McKinsey & Company. *The Gen Z Equation*. 2023.

⁴³ AUSMASA. *What Gen Zs Think of Mining*. 2024.



This creates a problem for the industry. While the mining industry is responsible for producing the minerals and resources that are vital for modern living, including the very technologies that will help ensure a cleaner and more environmentally friendly future, this is not how the younger population perceives the industry.

Figure 17: What Generation Z think of mining



Source: AUSMASA Gen Z Perceptions of Mining, developed in partnership with Year13

The Generation Z research also highlighted that, overall, young people don't feel they have people they can discuss mining careers with, although young people from the mining states of Western Australia and Queensland indicated they had access to more advice. For example, 76% of young people from Victoria say they do not speak with anyone about mining careers, followed by 65% from New South Wales, 54% from South Australia, 51% from Queensland and 30% from Western Australia. Overall knowledge of potential career opportunities, be they trade-based or professional, remained low. This is an area of immediate concern for the industry and is exacerbated by the fact that all industries are scrambling and competing for human capital.

AREA OF FOCUS

AUSMASA will continue to work closely with industry and the National Careers Institute (NCI) to explore ways of better promoting the full breadth of career opportunities within the mining industry.

Diversified workforce

The mining industry has seen a steady increase in its female workforce over recent years. In 2020, the industry's female workforce was 17% of the total, which has grown to 21% by 2024, or an additional 20,000 women.⁴⁴ It is still well below the national percentage of 48%, [Figure 11](#). By continuing to increase female participation, the industry can tap into a broader talent pool, thereby addressing the current skill gaps. Additionally, fostering a more inclusive environment can lead to diverse perspectives and innovative solutions, further strengthening the industry's capacity to meet its demands. Realising that its workplace culture needed significant improvement, the industry has worked hard to make meaningful changes.

In 2020, the industry's female workforce was 17% of the total, which has grown to 21% by 2024, or an additional 20,000 women. It is still well below the national percentage of 48%

While that journey continues, the outcome of specific recruitment activities, and supportive training and mentoring programs are being felt. Female enrolments in qualifications from the RII training package have grown 28% since 2015 to 16% of all RII enrolments in 2022. However, this is below the industry's female workforce of 21% of total workforce, indicating there is still work required to attract women to the industry.

Another area where significant ground still needs to be made up is in addressing the gender pay gap present within the industry. Data from the Workplace Gender Equality Agency's latest reporting round found that 95% of mining employers had pay gaps in favour of men, the worst of all industries.⁴⁵ While the industry's average pay gap of approximately 15% places it in the middle of the field among other industries, it's clear that more must be done to encourage female employment across the full range of vocational opportunities present in the industry if this gap is to be reduced.

AREA OF FOCUS

The industry should continue to encourage and support female employment opportunities across all occupations within the mining industry, with the aim of addressing the existing gender pay gap and ensuring comprehensive workforce diversification.

⁴⁴ Australian Bureau of Statistics. *Labour Force, Australia, Detailed - Table EQ06*. 2024.

⁴⁵ Workplace Gender Equality Agency. *Employer Gender Pay Gaps: Snapshot*. 2024.



Skilled migration

Skilled migration has been identified by many of AUSMASA's key stakeholders as a logical supporting strategy in helping to fill roles experiencing skills shortages. Broader economic challenges, such as an extremely tight housing and rental market, along with global competition for skilled migrants, have limited the effectiveness of this approach. At 0.78% of the minerals workforce, skilled migrants represent a small but crucial talent pipeline to address skills in critical shortage and 'hard to fill' roles and offer an opportunity to have a larger impact if barriers within the skilled migration system were addressed.⁴⁶

Industry feedback has focussed on the high cost and processing time of the current skilled migration system, further exasperated by Australia's housing shortage.

A balanced rental market is one with a rental vacancy rate of 3% or more.⁴⁷ Using Perth as an example, February 2024 vacancy rates of 0.3% significantly hamper the ability of prospective new residents to the

state to find a home.⁴⁸ Mining regions also have constrained rental markets. For example, the February 2024 vacancy rate for northern Western Australia was 1%⁴⁹ and central Queensland was 0.6%.⁵⁰ This certainly impacts prospective skilled migrants and Australian residents who may choose to relocate for work purposes. The national vacancy rate of 0.7%, while slightly better than Perth's, is still considered representative of a housing market under immense pressure.

The Australian Government aims to revamp its migration system to bolster national prosperity and security through its Migration Strategy.⁵¹ The Government acknowledges that migration has historically helped Australia overcome challenges and foster long-term prosperity, but the current system is considered broken and needs a 10-year overhaul, as suggested by the 2023 Review of the Migration System led by Dr. Martin Parkinson.

The February 2024 vacancy rate
for northern Western Australia was 1% and
central Queensland was 0.6%

46 Minerals Council of Australia. *Employment goals undermined by damaging IR changes*. 2023.

47 realestate.com.au. *New data proves the rental crisis is worsening and experts are baffled more isn't being done to help*. 2023

48 Domain Research. *Vacancy rates: February 2024*. 2024.

49 SQM Research. *Northern WA Residential Vacancy Rates*. 2024

50 SQM Research. *Central Queensland Residential Vacancy Rates*. 2024

51 Australian Government. *Migration Review*. 2024



The new Migration Strategy focuses on 5 objectives to realise the Government's vision:

1. Raising living standards for Australians by boosting productivity, meeting skills shortages and supporting exports.
2. Ensuring a fair go in the workplace by complementing the jobs, wages and conditions of all workers and preventing migrant worker exploitation.
3. Building stronger Australian communities by better planning the migration intake and giving migrants the opportunity to invest in their lives in Australia through permanent residence and citizenship.
4. Strengthening international relationships by building stronger economic and social connections with our region and international partners.
5. Making the system work by being fast, efficient and fair for migrants and employers.

The roadmap includes 8 key actions:

1. Targeting temporary skilled migration to address skills needs and promote worker mobility.
2. Reshaping permanent skilled migration to drive long-term prosperity.
3. Strengthening the integrity and quality of international education.
4. Tackling worker exploitation and the misuse of the visa.
5. Planning migration to get the right skills in the right.
6. Tailoring regional visas and the Working Holiday Maker Program to support regional Australia and its workers.
7. Deepening our people-to-people ties in the Indo-Pacific.
8. Simplifying the migration system to improve the experience for migrants and employers.



Digitisation and automation

Technological advances such as ongoing digitisation and automation are continuing to change how mining work is undertaken globally, with Australia being no exception and, in many cases, leading this innovation.

Automation allows for the operation of tasks with limited or no direct human involvement. Digitisation is the conversion of analogue information and processes into digital forms, creating vast new data streams and corresponding opportunities through the Internet of Things (IoT).

Automated processes can involve remote-controlled machinery, wherein a human operator controls aspects of the function from a distant location.

They can also involve artificial intelligence (AI) supported machinery. There is often an overlap, with some functions completed by sophisticated systems autonomously while a person maintains control of other functions.

Automated working operations have existed since the Industrial Revolution. When combined with the ability to digitise processes and have automated processes work directly from digitised inputs, these processes can almost eliminate the need for people to be involved in certain job tasks. When this is linked with new AI programs, which can troubleshoot problems as they arise, the human element has the potential to be even further removed from the equation.

For the mining industry, the opportunities for new ways of working have changed how jobs are undertaken in a variety of important ways. Self-driving haul trucks and other mobile plant equipment in surface operations are being used on many mine sites and will soon be commonplace. The autonomous vehicles drive in a pre-orchestrated manner, supported by sophisticated GPS tracking and mine site mapping, and are optimised to be gentler on the equipment than the average human operator.

Autonomous technology has also seen the introduction of driverless trains, with Rio Tinto being the first to use the technology in July 2018 for the delivery of 28,000 tonnes of iron ore from its Tom Price operation to a port at Cape Lambert.⁵² In this instance, Rio Tinto's AutoHaul™ team monitored the operation at its Perth Operations Centre, almost 1,500 km away.

While the ongoing introduction of autonomous technology within both the mining and the transport industry more broadly will displace or alter certain job roles (such as haul truck drivers and train drivers), it is also creating new job opportunities.

Autonomous operations need to be designed, developed, installed, tested,

⁵² Rio Tinto. *How Did One of the World's Largest Robots End Up Here?* 2019.

and monitored. Technology is giving rise to higher-paying jobs with greater opportunities for remote and flexible work. The growth of remote operations centres is seeing an increase in workers being able to support mining operations from metropolitan rather than remote locations, expanding the demographic of people that the industry can attract to work within it.⁵³

These jobs also require higher digital skills, and many need specialised degree qualifications. Job roles created by autonomous technology include autonomous operations controllers, with research by iMove also showing increased demand for roles in IT, cybersecurity, civil engineering, mechanical engineering, and transportation systems design.⁵⁴

A key priority for the industry and government will be to help impacted workers retrain for other job roles that are in demand. Given the current workforce shortage, every engaged and willing worker is a welcome part of the mining industry.

AREA OF FOCUS

AUSMASA, in partnership with industry and employee representatives, will ensure digitisation and automation training programs and support mechanisms are in place to harness each worker's existing skills and impart new skills.

Technological advancement

Modern mining operations require hundreds of millions, if not billions, of dollars' worth of investment. It stands to reason that mining operators seek out promising technological solutions where such implementation offers to increase productivity, improve safety or both. As such, the mining sector, despite public perceptions, is increasingly home to technologically advanced processes, systems and innovations.

Technological advancement is creating new job roles within the mining sector. These new roles often

53 Australian Resources and Energy Group. *A New Horizon: Guiding Principles for the Future of Work*. 2018.

54 Hussein Dia, Hadi Ghaderi, Sohani Liyanage, Rusul Abduljabbar, and Ali Matin. *Creating our Future Transport and Mobility Workforce*. 2023.



require advanced technical skills and education. Some examples of how technology is being used within the mining sector to improve productivity and safety include the use of advanced data analytics, continuous asset monitoring systems, real-time sensor data, use of robotics and increased augmentation of AI systems.⁵⁵

One example of how a combination of such technologies is being trialled in the mining industry is using autonomous, scanner-equipped robots to inspect underground mines for post-blast safety, with a combined benefit of reduced downtime and increased miner safety.⁵⁶

In its report exploring the future of work in the mining industry, the Minerals Council of Australia (MCA) identified that skills of increasing importance would include change management, collaboration, complex stakeholder engagement, creativity, data analysis, data and digital literacy, design thinking, stakeholder analysis and strategic planning.⁵⁷

Overall, MCA's report identified which roles within the mining sector would be enhanced, redesigned, or automated by technology.

It is not surprising to note that the report identified an eventual fall in demand for operational roles such as drillers, miners, shotfirers and mobile plant operators because of technological solutions, whereas numerous roles, including metal fitters, machinists, electricians, production managers and mining engineers, would continue to see a demand increase.⁵⁸

metal fitters, machinists, electricians, production managers and mining engineers, would continue to see a demand increase

Given the sector's ongoing shortage of workers, any roles displaced by technology create opportunities for retraining and redeployment, maximising the retention of experienced employees in the process.

The ability to identify the gaps between existing skills in affected roles and those required by newly created roles will continue to be a priority for AUSMASA in its engagement with the industry, noting that this is a key focus of the [skills mapping project](#) currently underway.

AREA OF FOCUS

Given that digital skills and digital literacy is a core aspect of technological advancement, AUSMASA will continue to work closely and collaboratively with the JSC responsible for digital skills – the Future Skills Organisation – while conducting its own work around skills mapping.

⁵⁵ Australian Resources and Energy Group. *A New Horizon: Guiding Principles for the Future of Work*. 2018.

⁵⁶ Olivia Thomson. *Robots are Increasing Safety and Productivity by Revolutionising Post-Blast Mine Re-Entry*. Australian Mining.com. 2023.

⁵⁷ EY. *The Future of Work: The Changing Skills Landscape for Miners*. 2019.

⁵⁸ EY. *The Future of Work: The Changing Skills Landscape for Miners*. 2019.

Mining and net zero

The Australian Government's Climate Change Bill 2022 enshrined into law an emissions reduction target of 43% from 2005 levels by 2030 and achieving net-zero emissions by 2050, kick-starting a journey towards decarbonisation that the mining industry will play a critical role in achieving.

While the industry is crucial for supplying critical minerals required for decarbonisation, the mining industry itself is addressing how its operations can be accomplished in more sustainable ways.

Mobile plant equipment such as dump trucks, excavators and shovels have generally been powered by large diesel engines, giving rise to a significant demand for heavy diesel mechanics. Increasingly, mobile plant manufacturers are working with mining companies to roll out either diesel-electric or fully electric equipment options.

Diesel-electric mobile plant equipment uses a diesel engine to power a generator, which in turn generates electricity to run electric motors. Technology such as trolley-assist can provide an additional source of energy for dump trucks on certain sections of haul roads.⁵⁹ Fully electric mobile plant either relies on batteries to provide electric energy or high-voltage trailing cables for equipment such as shovels and excavators.⁶⁰

The ongoing transition of mobile plant and light vehicles away from diesel and onto battery-electric systems is driven by the mining industry's commitment to a decarbonised operational future and, in the case of BHP, is seen as more efficient than transitioning to hydrogen-powered solutions.⁶¹

While hydrogen may play a significant role in a decarbonised Australian future, it does require investment in refuelling infrastructure. Many mine sites already generate their own electrical power due to their off-grid locations, and assuming the output is sufficient to run existing operations and charge a battery-electric mobile plant, no additional refuelling infrastructure or supply-chain logistics would be required.

*The ongoing **transition** of mobile plant and light vehicles **away** from **diesel** and onto **battery-electric** systems is driven by the mining industry's commitment to a **decarbonised** operational future*

59 Troy Adams. *An introduction to trolley-assist haulage systems*. 2022.

60 Jacinta Bowler. *Fortescue deploys Australia's "first fully electric" excavator on way to zero emissions in Pilbara*. The Driven. 2023.

61 BHP. *Operational Decarbonisation*. 2023.



The transition to electrification has created a scenario whereby heavy diesel mechanics will need to be upskilled to support both diesel and electric plant and vehicles, blurring the line between mechanical and electrical-related tasks. Achieving this requires both a training strategy (with supporting training packages) and greater clarity as to where the role of a heavy diesel mechanic finishes and that of an electrician begins. Heavy diesel mechanics will be one of the focus occupations for AUSMASA's [skills mapping project](#).

AREA OF FOCUS

While capturing the transition to electrification using ANZSCO presents some difficulties, AUSMASA welcomes the release of JSA's Clean Energy Capacity Study and looks forward to providing key insights into this workforce transformation challenge.

Mine closure and post-mine land use

Every mine site has a finite life linked to the economically viable quantity of recoverable resources. 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.⁶²

This demand for mine rehabilitation and closure activities requires a broad mix of skills from traditional trades to environmental and agrarian knowledge and First Nations cultural awareness.

While many of the skills required to undertake mine closure and post-mine land use tasks are already covered by units of competency across multiple training packages, research by the Cooperative Research Centre for Transformations in Mining Economies (CRC TiME) has suggested that additional skills are not currently catered for by the VET or higher education system.

*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*

Mine closure and post-mine land use operations also create a unique opportunity for increased participation by First Nations communities, including in the planning and execution of such works. Feedback from the industry suggests specialised training programs for this phase of a mine's life would help develop the necessary skills of the workforce.

AREA OF FOCUS

AUSMASA will continue to work closely with industry and CRC TiME to define what VET programs could be developed to support this important workforce need.

⁶² CSIRO. Enabling mine closure and transitions: Opportunities for Australian industry. 2023.

Workplace cultural reform

Workplace cultural reform refers to deliberate and organised efforts to transform workplace values, behaviours, and the overall culture within an organisation. It aims to foster safety, diversity, equity, and inclusion by challenging and changing existing attitudes and practices that perpetuate inequalities.

As a dimension of cultural reform, the prevention of sexual harassment in the workplace is critical. The 2022 Australian Human Rights Commission report '*Time for Respect: Fifth national survey on sexual harassment in Australian workplaces*' highlighted "power imbalances and the misuse of power related to gender inequality and other forms of discrimination and disadvantage, combined with specific workplace risk factors, continue to drive sexual harassment against some people more than others" and that these experiences can have harmful and significant negative impact on individual's mental health, productivity and more broadly the economy.⁶³

The report highlighted several key messages:

Sexual harassment continues to be an unacceptably common feature of Australian workplaces, with one in 3 workers experiencing workplace sexual harassment in the last 5 years.

Most sexual harassment in Australian workplaces is carried out by men.

Half of incidents are repeated and of those, half are ongoing for more than one year.

Reporting remains low with only 18% of sexual harassment incidents reported.

Only a third of Australian workers think their organisation is doing enough.

The Australian Human Rights Commission has new regulatory powers to investigate and enforce compliance with positive duty. Positive Duty legislation on employers came into force in December 2023 and has been established to eliminate workplace sexual harassment and discrimination. Employers must take 'reasonable and proportionate measures' to eliminate, as far as possible, unlawful sex discrimination including sexual harassment.

⁶³ Australian Human Rights Commission. *Time for respect: Fifth national survey on sexual harassment in Australian workplaces*. 2022.

The mining industry has acknowledged the challenges it faces regarding workplace culture, particularly concerning bullying, sexual harassment, and assault.

The mining industry has acknowledged the challenges it faces regarding workplace culture, particularly concerning bullying, sexual harassment, and assault. These issues have a negative impact on the sector by contributing to poor public perception and deterring new entrants into the industry.

Polling of industry stakeholders at a recent AUSMASA online workforce planning workshop showed that the industry feels that inroads are being made to address these challenges. Only 11% of stakeholders felt that

the mining industry culture had not improved, with 52% believing that either moderate or significant improvements had been achieved.

Workplace cultural reform, particularly as it relates to sexual harassment, bullying and racism, continues to spark intense conversations across a broad range of industries, resulting in the creation of focused training initiatives. Supporting positive change within its own state, the Western Australian Government announced the establishment of the Mental Awareness, Respect and Safety (MARS) Program in December 2021 to address serious mental health, workplace culture and safety issues in the Western Australian mining industry. The MARS program is an inter-agency collaboration involving the Department of Mines, Industry Regulation and Safety (DMIRS), the Mental Health Commission, the Equal Opportunity Commission, and the Department of Communities.

As part of the MARS program, Edith Cowan University has established the MARS Centre, to support the mining industry in achieving mentally healthy workplaces, build a culture of safety and respect, and prepare for workplace safety in future mining.⁶⁴ An early initiative of the MARS Centre was to develop a new Graduate Certificate of Leadership in Mining Workplace Safety, for which the state government has offered scholarships for those working in the Western Australian mining industry.

In all instances, the programs developed to provide training on identifying and managing cultural reform, the prevention of sexual harassment, bullying, and racism, and the support of safety, diversity, equity,

⁶⁴ Edith Cowan University. *Mental Awareness, Respect and Safety (MARS) Centre*. 2024.



and inclusion in the workplace are either non-accredited VET programs or higher education-delivery programs.

One methodology for facilitating cultural reform and instilling learning and knowledge in Australia's workforce is developing core skills and knowledge in qualifications. It is critical that Australia's workforce learns and gains skills and knowledge about the importance of the prevention of sexual harassment, bullying, and racism and how they ensure safety, diversity, equity, and inclusion in the workplace.

AREA OF FOCUS

AUSMASA proposes to collaborate with other JSCs to develop an accredited training program, with supporting resources, for developing safe and respectful workplaces. This program would be made available across multiple training packages.

Mental Wellbeing

A significant portion of the Australian population has experienced mental health issues. The 2020–2022 National Study of Mental Health and Wellbeing,⁶⁵ found that 8.5 million Australians aged 16 to 85 (43% of the population) had experienced a mental illness at some point in their lives. Furthermore, 4.3 million individuals (22%) reported experiencing a mental illness within the 12 months preceding the study. The most prevalent mental health conditions identified were anxiety disorders, affecting 3.4 million people (17%); affective disorders, impacting 1.5 million (8%); and substance use disorders, which affected 650,000 people (3%).

While a subset of the population, the mental health of workers in the Australian mining industry is a critical concern due to the unique challenges faced by these workers, such as remote locations, long shifts, and physically demanding work. The male-dominated nature of the industry also contributes to mental health challenges, as prevalence rates of mental disorders can be significantly elevated in male-dominated industries such as mining.⁶⁶ Beyond the direct impact on the person affected, mental health issues also impact workforce productivity, leading to decreased efficiency, higher absenteeism, and increased turnover rates, resulting in substantial financial costs for employers.⁶⁷ Despite existing initiatives like employee

65 Australian Bureau of Statistics, *2020–2022 National Study of Mental Health and Wellbeing (NSMHWB)*, 2024

66 Roche et al, *Men, Work, and Mental Health: A Systematic Review of Depression in Male-dominated Industries and Occupations*, 2016

67 Bloom et al, *The Global Economic Burden of Non-communicable Diseases*, 2011



assistance programs, on-site counselling, and stress management workshops, more tailored mental health programs are needed.

Further research is required to quantify the effects of mental health issues on productivity and compensation claims within the mining industry. Such research would provide valuable data to guide investment in mental health initiatives by demonstrating the tangible benefits of these programs, including reduced compensation claims and improved productivity.

The MARS program has been effective in promoting mental health awareness in the industry. Expanding this program to include specific training on mental wellbeing and recovery is recommended to enable early intervention and equip workers with the skills to recognise and respond to mental distress. Integrating mental health awareness into existing safety training programs is crucial to creating a more holistic approach to worker well-being, emphasising that mental health is as important as physical safety.

AREA OF FOCUS

Research is required to quantify the effects of mental health issues on productivity and compensation claims within the mining industry.

AREA OF FOCUS

AUSMASA proposes to collaborate with other JSCs, especially HumanAbility, to investigate the appropriateness of current mental health training programs and packages for remote workers such as those in the mining industry.

First Nations employment and engagement

Aboriginal and Torres Strait Islander traditional custodians and communities are fundamental partners in mining and integral to the social and economic contribution that mining makes to Australia.

Government initiatives play a pivotal role in increasing the percentage of First Nations employees and ensuring social and cultural accountability. Programs such as the Indigenous Procurement Policy and the Indigenous Skills and Employment Program, have incentivised businesses to recruit and retain Indigenous Australians, thereby increasing employment in these sectors.

The 2023 Intergenerational Report highlights the importance of genuine engagement and collaboration with First Nations communities to attract First Nations Aboriginal people into the mining industry. This engagement should promote benefit sharing and respect of the land and water rights and interests of First Nations people and communities.⁶⁸

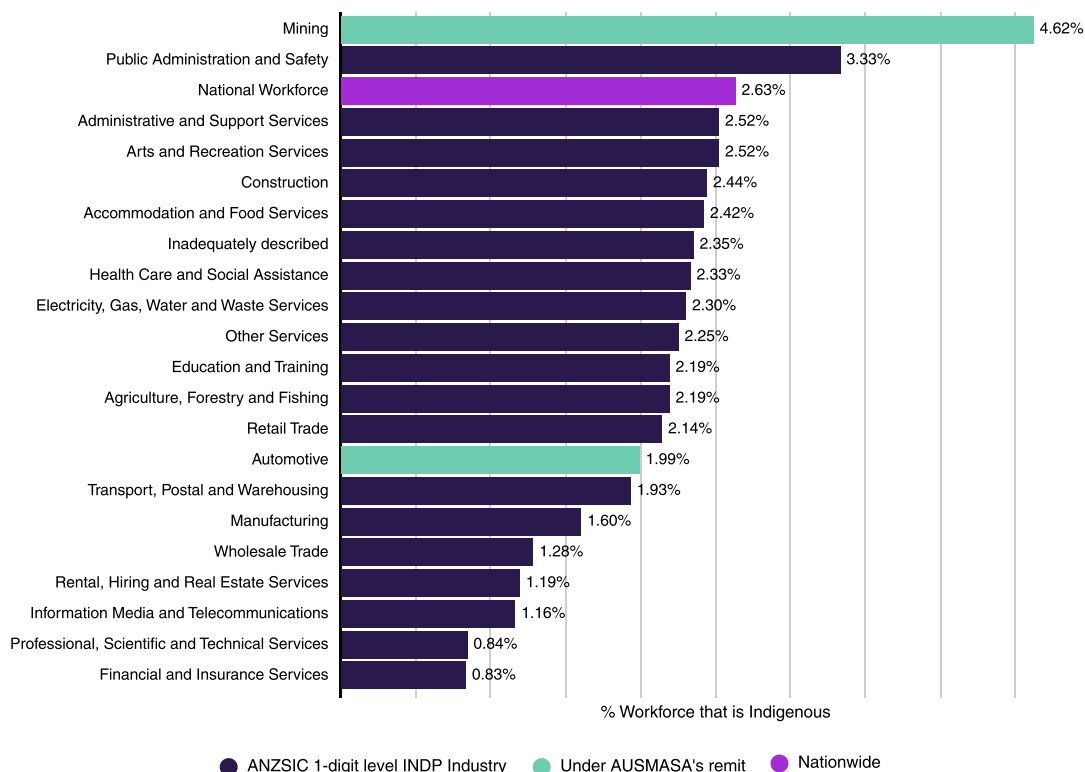
First Nations Australians accounted for 4.6% of the mining workforce, which was above the average of 2.6% for all industries

⁶⁸ The Australian Government. *Intergenerational Report 2023*. 2023.

According to 2021 census data, First Nations Australians accounted for 4.6% of the mining workforce, which was above the average of 2.6% for all industries.⁶⁹ The percentage of the mining workforce represented by First Nations employees has grown strongly, from 1.3% in 2011 to 3.8% in 2016.

As of March 2023, First Nations Australians represented 12.3% of all mining apprentices and trainees, which was higher than the all-industries average of 6.1%.⁷⁰ While such strong participation by First Nations peoples in the apprenticeship system is encouraging, it should be noted that First Nations completion rates within trade apprenticeship qualifications are significantly lower than non-Indigenous students, suggesting that additional mentoring and support ought to be implemented in order to boost completion rates.⁷¹

Figure 18: Proportion of Indigenous workforce by industry



Note: the proportion of the Automotive Industry has been calculated by averaging the 3-digit ANZSIC groups covering the industry. For the detail of the groups please refer to AUSMASA's Workforce Plan Backbone

Source: ABS Table Builder 2021 Census - employment, income and education

While the mining industry employs First Nations people at a higher rate as a proportion of its workforce than any other industry, it is important to note that many more First Nations Australians work in other sectors of the economy. Equally, given that the mining industry operates directly on the land of many First Nation peoples, it should be expected that their ability to share in employment opportunities is prioritised.

While mining companies have a growing track record of creating training and employment programs for First Nations communities, be that as part of direct mining operations or roles such as rangers, some

69 Australian Bureau of Statistics. 2021 Census - DataBuilder - Indigenous Employment by Industry. 2023.

70 NCVER. Apprentices and trainees 2023 - March quarter DataBuilder, Contract status, Employer industry 2-digit by Indigenous status, 12. 2023.

71 Jobs and Skills Australia. *First Nations People Workforce Analysis*. 2023.



miners are also in the process of including First Nations stakeholders at much more strategic stages of their operations.

One such example includes Rio Tinto's partnership with the Yinhawangka Aboriginal Corporation (YAC) in co-designing the Western Range mining project, which was Rio Tinto's first co-designed mine. YAC and Rio Tinto jointly developed a social and cultural heritage management plan, which outlines protocols for joint decision-making on environmental matters, mine planning and closure.⁷²

As discussed in the section on [mine closure and post-mine land use](#), there are significant training and employment opportunities for First Nations communities in this growing area of the mining life cycle. AUSMASA will continue to work closely with stakeholders to advance projects aimed at supporting the training of skills in this area.

AREA OF FOCUS

AUSMASA will continue to monitor First Nations training, apprenticeships, and job outcomes to identify best practices and assist in addressing the challenges faced by First Nations individuals in securing and thriving in mining careers. By analysing these outcomes, the industry will have the data it needs to implement targeted strategies and improve support.

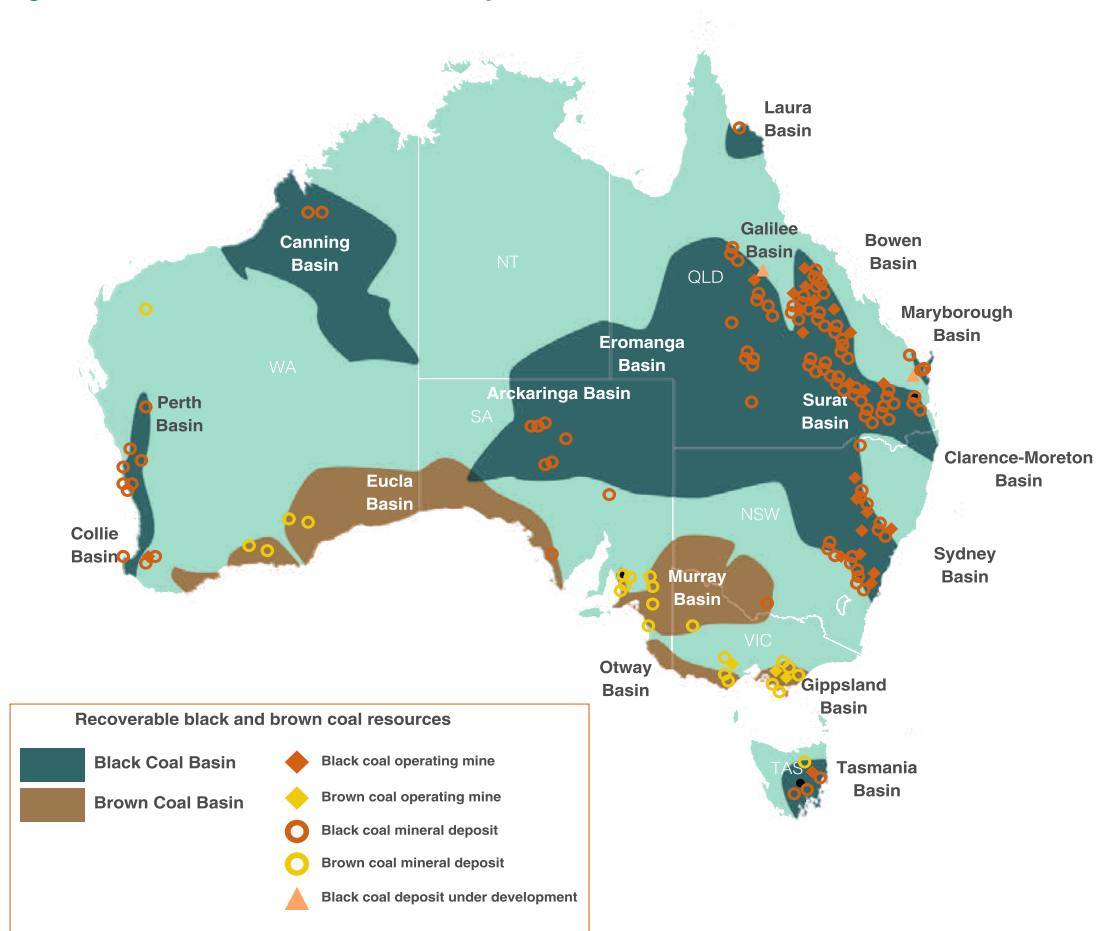
⁷² Yinhawangka Aboriginal Corporation. *Preserving Yinhawangka Culture*. 2024.

Coal mining overview

The mining and consumption of coal in Australia have been the foundation of the Australian economy for decades. The sector is a globally competitive industry, a major centre of regional employment and a key source of export income for the nation. Coal mining has, at some stage, occurred in all states across Australia⁷³ but is today concentrated in the Bowen-Surat basin of Queensland and the Hunter region of New South Wales. Locally important mining also occurs in Collie (Western Australia), the Illawarra region (New South Wales), the La Trobe Valley (Victoria) and Fingal (Tasmania). Across these regions, the Australian coal industry employs over 50,000 people and creates significant additional employment opportunities via its extensive regional supply chains.⁷⁴

The size and quality of Australia's coal resources have been key drivers of the industry's establishment and success. Australia is the fifth largest producer of coal in the world and contains the fourth largest resources of black coal in addition to the second largest brown coal resources.⁷⁵ Australian black coal is used predominately as (1) thermal coal, also called steaming coal, for electricity generation and (2) coking coal, also called metallurgical coal, in the iron and steel industries.⁷⁶

Figure 19: Australian coal mines and deposits



Source: Geoscience Australia. 2023b. Coal, 2024

73 Geoscience Australia, *Coal*, 19 April 2024.

74 Australian Bureau of Statistics, *Labour Force, Australia, Detailed*, released 25 January 2023.

75 Geoscience Australia, *Australia's Identified Mineral Resources*, March 2024.

76 Geoscience Australia, *Black Coal*, 19 December 2023.

Australia's thermal coal is renowned for its high energy content with low ash and sulphur and is a reliable source of energy in electricity markets across Asia. While the US and most European nations are moving away from thermal coal in accordance with their Paris climate agreements, this is being more than offset by rising thermal coal consumption in Asia and initial estimates indicate 2023 was another record year for world coal use.⁷⁷

Australia is also the world's leading exporter of metallurgical coal used in steel production. The steel industries of India, Japan, and South Korea all rely on Australian metallurgical coal for use in their blast furnaces. New technologies are being pioneered that use alternative reduction methods to smelt iron ore, but these are still in the early development stages. Metallurgical coal is expected to be in high demand in Australia's current markets for some time to come.

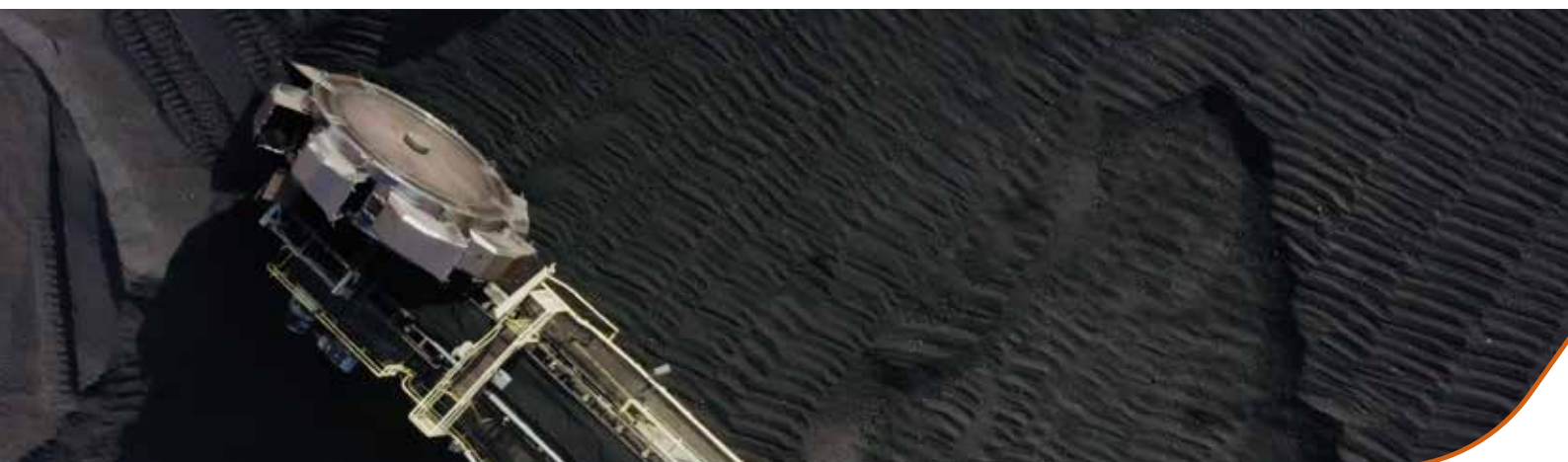
Australia's coal industry is primarily export-focused, and coal was our largest mineral or energy commodity export up until 2009–10, when rising iron ore demand from China had it claim the top spot in Australia's exports. In 2022–23, coal reclaimed the title of largest export in Australia with a record-high export revenue of \$127 billion. This strong earnings result came despite export volumes for both metallurgical and thermal coal falling to their lowest levels since 2012–13. The surge in global energy prices and limited availability of metallurgical coal due to restrictions on supplies from Russia pushed coal prices to all-time high levels. Prices have since moderated but remain at historically high levels that are supporting a rebound in investment. Several new mines are now under development or scheduled to re-start, which will provide increased job opportunities in major coal-producing regions.

In **2022–23**, coal reclaimed the title of largest export in Australia with a record-high export revenue of **\$127 billion**

Australian metallurgical coal production and exports have been constrained in recent years by bad weather and logistical problems. Demand factors also played a role, including relatively soft steel production among some regional importers, and sustained low exports to China even following the removal of trade restrictions. Australian thermal coal exports finished 2023 on a strong note, with 18.9 Mt exported in December. This is the highest monthly total since July 2021 and suggests that disruptions to coal mining and transport infrastructure have been largely resolved.⁷⁸

⁷⁷ International Energy Agency, *Coal 2023*, released 15 December 2023.

⁷⁸ Department of Industry, Innovation and Science, *Resources and Energy Quarterly: March 2024*, released 28 March 2024.



Coal mining workforce demographics insights

Figure 20: Coal mining workforce demographics insights

50,400

Workforce Numbers
4 quarter average

15%

Female %

41

Median Age

8%

Age 25 or Younger

7%

Age 60 +

56%

VET Qualified

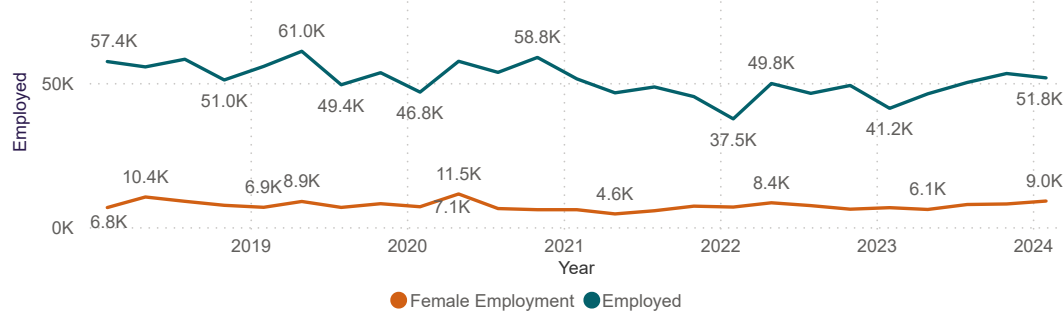
15%

Bachelor or Above

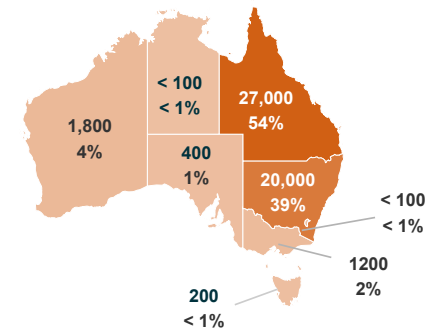
5%

First Nations

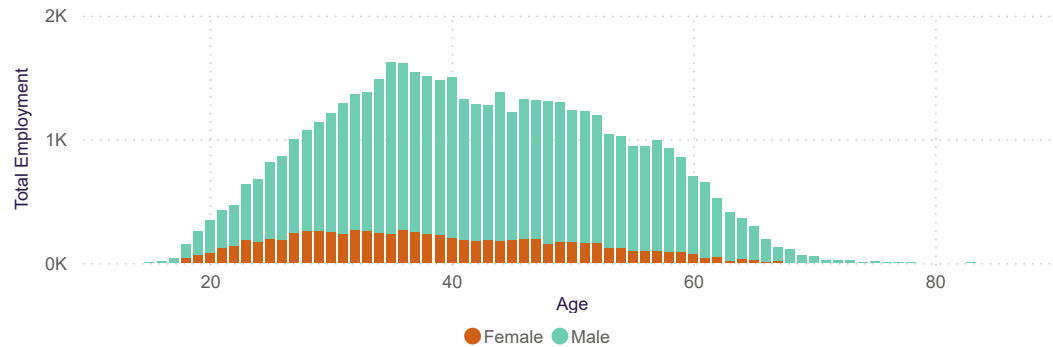
(a) Total Workforce Numbers 2018 - 2024 by Quarter



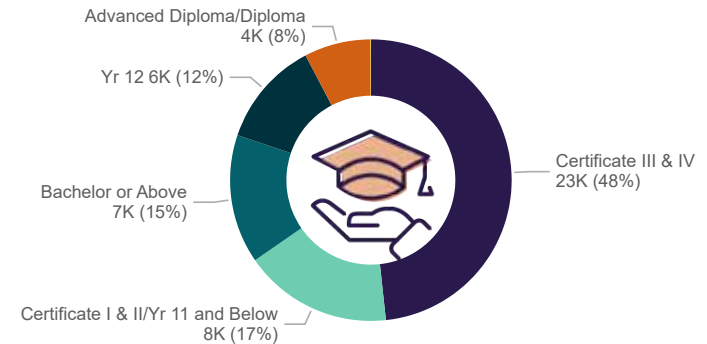
(b) Total Workforce by State/Territory, 4 quarter average



(c) Age Distribution of the Workforce



(d) Education Level of the Workforce

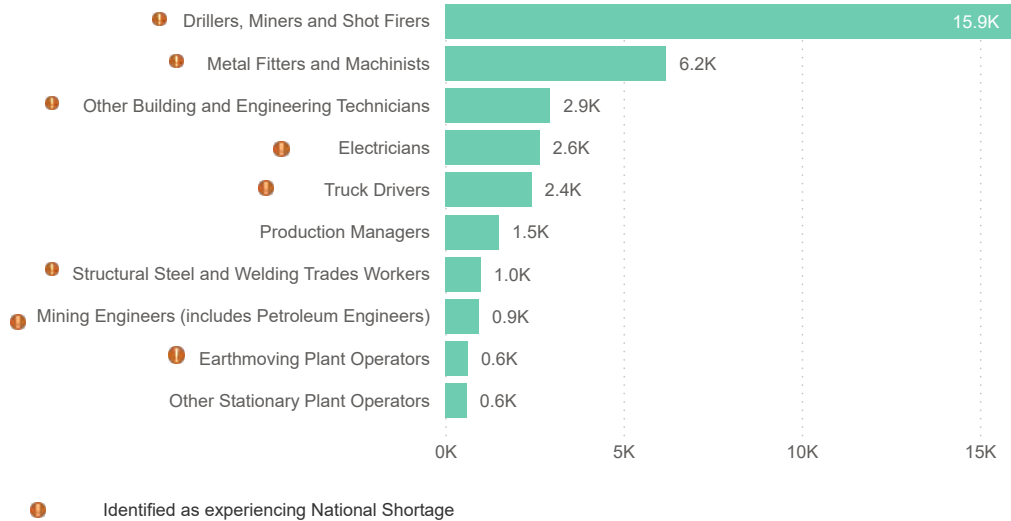


Sources: (top row) Workforce Numbers and Female %: ABS Detailed Labour Force Survey (Table EQ06, Four-Quarter Average), May 2023 - February 2024 | Median Age, Age 25 or Younger, Age 60+, VET Qualified, Bachelor or Above and First Nations: ABS Table Builder 2021 Census - counting persons, 15 years and over by 2-digit level INDP Industry of Employment (a) ABS Detailed Labour Force Survey (Table EQ06, Original), Reference Period: February 2024 (b) ABS Detailed Labour Force Survey (Table EQ06, 4-quarter Average), Reference Period: February 2024 (c) Census of Population and Housing (AGEP Age and SEX Sex), 2021, TableBuilder (d) Census of Population and Housing (HEAP Level of Highest Educational Attainment), 2021, TableBuilder. **Notes:** Workforce Numbers are rounded to the nearest 100.

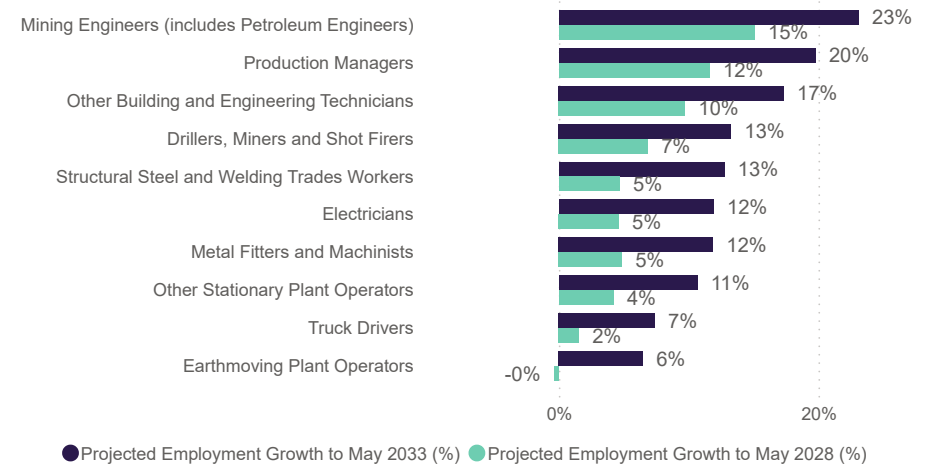
Coal mining workforce occupations and VET qualification insights

Figure 21: Coal mining workforce occupations and VET qual insights

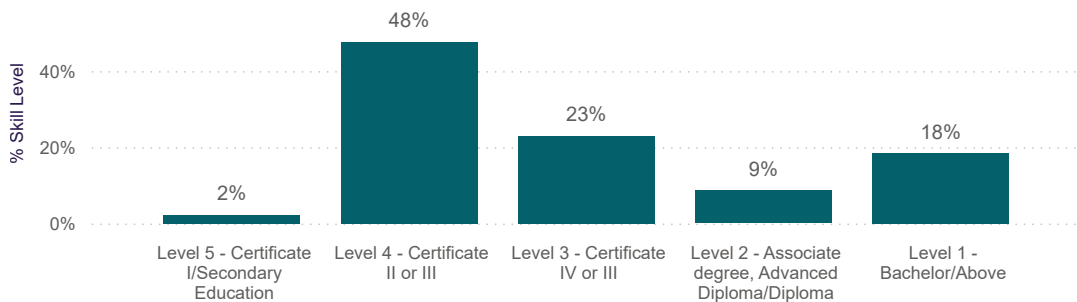
(e) Top 10 ANZSCO Occupations by Workforce Numbers



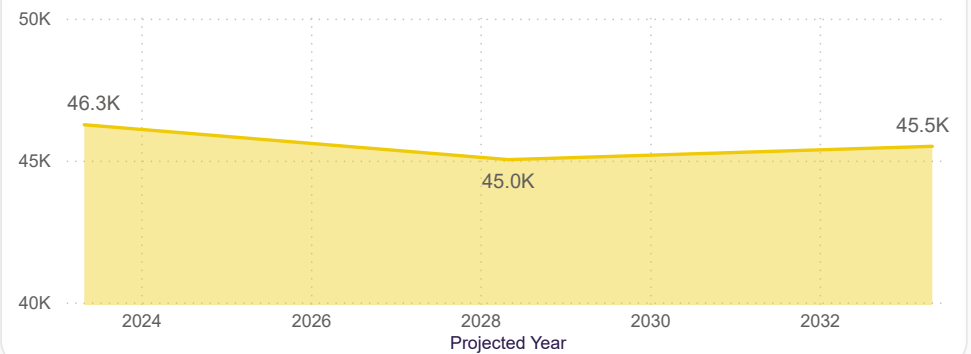
(f) Employment Projections by ANZSCO Occupations



(g) Coal Mining Workforce Occupation Skill Level Commensurate with



(h) Employment Projections of Coal Mining

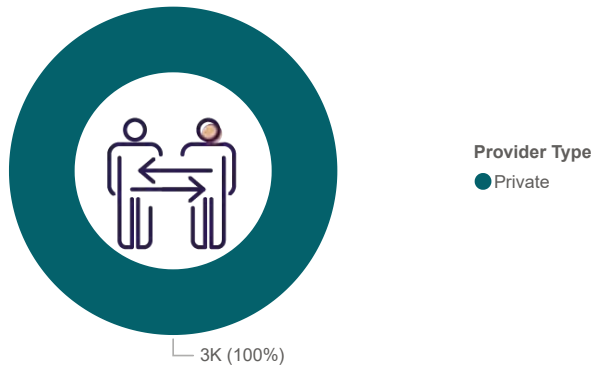


Sources: (e) ABS Table Builder 2021 Census - INDP Industry of Employment, OCCP Occupation | JSA Skills Priority List 2023. 4-dig SPL(ANZSCO 2013) (f) Employment Projections produced by VU for JSA (May 2023 to May 2033) (g) ABS Table Builder 2021 Census - employment, income and education (OCSKP Occupation Skill Level by INDP Industry of Employment) (h) Employment Projections produced by VU for JSA (May 2023 to May 2033)

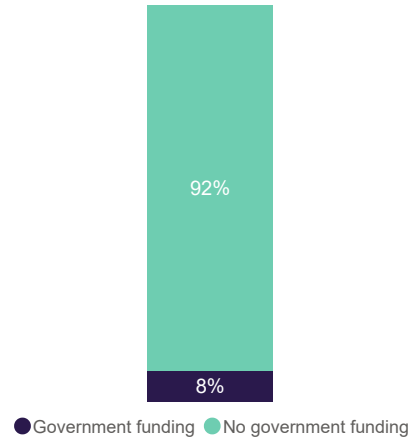
Coal mining workforce RII training package insights

Figure 22: Coal mining workforce RII training package insights

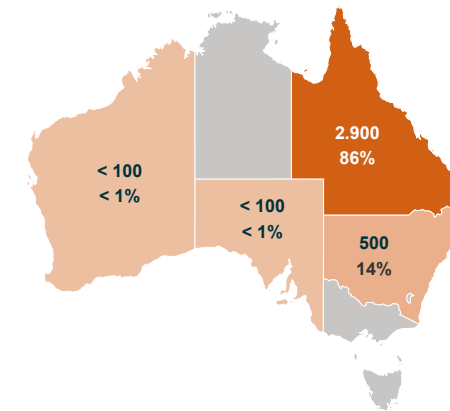
(i) Enrolments by Type of Training Providers



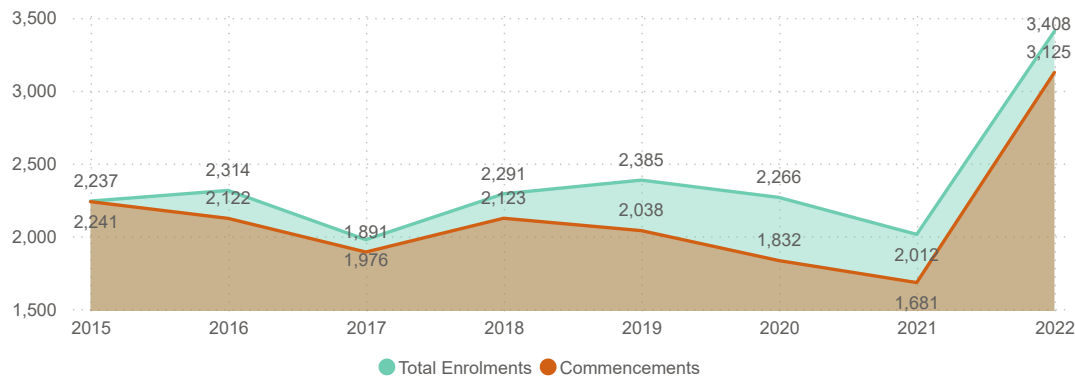
(j) Enrolments by Funding Sources



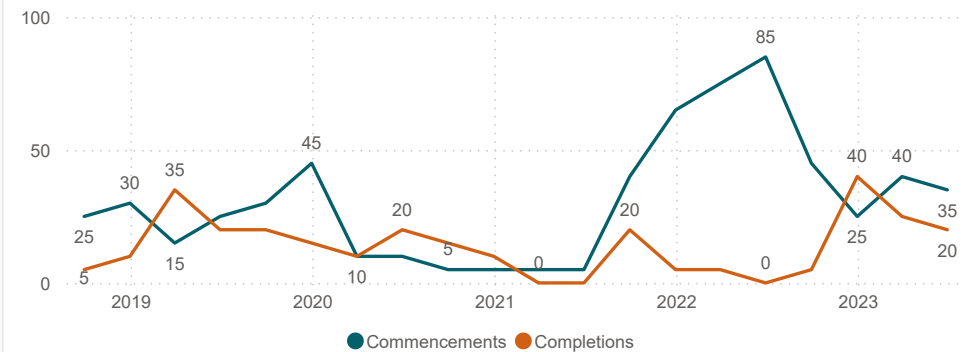
(k) Training Program Delivery Location



(l) RII Coal Mining Annual Enrolments and Commencements



(m) RII Coal Mining Apprentices and Trainees Commencements and Completions by Quarter



Sources: (i) NCVER. 2023. TVA program enrolments 2022 (VOCSTATS). Adelaide (j) NCVER. 2023. TVA program enrolments 2022 (VOCSTATS). Adelaide (k) NCVER. 2023. TVA program enrolments 2022 (VOCSTATS). Adelaide (l) NCVER. 2023. TVA program enrolments 2015-2022 (VOCSTATS). Adelaide, December (m) NCVER. 2023. Apprentices and trainees, Sep 2018 - Jun 2023 (VOCSTATS). Adelaide **Note:** Figure (m) Apprentices and Trainees commencements and completions are rounded to nearest 5. Figure (k) The enrolments are rounded to nearest 100.

Coal mining workforce demographics

Australia's coal mining workforce is heavily concentrated in Queensland (54% of all workers) and New South Wales (39% of all workers), [Figure 20 \(b\)](#). ABS Labour Force data shows that the workforce is concentrated close to where coal reserves are located, which creates a large regional workforce.⁷⁹ The biggest regional concentrations of coal mining employment in 2021 (using census data) were in Mackay–Isaac–Whitsunday at 13,335 (up 3,380 (34.0%) from 2016), Hunter Valley at 10,056 (up 1,232 (14.0%)) and Central Queensland at 7,349 (up 679 (10.2%)).⁸⁰

In such cases, coal mining becomes an important part of the social and economic fabric of local communities, with many families boasting multiple generations of coal workers. This establishment of close-knit communities near the mines themselves sets coal mining apart from most of Western Australia's metal ore mining operations, which are largely reliant on a fly-in fly-out (FIFO) workforce.

While the community cohesion created by coal mining has many positive aspects, it can make the impacts associated with mine closures more acute, as taking up similar mining roles with other organisations could well mean relocating to another community or state.

Not unlike other mining industry sectors, the coal mining workforce is being impacted by significant skills shortages. Of the industry's top 10 occupations, 8 have been identified by the 2023 Skills Priority List as experiencing a shortage, which includes all top 5 occupations, [Figure 20 \(e\)](#).⁸¹ Each of the top five occupations is showing job vacancy levels significantly higher than in the pre-COVID period.⁸² Based on JSA employment projections, these occupations are projected to grow over the coming years, adding further pressure on the industry and a workforce already experiencing unmet demand.⁸³

The coal mining workforce underperforms when compared to other mining sectors in relation to female participation, with only 15% of its workforce represented by women, compared to 25% of the non-metallic mineral mining and quarrying workforce, 24% of the metal ore workforce and 21% of the exploration and other mining support services workforce, [Figure 23](#) and [26](#).

79 Australian Bureau of Statistics. February 2024 - *Labour Force, Australia, Detailed* - 'Table EQ06 - 4-quarter average'.

80 Gilfillan, Geoff. 2023. *Employment trends in coal mining and the renewable energy sector*. Canberra: Parliament of Australia.

81 Jobs and Skills Australia. *'Skills Priority List'*. 2023

82 Jobs and Skills Australia. *Internet Vacancy Index*, ANZSCO4 Occupations, States and Territories - Feb 2024(4-quarter average).2024.

83 Jobs and Skills Australia. *'Employment Projections'*. 2023





Addressing this underperformance represents a significant opportunity for the coal industry to address its ongoing skills shortages and harness the proven benefits of having a diverse workforce. The mining industry's performance in relation to greater female participation is explored more deeply in the [diversified workforce](#) section of this plan.

One challenge for the coal industry, which is not dissimilar to other mining sectors, is the low proportion of the workforce that is represented by younger workers (Generation Z, aged 25 or below). [Figure 20](#) shows that the coal workforce is comprised of 8% younger workers and 7% older workers (aged 60+). In the case of coal mining, given that the total projected workforce over the coming 10 years is projected to remain largely steady, this equilibrium between new entrants and likely retirements may not cause as big an issue as is posed for other mining sectors, [Figure 21 \(h\)](#).

The coal industry's strong reliance on VET qualifications is not dissimilar to other sectors within the mining industry. The way vocational training is delivered in support of the industry is unique. [Figure 22](#) shows 100% of current vocational training related to coal-specific qualifications is conducted by private RTOs, with the vast majority (92%) being delivered under fee-for-service arrangements as opposed to government-funded initiatives. Despite the coal workforce being strongly represented in both Queensland and New South Wales, 86% of coal-specific VET enrolments were in Queensland versus only 13.5% in New South Wales. This discrepancy may be linked to different funding approaches for RII training in each state or licensing requirements and an area of focus for AUSMASA to further explore.

Coal mining key workforce drivers

The use of coal as an energy source has long been linked to rising global temperatures, with nations globally pivoting to the use of viable alternatives. A 2021 study suggested that for the world to avoid exceeding an increase in global temperatures of 1.5 degrees Celsius, 95% of Australia's coal reserves would need to stay in the ground.⁸⁴

Consequently, Australia's coal industry and workforces will come under increasing pressure as the world acts to meet climate change targets. For example, the International Energy Agency's Net Zero by 2050 Roadmap calls for no additional final investment decisions for new unabated coal plants, for the least efficient coal plants to be phased out by 2030, and to retrofit the remaining coal plants still in use by 2040.⁸⁵

84 Dan Welsby, James Price, Steven Pye and Paul Ekins. 2021. 'Unextractable Fossil Fuels in a 1.5°C world'. Nature 597.

85 International Energy Agency, [Net Zero by 2050 - A Roadmap for the Global Energy Sector](#), released May 21.

Transitioning away from coal is complex and will take time. As the concept of a 'just transition' takes hold in the global community, greater consideration will be given to those impacted by the transition the most. Closing coal mines affects not only mine workers but also workers in related sectors and entire communities in coal-dependent regions. Crucially, many developing countries face energy shortages that disproportionately impact the poor, hindering the transition to clean energy and the phasing out of coal.⁸⁶ Consequently, the supply and demand dynamics for coal is uncertain. Australia is not immune from these dynamics, and our workforce and regional community challenges will require careful management through government policy and planning. Ensuring this skilled workforce is not lost and properly supported to transition to other productive parts of the economy will be a priority.

In the near term, the transition away from Australian coal-fired power stations in support of the move to a decarbonised future will have a direct impact on coal mines located close to such power stations, where the primary purpose is to supply coal for local consumption.

The Australian Government, and state and territory governments, are investing significant funds in helping communities affected by such transformation to transition to new jobs within the clean energy sector. Such initiatives will still require a large-scale re-skilling effort, with new jobs likely requiring significantly more complex and digital skills.

For those workers who are unable or unwilling to reskill and transition to new job roles, similar roles are available within other mining operations. This would undoubtedly require workers to move to the jurisdictions or metropolitan hubs from which FIFO operations are staged. In many instances, such a move would be a significant barrier, with a close connection to the community and the cost of relocation and housing in alternate locations being key factors.

The pending closure of Western Australia's Collie coal-fired power stations is a prime example of such a pending workforce transformation challenge. After the state government announced that all coal-fired power stations would be shut down by 2029, several initiatives were set in motion. The government, recognising that the move away from coal would impact upwards of 1,200 workers, announced \$200 million for the Collie Industrial Transition Fund to attract new projects and industries and \$47.8 million for training initiatives to assist with the local workforce's transition.⁸⁷

⁸⁶ The World Bank, *For a Just Transition Away from Coal, People Must Be at the Centre*, November 2021.

⁸⁷ Sam Bold, Georgia Loney and Anthony Pancia. *Collie Residents React as Western Australia Gives Deadline for Coal-Fired Power Plants*. 2022



Other coal-fired power stations that are slated for closure, with a corresponding impact on coal mines that currently supply them, include Eraring Power Station (New South Wales – August 2025), Callide B Power Station (Queensland – 2028), Yallourn W Power Station (Victoria – 2028) and Vales Point B (New South Wales – 2033).⁸⁸

Over the longer term, as key export markets such as China move towards non-coal energy generation, the thermal coal market will be impacted more severely. This would create a much larger displacement of coal miners.

With the surging demand for [critical minerals](#), such as lithium, there would likely be opportunities for such workforces to be retrained and re-engaged in areas of demand.⁸⁹ Given metallurgical coal's key role in the production of steel, the transition away from it will be more gradual. Research into alternative steel-producing technologies and techniques that do not require the use of metallurgical coal is ongoing, with the impact of such not likely to take place until the 2030s.⁹⁰

With the surging demand for critical minerals, such as lithium, there would likely be opportunities for such workforces to be retrained and re-engaged in areas of demand

AREA OF FOCUS

The VET sector must be ready and responsive to the future transformation of the coal industry workforce. AUSMASA will work closely with the industry to ensure that innovative and engaging training programs are available.

88 Australian Energy Regulator. *State of the energy market 2023*. 2023.

89 Australian Industry Energy Transitions Initiative. *Skilling Australian industry for the energy transition*. 2023.

90 John Quiggin. *Getting Off Coal - Economic and Social Policies to Manage the Phase-out of Thermal Coal in Australia*. 2020





Metal ore mining overview

Australia's rich and varied minerals endowment has attracted significant exploration and mining investment which has made Australia a world leader in mining technology, geoscience, and sustainable mining practices.

Australia has one of the most diverse metal ore production profiles in the world. Almost every major mineral is produced somewhere – iron ore in the Pilbara, tin in Tasmania, copper in South Australia and antimony in Victoria. This output is primarily export focused and just a small percentage of the mineral production remains in Australia for domestic consumption. Of the 900 million tonnes (Mt) of iron ore produced in Australia last year, over 99% was exported to our trading partners in China, Japan, and South Korea.⁹¹ As a result, Australia is one of the world's largest producers of mineral and metal commodities in the world.⁹²

The scale of Australia's metal ore mining sector cannot be overstated. In a single year the iron ore industry alone extracts, processes, and ships 4 times more rock than the entire Panama Canal construction project. While geological potential is an important part of the industry's success, such feats would not be possible but for a highly skilled workforce.

One approach to managing the recruitment challenges facing the sector has been the rise of remote or automated transportation. Such systems have deployed many cutting-edge technologies to allow haulage trucks and trains in the Pilbara to be remotely managed by operators in control rooms located in Perth. Such innovations not only support increased productivity but create new opportunities for more workforce diversity.

Australia is undoubtedly the world leader in metal ore mining and demand for the iron ore, gold, bauxite and copper we produce is unlikely to abate. The broad consensus is that even greater demand will be driven by the rising incomes of highly populated emerging economies, energy transition, and the drive for even faster, yet smaller, computing technology.

Australia's challenge is to remain competitive with the growing number of mining jurisdictions around the world that benefit from low-cost labour in building and running mining operations.

While Australia's iron ore, bauxite and more recently, lithium sectors have surged, our copper, nickel and zinc production have not grown or is lower today than they were 20 years ago, [Table 1](#).⁹³ With lower prices further challenging the viability of these key sectors within metal ore mining,

91 Department of Industry, Innovation and Science, *Resources and Energy Quarterly: December 2023*, released 18 December 2023.

92 Geoscience Australia, *Australian mineral facts*, last updated 19 April 2024

93 Geoscience Australia, *Australian Resource Reviews*, last updated 19 December 2023.

Australia needs to focus on boosting its competitiveness for mining investment through innovation and supplying a highly skilled workforce that can productively employ the latest mining technology.

The metal ore mining sector also covers the mining of mineral sands (referred to as rare Earth elements), such as ilmenite, zircon and rutile, each of which has important industrial applications such as in the production of permanent magnets utilised in wind turbines.⁹⁴

While mineral sands reserves occur in every state and the Northern Territory, most operating mines are located in Western Australia (11), followed by New South Wales (2), the Northern Territory (1) and South Australia (1).⁹⁵

Table 1: Australian commodity production

Commodity	Unit	2002-03	2012-13	2022-23	20-Year Growth	
Bauxite	Mt	54	79	99	81%	▲
Copper	kt	884	971	808	-9%	▼
Gold	t	276	245	301	9%	▲
Iron Ore	Mt	199	555	957	382%	▲
Lead	kt	695	639	516	-26%	▼
Lithium (Ore)	kt	-	417	3,088	n/a	▲
Nickel	kt	209	302	150	-27%	▼
Silver	t	1,894	1,696	1,119	-41%	▼
Tin	t	6,222	6,637	8,643	39%	▲
Uranium	t	9,172	8,954	5,409	-41%	▼
Zinc	kt	1,499	1,468	1,165	-22%	▼

Source: Department of Industry, Science and Resources, *Resources and Energy Quarterly – December 2023*. Units – Mt, megatonne; kt, kilotonne; t, tonnes

94 Resources Victoria. *Mineral Sands Exploration in Victoria*. 2022

95 Geoscience Australia. *Australian Operating Mines Map Data 2023*. 2023



Metal ore mining demographic insights

Figure 23: Metal ore mining demographic insights

143,300

Workforce Numbers
4 quarter average

24%

Female %

40

Median Age

8%

Age 25 or Younger

8%

Age 60 +

47%

VET Qualified

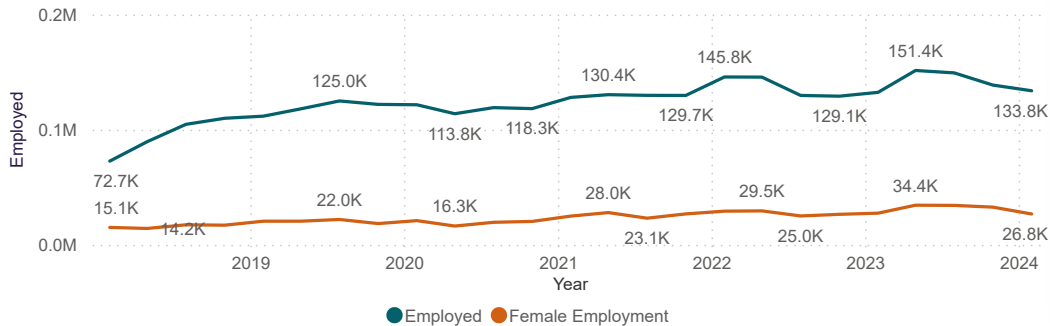
26%

Bachelor or Above

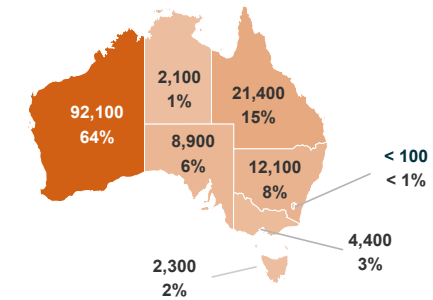
5%

First Nations

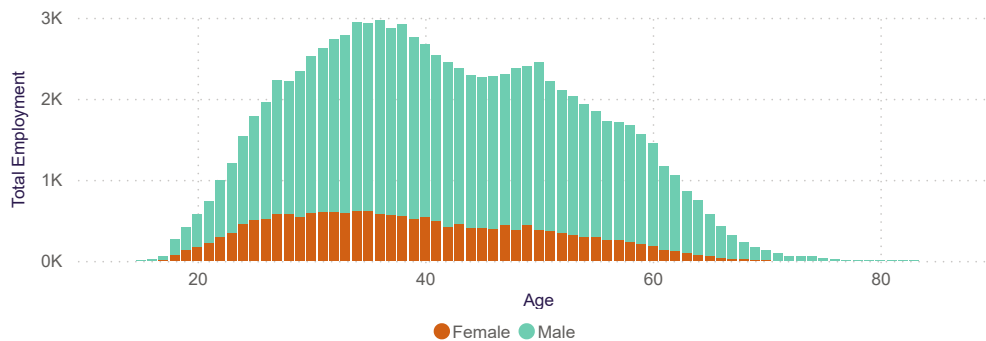
(a) Total Workforce Numbers 2018 - 2024 by Quarter



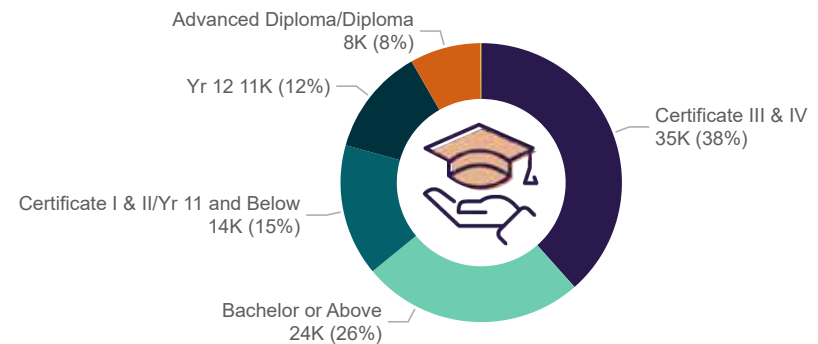
(b) Total Workforce by State/Territory, 4 quarter average



(c) Age Distribution of the Workforce



(d) Education Level of the Workforce

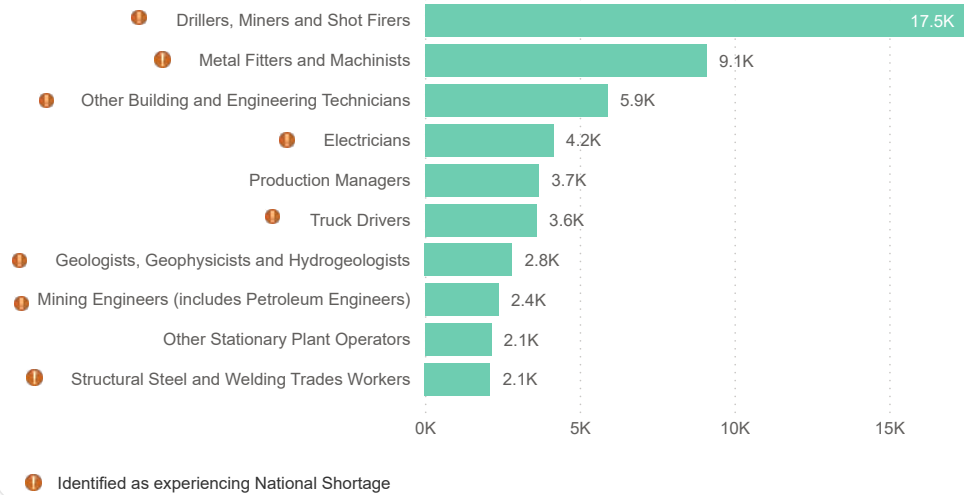


Sources: (top row) Workforce Numbers and Female %: ABS Detailed Labour Force Survey (Table EQ06, Four-Quarter Average), May 2023 - February 2024 | Median Age, Age 25 or Younger, Age 60+, VET Qualified, Bachelor or Above and First Nations: ABS Table Builder 2021 Census - counting persons, 15 years and over by 2-digit level INDP Industry of Employment (a) ABS Detailed Labour Force Survey (Table EQ06, Original), Reference Period: February 2024 (b) ABS Detailed Labour Force Survey (Table EQ06, 4-quarter Average), Reference Period: February 2024 (c) Census of Population and Housing (AGEP Age and SEX Sex), 2021, TableBuilder (d) Census of Population and Housing (HEAP Level of Highest Educational Attainment), 2021, TableBuilder **Notes:** Workforce Numbers are rounded to the nearest 100.

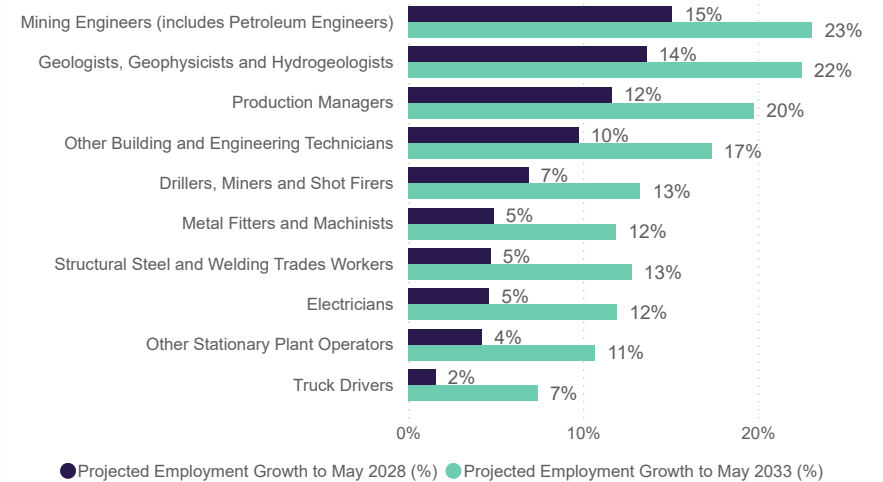
Metal ore mining occupation insights

Figure 24: Metal ore mining occupation insights

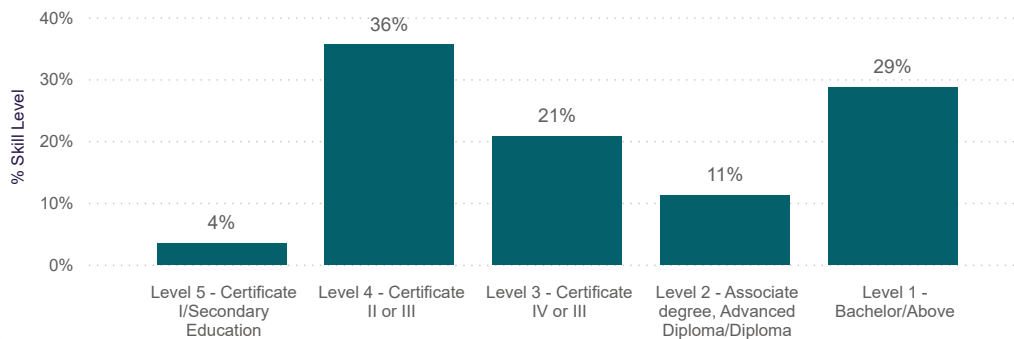
(e) Top 10 ANZSCO Occupations by Workforce Numbers



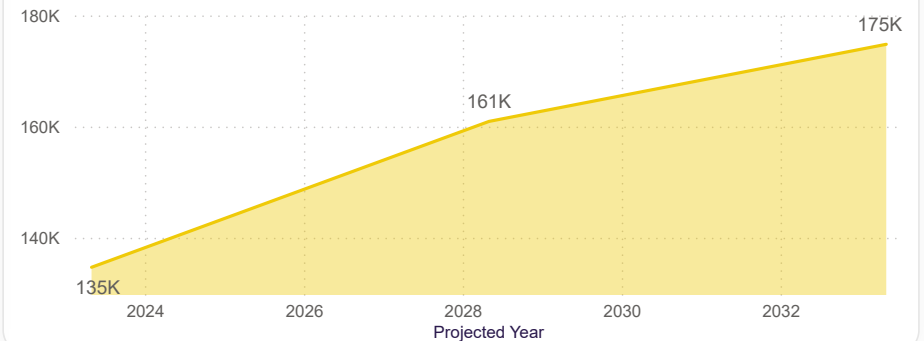
(f) Employment Projections by ANZSCO Occupations



(g) Metal Ore Mining Workforce Occupation Skill Level Commensurate with



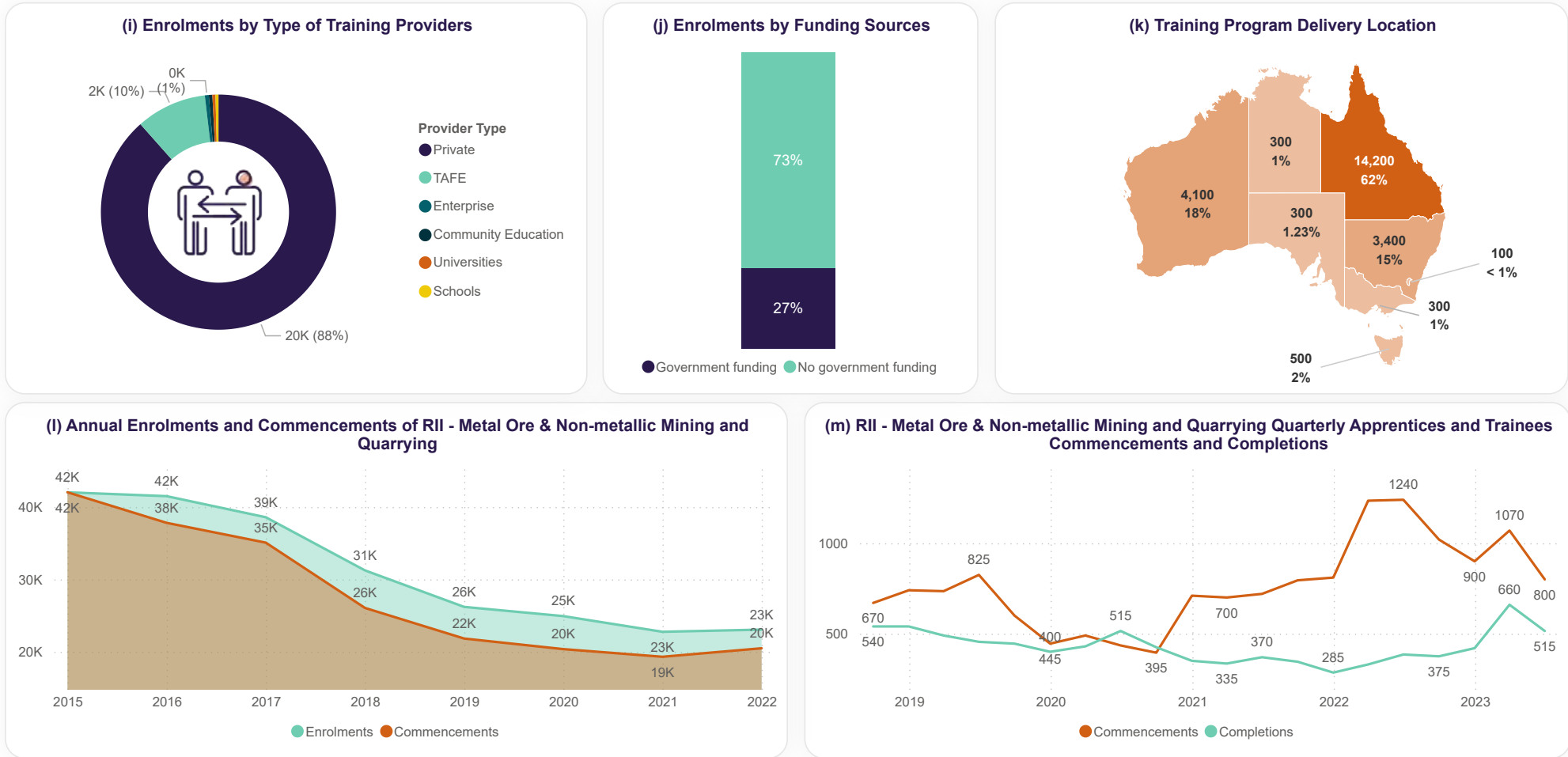
(h) Employment Projections of Metal Ore Mining



Sources: (e) ABS Table Builder 2021 Census - INDP Industry of Employment, OCCP Occupation | JSA Skills Priority List 2023. 4-dig SPL(ANZSCO 2013) (f) Employment Projections produced by VU for JSA (May 2023 to May 2033) (g) ABS Table Builder 2021 Census - employment, income and education (OCSKP Occupation Skill Level by INDP Industry of Employment) (h) Employment Projections produced by VU for JSA (May 2023 to May 2033)

Metal ore mining RII metal ore & non-metallic mining and quarrying training package insights

Figure 25: Metal ore mining RII metal ore & non-metallic mining and quarrying training package insights



Sources: (i) NCVER. 2023. TVA program enrolments 2022 (VOCSTATS). Adelaide (j) NCVER. 2023. TVA program enrolments 2022 (VOCSTATS). Adelaide (k) NCVER. 2023. TVA program enrolments 2022 (VOCSTATS). Adelaide (l) NCVER. 2023. TVA program enrolments 2015-2022 (VOCSTATS). Adelaide, December (m) NCVER. 2023. Apprentices and trainees, Sep 2018 - Jun 2023 (VOCSTATS). Adelaide **Note:** Figure (m) Apprentices and Trainees commencements and completions are rounded to nearest 5. 2. Figure (k) The enrolments are rounded to nearest 100.

Metal ore mining workforce demographics

The metal ore mining workforce has grown steadily, lifting from 94,200 (four-quarter average from February 2018 to November 2018) in 2018 to 143,300 in 2024, [Figure 23 \(a\)](#). This growth is not expected to abate, with JSA employment projection data pointing to a workforce size of 175,000 by 2032.⁹⁶

This growth will be challenged by the existing skills shortages in the current workforce, highlighted by the fact that 8 out of the top 10 occupations by worker numbers in the sector are shown as experiencing skills shortages as reported by the 2023 Skills Priority List, [Figure 24 \(e\)](#).⁹⁷ These same 8 occupations are showing job vacancy rates significantly higher than pre-COVID levels.⁹⁸

Metal ore mining occurs in all states and the Northern Territory. Several mining hubs have organically developed over time to take advantage of geologically rich areas— such as the Pilbara, Kalgoorlie gold fields, and Mt Isa region - and have underpinned much of the rise in demand for a skilled workforce.

Western Australia has the largest metal ore workforce, representing 64% of the industry. Queensland has almost 15% of the workforce, followed by New South Wales with just over 8%, [Figure 23 \(b\)](#).

The majority of metal ore mining takes place far from major cities and often in challenging environmental conditions characterised by extreme heat and remoteness. This is particularly the case for metal ore mining in Western Australia. To address these issues, the industry has focused on fly-in fly-out (FIFO) operations, drawing most of its workforce from the greater Perth metropolitan area and from the eastern seaboard.

FIFO has boosted the availability of workers and skills at remote mine sites and created a more mobile workforce capable of more easily transitioning from one site to another to meet changes in labour demand. It has also created a new set of social and health issues. In a 2018 study for the Western Australian Mental Health Commission, the Centre for Transformative Work Design found there was a greater risk of mental ill health among workers operating under FIFO arrangements, with one-third of the 3,000 FIFO workers surveyed experiencing high or very high levels of psychological distress.⁹⁹

⁹⁶ Jobs and Skills Australia. *'Employment Projections'*. 2023

⁹⁷ Jobs and Skills Australia. *'Skills Priority List'*. 2023

⁹⁸ Jobs and Skills Australia. *'Internet Vacancy Index'*, ANZSCO4 Occupations, States and Territories – Feb 2024(4-quarter average).2024

⁹⁹ Centre for Transformative Work Design, *'Impact of FIFO work arrangements on the mental health and wellbeing of FIFO workers'*, A report for the WA Mental Health Commission, released September 2018.





Women currently make up around one-quarter (24%) of the total metal ore mining workforce. While this represents a steady improvement in female participation, it is accepted that more needs to be done to not only attract but also support a more diverse workforce. The mining industry's performance in relation to greater female participation is explored more deeply in the [diversified workforce](#) section of this plan.

One challenge for the metal ore sector, which is not dissimilar to other mining sectors, is the low proportion of the workforce that is represented by younger workers (Generation Z, aged 25 or below). [Figure 24](#) shows the metal ore workforce is comprised of 8% younger workers and 8% older workers (aged 60+). Given the projected growth that is forecast for this sector, the ability of the industry to attract more young workers to offset pending retirements and meet additional demand will be critical. The challenges of attracting new entrants to the mining industry are explored in greater detail in the [community perceptions of the mining industry](#) section of this plan.

While the metal ore mining sector is strongly reliant on VET-based qualifications (with 47% of its workforce VET qualified) the distribution of enrolments for relevant RII qualifications does not mirror the workforce distribution across states. While Western Australia has the largest proportion of the workforce (64%), it only accounts for 17.7% of RII enrolments, whereas Queensland (with almost 15% of the workforce) has 61.5% of RII enrolments. This discrepancy may be linked to different funding approaches for RII training in each state, something which will be an area of focus for AUSMASA to further explore. Across the sector, almost 90% of VET training is conducted by private RTOs, with only 27% of training benefiting from government funding to support it, [Figure 25 \(i and j\)](#).

Overall, commencements and enrolments in key RII qualifications that support the metal ore sector have been steadily decreasing since 2015, when over 42,000 students commenced and were actively enrolled. By 2022, the enrolled student population had dropped by almost half to 23,000, [Figure 25 \(i\)](#). This may become problematic as lower commencements and enrolments can lead to lower completions, as the pool of new and existing students available is reduced.

AREA OF FOCUS

AUSMASA will conduct further research into both the unequal geographical distribution and the longer-term decline of RII qualification enrolments within the metal ore mining sector.

Metal ore mining key workforce drivers

The focus on emissions targets, renewable energy, critical minerals, and low-emission technologies will not only change how and what is mined but also how it is processed, transported, and exported.

Evolving technologies are changing the type of resources required by the mining industry. One example, the adoption of EVs, has led to a surge in global demand for lithium, a key component in Lithium-ion batteries. Increasing demand for EVs, and by extension, the minerals that make them possible is a key focus of the National Electric Vehicle Strategy.¹⁰⁰ The growing demand for lithium-ion battery technologies implies that technological advancements in lithium extraction and processing are imperative.

The global drive towards renewable technologies is creating a surge in demand for the minerals that make such a world possible. According to research by the Minerals Council of Australia, more than 260 new lithium, cobalt, nickel, and copper mines will be required globally by 2030 if the world is to meet global demand for mineral-intensive EVs and energy storage batteries.¹⁰¹

Analysis from the International Energy Agency of major mines that came online between 2010 and 2019 shows that it took on average over 16 years to develop projects from discovery to first production, although the exact duration varies by mineral, location and mine type. It took more than 12 years to complete exploration and feasibility studies, and 4-5 years for the construction phase. These long lead times raise questions about the ability of supply to ramp up output if demand were to pick up rapidly.¹⁰² This positions critical minerals as a key demand driver for increased access to a skilled workforce, among other things, to realise this potential.

Finally, as evidenced by the changing nature of technological applications within mining and the nature of global competition in this space, it is imperative that the mining industry and its workforce be highly efficient. As part of the [national economic settings section](#) of this workforce plan, Australia's declining productivity levels have already been flagged. The ongoing investment in training and adoption of new technologies will be key for the mining industry to remain competitive.

Critical Minerals

Critical minerals will play a significant role in Australia's achievement of its environmental strategic and economic diversification objectives. The Department of Industry, Resources and Science (DISR) describes critical minerals as 'essential to our modern technologies, economies and national security, and whose supply chains are vulnerable to disruption'.¹⁰³ DISR maintains a list of critical minerals, deciding which minerals to include based on global technology needs, particularly for emission reduction, advanced manufacturing, and defence.

more than **260** new lithium, cobalt, nickel, and copper mines will be required globally by **2030** if the world is to meet global demand for mineral-intensive EVs and energy storage batteries

¹⁰⁰ Department of Climate Change, Energy, the Environment and Water. *National Electric Vehicle Strategy*. 2023.

¹⁰¹ Minerals Council of Australia. *Future Critical: Meeting the Minerals Investment Challenge*. 2023.

¹⁰² International Energy Agency. *The Role of Critical Minerals in Clean Energy Transitions - Reliable supply of minerals*. March 2022

¹⁰³ Department of Industry, Science and Resources. *Critical Minerals Strategy 2023–2030*. 2023.

The global demand for critical minerals has further highlighted the challenges that Australian miners face when competing against miners from other countries. Indonesia, for example, has invested heavily in its ability to mine and process large volumes of nickel at prices significantly lower than Australian miners.¹⁰⁴ Using a technology called High-Pressure Acid Leaching (HPAL), Indonesian refined nickel produces over 3 times more carbon emissions than Australian nickel, leading some in the industry to label Indonesian nickel as 'dirty nickel'.¹⁰⁵ Australia's 'green advantage' for its nickel has not yet fully protected it from the market's pricing response.

This surge in supply has seen nickel prices drop by 51% since early 2022.¹⁰⁶ Equally, the increased global supply of lithium has seen the price for lithium hydroxide drop by similar amounts since its peak in December 2022.¹⁰⁷ Such pricing volatility speaks to the turbulent trading conditions that often underpin the reality of Australia's mining industry. The impact on the industry, and by extension its workforce, has been swift. Since September 2023 5 nickel mines have closed, reducing domestic production by 33% and placing a further 31% at risk.¹⁰⁸ These closures have directly displaced 1,000 workers¹⁰⁹, with a further 3,300 at risk after BHP recently advised that it is considering the future of its Nickel West operations.¹¹⁰ The Chamber of Minerals and Energy of Western Australia (CME) predicts that up to 10,000 workers are at risk due to the current challenges faced by the nickel industry.¹¹¹

The Chamber of Minerals and Energy of Western Australia (CME) predicts that up to 10,000 workers are at risk due to the current challenges faced by the industry

With ongoing skills shortages and the broader metal ore industry continuing to expand, most of the workers currently affected by job losses are likely to find new employment opportunities within the sector. If job losses were to increase to the scale warned of by the CME, the impact would be much more severe. Equally, job losses in mining jurisdictions that are not as heavily concentrated as the likes of Western Australia are likely to be harder to absorb. This has been the case in Tasmania, where 200 workers lost their jobs after the closure of the Avelbury nickel mine. Other mines in the area indicated that they could absorb some of the displaced workers, but not all.¹¹²

Critical Minerals Strategy 2023–2030

The adoption of critical minerals in Australia over the next decade is poised to be significantly influenced by the country's commitment to environmental sustainability and renewable energy. The Australian Government's Critical Minerals Strategy 2023–2030 is a comprehensive framework that aims to position Australia as a global leader in the critical minerals sector.

104 Chamber of Minerals and Energy of Western Australia. *A Critical Juncture – Australia's Opportunities and Challenges in Nickel*. 2024.

105 The Sydney Morning Herald. Boardrooms, top investors blindsided by nickel crash. 2024.

106 Chamber of Minerals and Energy of Western Australia. *A Critical Juncture – Australia's Opportunities and Challenges in Nickel*. 2024.

107 Department of Industry, Science and Resources. *Resources and energy quarterly: December 2023*. 2023

108 Chamber of Minerals and Energy of Western Australia. *A Critical Juncture – Australia's Opportunities and Challenges in Nickel*. 2024.

109 The Sydney Morning Herald. Boardrooms, top investors blindsided by nickel crash. 2024.

110 The West Australian. *BHP stands down contractors at Kalgoorlie nickel smelter*. 2024.

111 Chamber of Minerals and Energy of Western Australia. *A Critical Juncture – Australia's Opportunities and Challenges in Nickel*. 2024.

112 The Advocate. *West Coast mining company reaches out to displaced Avelbury mine workers*. 2024

The global shift towards low emissions and renewable energy will correspondingly reduce the demand for fossil fuel-intensive exports, such as thermal coal. This transition underscores the importance of critical minerals in Australia’s future economic landscape as well as the need for appropriate training strategies to help affected workforces realise those opportunities.

To support this, Australia has a defined list of critical minerals, shown in [Table 2](#). It’s important to note that, despite not classifying copper as a critical mineral, which contradicts the perspective of numerous industry stakeholders, various countries, and the International Energy Agency, the Government did make a significant update in December 2023. They introduced a Strategic Materials List alongside the update to the Critical Minerals List. This new list is designed to acknowledge the vital role that certain materials play in the global move towards net-zero emissions and in other strategic areas, as well as the demand for these materials from international partners. The Strategic Materials List includes aluminium, copper, phosphorous, tin, and zinc.

Table 2: Australia’s Critical Minerals List

Critical mineral	Australian geological potential	Australian economic demonstrated resources (2022)	Australian production (2022)	ANZSIC Class
High-purity Alumina	High	HPA ore: 16,700 kt	0	0802
Antimony	Moderate	139.4 kt	2.3 kt	0809
Arsenic	Moderate	No data	No data	
Beryllium	Moderate	No data	No data	0809
Bismuth	Moderate	No data	No data	0809
Chromium	Moderate	0	0	0809
Cobalt	High	1,742 kt	5.8 kt	0809
Fluorine	Moderate	343 kt	0	0990
Gallium	High	No data	No data	-
Germanium	High	No data	No data	-
Graphite	Moderate	8,500 kt	0	0990
Hafnium	Moderate	14.5 kt	No data	-
Indium	Moderate	No data	No data	-
Lithium	High	7,046 kt	75 kt	0990
Magnesium	High	Magnesite: 284,000 kt	Magnesite: 500 kt	0990
Manganese	High	Manganese ore: 496,000 kt	Manganese ore: 4,500 kt	0809
Molybdenum	Moderate	687 kt	0.28 kt	0809
Nickel	High	24.1 Mt	0.15 Mt	0806
Niobium	Unknown (interpreted moderate)	216 kt	No data	-
Platinum-group elements	Moderate	359.3 t	0.492 t	0809
Rare-earth elements	High	5,700 kt	16 kt	0990
Rhenium	Unknown (interpreted moderate)	157 t	No data	-
Scandium	High	36.65 kt	0	-
Selenium	Unknown (interpreted moderate)	No data	No data	-
Silicon	High	No data	No data	-
Tantalum	High	110 kt	0.1 kt	0809
Tellurium	Unknown (interpreted moderate)	No data	No data	-
Titanium	High	Ilmenite: 303,300 kt	Ilmenite: 700 kt	0805
Tungsten	High	568 kt	0.23 kt	0809
Vanadium	High	8,510 kt	0	0809
Zirconium	High	Zircon: 88,300 kt	Zircon: 500 kt	0805

Source: Department of Industry, Science and Resources. Australia’s Critical Minerals List. 2023.

In response to specific issues with Indonesian refined nickel, the federal government also amended the Critical Minerals List to include nickel, thereby giving nickel miners the opportunity to access financing under the \$4 billion Critical Minerals Facility and critical minerals-related grant programs such as the International Partnerships Program (\$40 million).¹¹³ In the 2024–2025 Budget the Government committed \$7.1 billion over 11 years for critical minerals, with almost all (an estimated \$7.0 billion) of this funding set aside for a new Critical Minerals Production Tax Incentive.¹¹⁴ While consultation on the final settings and details are yet to take place, the proposed 10% tax offset for ‘eligible processing costs’ could provide important support for the critical minerals workforce and bring on-stream additional supply, refining, and processing capacity over time.¹¹⁵

Critical Minerals Workforce

The Critical Minerals Strategy is a multi-faceted approach that not only aims to make Australia a key player in the global critical minerals market but also addresses broader social and environmental goals, which will likely facilitate the adoption of critical minerals by both the public and industry. It has far-reaching implications for the Australian labour market and energy and VET sectors, promising sustainable growth and global competitiveness.

The strategy aims to address skills shortages in key professions, such as mining engineers, hydrogeologists, metallurgists, and geologists, while supporting 10,000 apprentices to enter the clean energy sector through the Government’s \$105.1 million New Energy Apprenticeship and New Energy Skills Programs.¹¹⁶ The strategy focuses on workplace safety, culture, and flexibility to attract a diverse workforce, as well as environmental, social and governance credentials, including sharing benefits with First Nation communities and promoting gender equality.

Critical minerals will continue to play an important and growing role in achieving the world’s progression to a decarbonised future. As technologies change, the demand for different minerals will change accordingly.

Irrespective, a clear prerogative for the critical minerals sector, something which is echoed by the Critical Minerals Strategy, is the importance of greater onshore refining and beneficiation of the ores produced. As part of the CSIRO’s recent webinar ‘*Critical minerals and the energy transition*’, it was made clear that, unlike minerals such as iron ore or bauxite, where most of the value is already realised at the basic ore stage of processing,

113 Hon. Madeleine King MP – Media Releases. *Nickel placed on critical minerals list*. 2024

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

115 Department of Industry, Science and Resources. *Investments to capitalise on Australia’s critical minerals and the global clean energy transition*. 2024.

116 Department of Industry, Science and Resources. *Critical Minerals Strategy 2023–2030*. 2023.



with critical minerals the true value is achieved further down the value chain, requiring more processing and refining to attain.¹¹⁷

Critical mineral mining requires access to the full breadth of existing mining industry occupations. The strategy's call for greater onshore refining and processing capabilities represents a new demand driver for skilled roles that may not currently exist within the mining workforce. Equally, increased onshore processing of critical minerals is likely to also drive demand for new skills in supporting industries such as manufacturing.

The need to support the development of such a processing capability and its workforce, and to identify any existing skills gaps as a matter of priority is highlighted in both Queensland and Western Australia's own respective critical mineral strategies.¹¹⁸

The ability to produce accurate, critical mineral industry workforce statistics utilising the ANZSIC structure is problematic as the combined list of minerals classified as critical minerals are captured across multiple ANZSIC classes, groups and sub-categories, [Table 2](#). These classes, groups and sub-categories often also include other resource types that are not critical minerals. Of note is the fact that lithium, a metal, is not covered by ANZSIC's metal ore group, but rather included as part of the non-metallic mineral and quarrying group.

AREA OF FOCUS

Given the significant implications critical minerals will have on Australia's mining and economic future, AUSMASA proposes that the ABS consider creating a new ANZSIC code. This initiative will facilitate and allow accurate workforce planning data to be produced quarterly through the ABS's Labour Force survey.

AREA OF FOCUS

A key priority for AUSMASA will be to work closely with industry and relevant government bodies in identifying any skills gaps within the current workforce and emerging skills required to assist in making these critical mineral strategies a reality. A particular focus will be on determining if current processing-related qualifications will be fit for purpose in relation to onshore refining and processing of critical minerals.

¹¹⁷ CSIRO. Webcast – *Critical minerals and the energy transition*. 2024.

¹¹⁸ Department of Jobs, Tourism, Science and Innovation. 2020. Strategy Update: Western Australia's Future Battery and Critical Minerals Industries. Perth: Government of Western Australia; Department of Resources. 2023. Queensland Critical Minerals Strategy. Brisbane: Government of Queensland.

Non-metallic mineral and quarrying overview

With approximately 1,900 quarries in Australia, the quarrying industry is an important part of Australia's resources landscape, supplying key raw materials such as stone, sand, gravel, limestone, and gypsum in support of the building and construction industry. These materials are used in the construction of roads, houses, and commercial infrastructure.¹¹⁹ The processing of quarried raw material is generally limited to crushing and screening activities.

While the quarrying industry has similar job roles to those found in coal and metal ore mining, such as mobile plant operators, production managers and maintenance staff, there are some unique aspects to the industry that represent both opportunities and challenges. Of note, most quarries are much smaller operations when compared to metallic ore mining. Of the almost 1,900 quarries in Australia, 57% do not employ any staff (being owner-operators), while another 23% employ only one to 4 staff.¹²⁰

Demand for roles in the quarrying industry is directly related to the demand for the products they help to produce. Given that most quarried material supports the building and construction sector, it is the demand of those industries that offers insight into this industry's future growth potential. It is worth noting that the building and construction industry in Australia is coming off a volatile period that was impacted by rising interest rates, supply chain disruption and the erosion of profit; however, a period of recovery and growth is forecast for 2024–28.¹²¹

The Non-metallic mineral and quarrying ANZSIC group cover lithium and graphite mining, which are both recognised as critical minerals. There are 7 operating lithium mines in Australia, with 6 in Western Australia and one in the Northern Territory.¹²² This report's section on Critical Minerals provides further detail on the difficulties of reporting accurate workforce data that focuses on just critical minerals, as many of them are dispersed across multiple ANZSIC classes and groups.

119 Australian Bureau of Statistics. *Counts of Australian Businesses, including Entries and Exits*. 2023

120 Australian Bureau of Statistics. *Counts of Australian Businesses, including Entries and Exits*. 2023

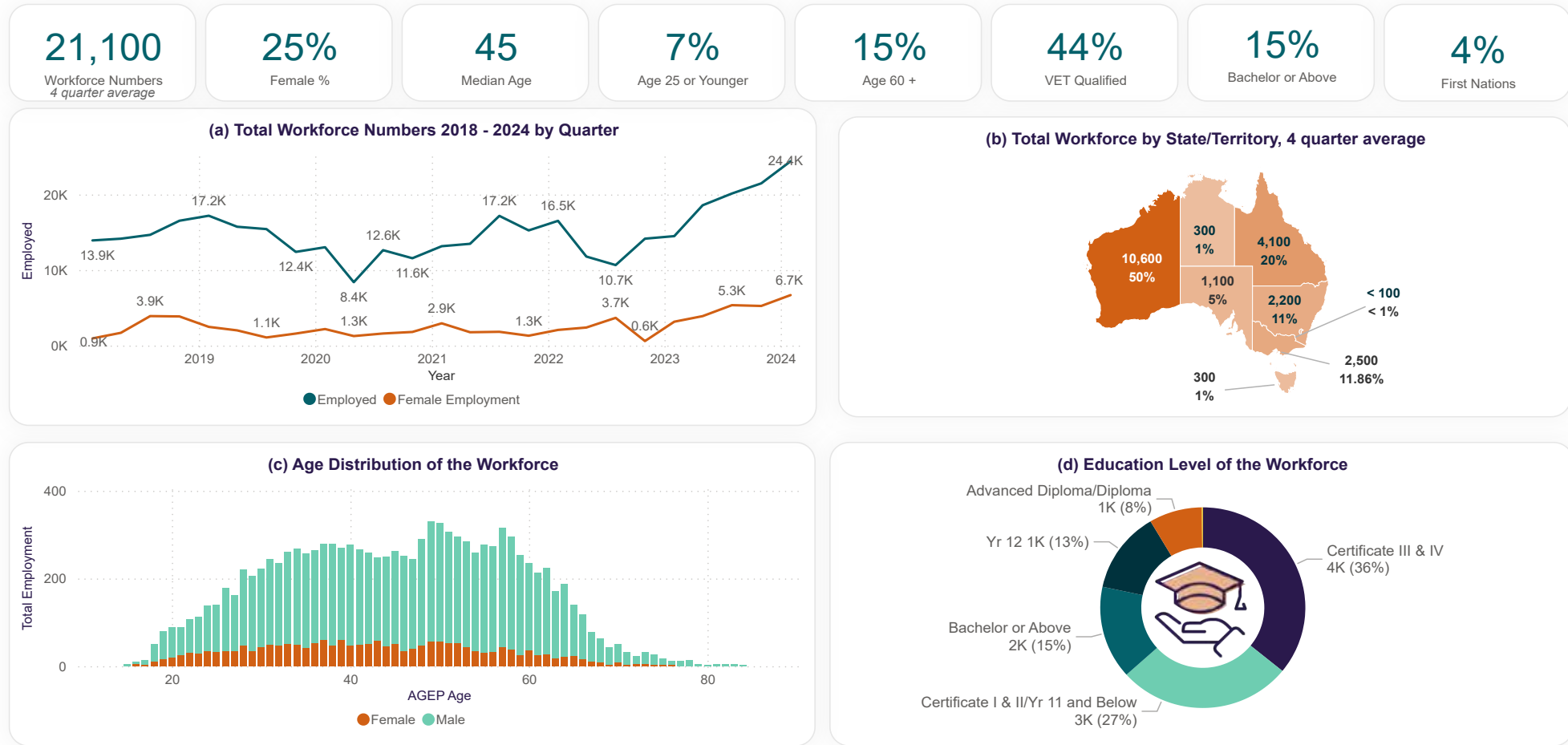
121 A. Kelly. 2023. *Construction in Australia*. IBISWorld.

122 Geoscience Australia. *Australian Operating Mines Map Data 2023*. 2023



Non-metallic mineral and quarrying workforce demographics insights

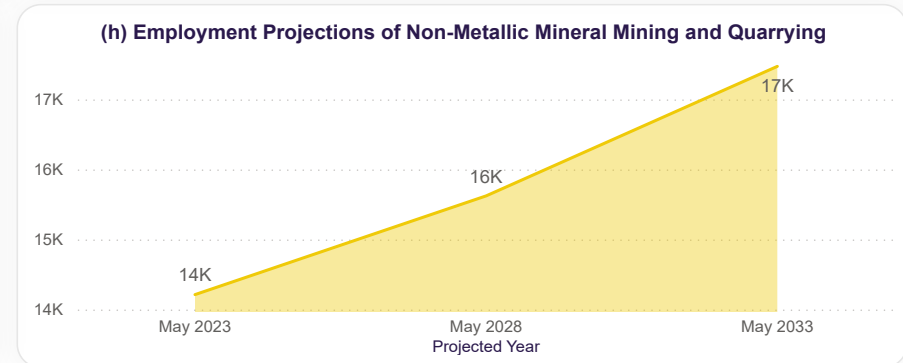
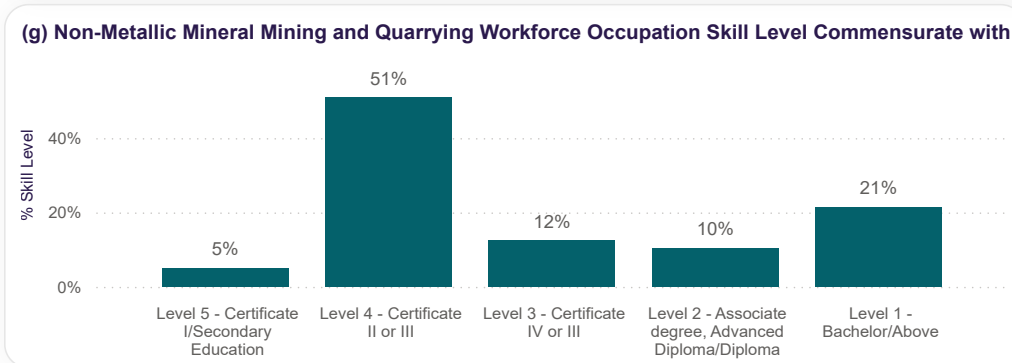
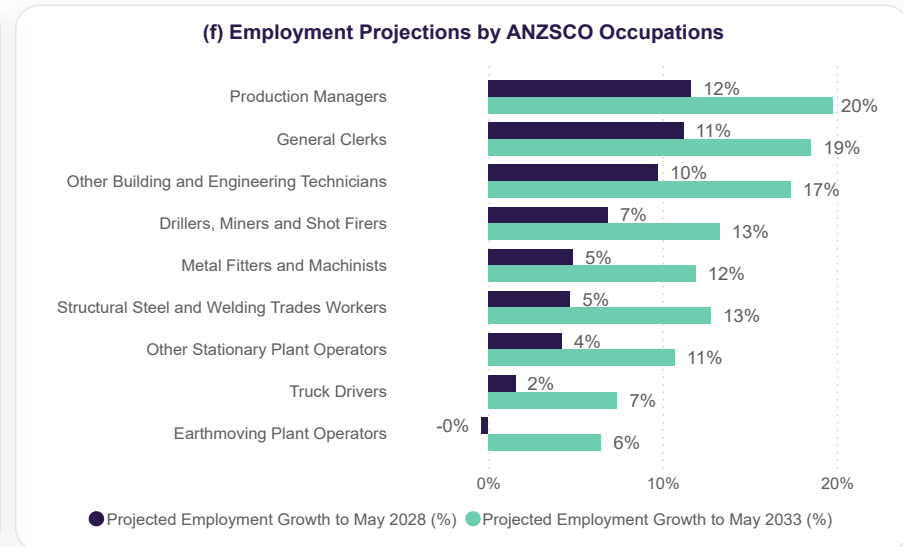
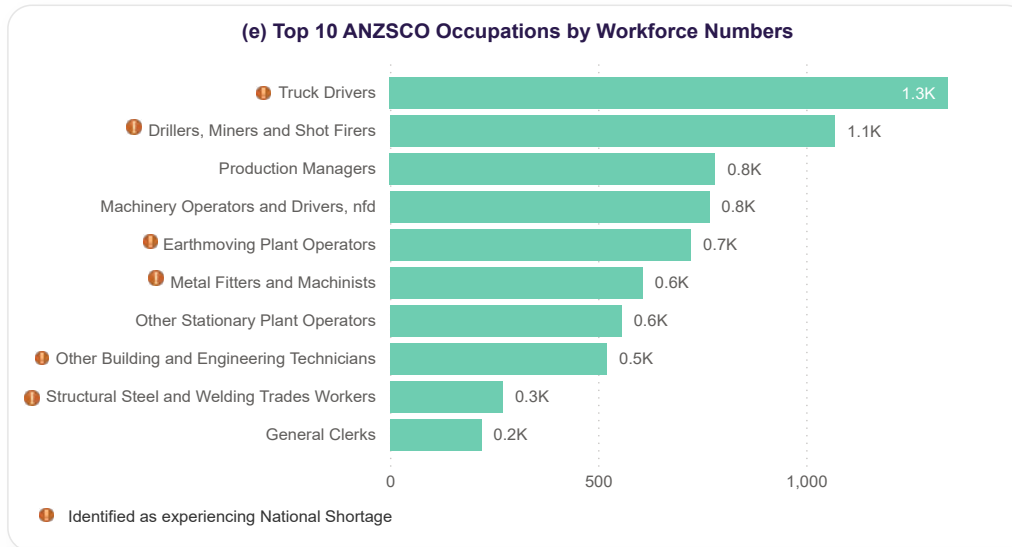
Figure 26: Non-metallic mineral and quarrying workforce demographics insights



Sources: **(top row)** Workforce Numbers and Female %: ABS Detailed Labour Force Survey (Table EQ06, Four-Quarter Average), May 2023 - February 2024 | Median Age, Age 25 or Younger, Age 60+, VET Qualified, Bachelor or Above and First Nations: ABS Table Builder 2021 Census - counting persons, 15 years and over by 2-digit level INDP Industry of Employment **(a)** ABS Detailed Labour Force Survey (Table EQ06, Original), Reference Period: February 2024 **(b)** ABS Detailed Labour Force Survey (Table EQ06, 4-quarter Average), Reference Period: February 2024 **(c)** Census of Population and Housing (AGEP Age and SEXP Sex), 2021, TableBuilder **(d)** Census of Population and Housing (HEAP Level of Highest Educational Attainment), 2021, TableBuilder **Notes:** Workforce Numbers are rounded to the nearest 100.

Non-metallic mineral and quarrying workforce occupation insights

Figure 27: Non-metallic mineral and quarrying workforce occupation insights



Sources **(e)** ABS Table Builder 2021 Census - INDP Industry of Employment, OCCP Occupation | JSA Skills Priority List 2023. 4-dig SPL(ANZSCO 2013) **(f)** Employment Projections produced by VU for JSA (May 2023 to May 2033) **(g)** ABS Table Builder 2021 Census - employment, income and education (OCSKP Occupation Skill Level by INDP Industry of Employment) **(h)** Employment Projections produced by VU for JSA (May 2023 to May 2033)

Notes: The Non-metallic mineral and quarrying sector shares VET qualifications with Metal Ore mining sector. Please refer figure 24 for VET insights.

Non-metallic mineral and quarrying workforce demographics

The non-metallic mineral and quarrying workforce experienced a strong period of growth, from 13,300 (four-quarter average, February 2022 to November 2022) to 21,100 (four-quarter average, May 2023 to February 2024)¹²³.

This rapid growth has had an effect on employment as of February 2024 which has already exceeded JSA's 2028 Employment Projection by around 5,000 workers, [Figure 27 \(h\)](#).¹²⁴ This growth in workforce size is likely correlated to the increase in lithium and mineral sands operations, especially in Western Australia.

Rapid growth has had an effect on employment as of February 2024 which has already exceeded JSA's 2028 Employment Projection by around 5,000 workers.

Given that the type of occupations employed by the non-metallic mineral and quarrying sector closely mimics that of the metal ore sector, it is not surprising that both sectors are experiencing similar skills shortages. Of the sector's top 10 occupations by number of workers, 7 are identified by the 2023 Skills Priority List as experiencing a national shortage.¹²⁵

Key occupations for this sector, such as truck drivers and drillers, miners and shot firers are all showing national vacancy levels consistently above those experienced prior to the COVID pandemic, highlighting the strength with which the industry has rebounded.¹²⁶

While the distribution of quarries (and by extension its workforce) is closely correlated to urban and regional centres, lithium mining is heavily focused on Western Australia (86% of all operating mines), which has concentrated this sector's workforce in that state (50% of workforce in Western Australia), [Figure 26 \(b\)](#).

In addition to their broad distribution across the country, quarries tend to be located much closer to urban areas than large-scale coal and metalliferous mining operations. Quarried materials are heavily consumed by the building and construction industry, making proximity to these activities important.

This geographic relationship to population centres offers employment access to the extractive resources industry without necessarily requiring either a commitment to a FIFO lifestyle or relocation to a population hub associated with major mining operations.

Of the sector's top 10 occupations by number of workers, 7 are identified by the 2023 Skills Priority List as experiencing a national shortage

[Figure 26](#) shows that the non-metallic mineral and quarrying sector has the highest proportion of female employees within the overall mining industry, at 25%.

A significant demographical challenge for the sector is its aging workforce. With a median age of 45, the sector has the oldest workforce within the mining industry. More worrying is the fact that the proportion of the workforce (15%) that is approaching

¹²³ Australian Bureau of Statistics. February 2024 - *Labour Force, Australia*, Detailed - 'Table EQ06'.

¹²⁴ Jobs and Skills Australia. *'Employment Projections'*. 2023

¹²⁵ Jobs and Skills Australia. *'Skills Priority List'*. 2023

¹²⁶ Jobs and Skills Australia. *Internet Vacancy Index*, ANZSCO4 Occupations, States and Territories – Feb 2024(4-quarter average).2024

retirement (60+) is more than double the proportion of younger workers (<25) working in the industry (7%). This trend alone, if not addressed, has the potential to place significant strain on the sector's ability to meet the growing workforce demands currently being exhibited, [Figure 28](#).

Not dissimilar to the metal ore mining sector, the non-metallic mineral and quarrying sector strongly relies on vocational education and training, but a lower reliance on higher education. Given the sector's use of key qualifications closely mimics those used by the metal ore sector, it is difficult to distinguish enrolment statistics between the 2 sectors.

Non-metallic mineral and quarrying key workforce drivers

While the occupations required for the non-metallic mineral and quarrying workforce are closely aligned to those in the metal ore and coal mining sectors, they tend to occur within much smaller operations (except for lithium mining, whose characteristics are more closely aligned to the metal ore mining sector workforce). As far as the quarrying workforce is concerned, this creates both opportunities and challenges.

Smaller quarrying operations may present a more close-knit working environment, which is likely to be closer to metropolitan or key regional locations and is unlikely to require shift work. Equally, it is possible that by employing fewer staff, more opportunities present themselves to be cross trained across multiple disciplines, such as mobile plant operations or processing. Of course, the opposite could also be true, whereby smaller operations may offer fewer advancement or up-skilling operations.

Either way, one of the quarrying industry's key workforce retention challenges is the potential loss of workers either to the coal and metal ore mining sector or the construction industry (especially civil). While the industry cannot necessarily compete with the wages paid by larger mining operations, it should focus on the unique aspects that it does offer to appeal to workers who are attracted to these differences.

The ability of the industry to attract new workers to counter its aging workforce will be key. In addition to continuing efforts to promote this sector to younger workers – including as a potential stepping stone to larger mining or civil opportunities – an exploration of how the sector could promote itself to experienced mining workers wanting to 'step down' from larger mining operations, especially if they involve shift work and FIFO requirements, could also be warranted.

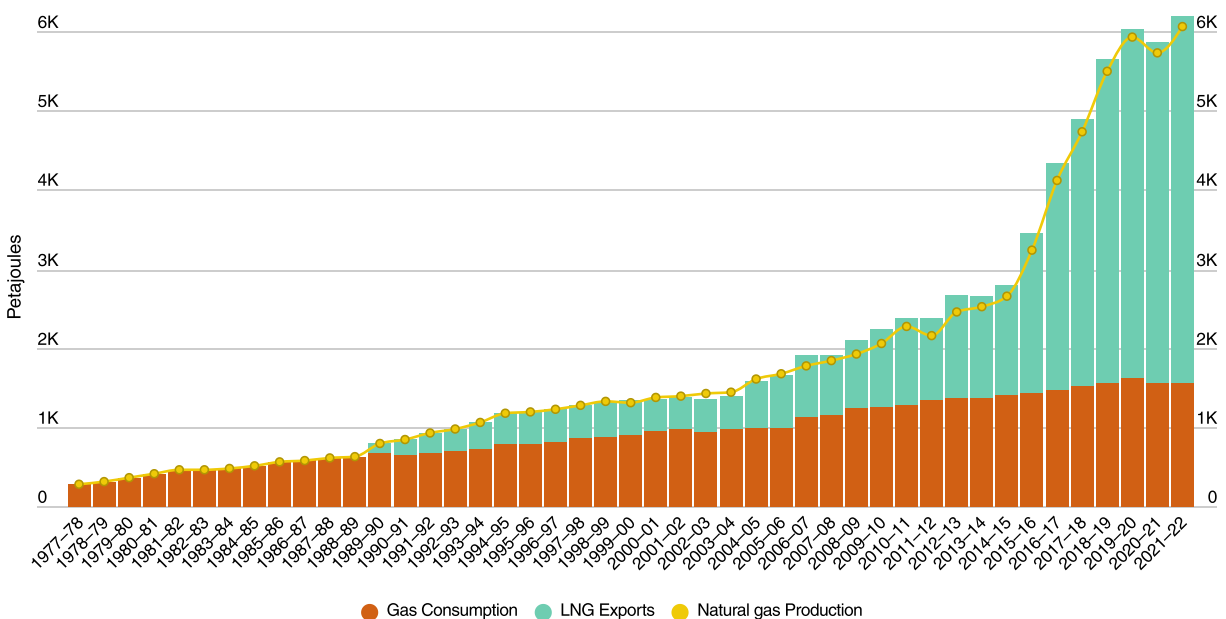


Oil and Gas Extraction Overview

Not unlike the broader mining industry, the Oil and Gas Extraction industry provides significant economic benefits to Australia on the back of a relatively small, but highly skilled, workforce. The combined value of the oil and gas industry was \$130 billion in 2023, with gas (both natural and coal seam) accounting for 87% of that value.¹²⁷

Australia’s gas production, and export, has grown significantly from the 1980’s, when production was focused on meeting local consumption demand. Today, Australia is one of the world’s leading exporters of Liquefied Natural Gas (LNG), ranking second after Qatar in 2022.¹²⁸ Oil production, and exports, are significantly lower, requiring Australia to remain a net importer of this energy source.¹²⁹

Figure 28: Gas production, consumption and export (LNG)



Source: Department of Climate Change, Energy, the Environment and Water (2023), Australian Energy Statistics, Table C, Table J
 Note: Consumption data includes statistical discrepancies.

The oil and gas industry is highly vertically integrated with operations supporting the exploration, extraction, refining and transportation (for both domestic and export purposes) functions.¹³⁰

ANZSIC’s inclusion of oil and gas activities under Division B (Mining) are focused on upstream activities (exploration, drilling and extraction), whilst the refining and transportation are covered by the manufacturing and transportation divisions.

Oil and gas extraction activities occur both offshore (within Australia’s exclusive economic zone EEZ) and onshore. The bulk of Australia’s offshore oil and gas platforms are located off the coast of Western Australia, with substantial activity also continuing in the Bass Strait between Victoria and Tasmania.¹³¹

127 IBISWorld. *Oil and Gas Extraction in Australia - Market Size (2008–2030)*. 2024.

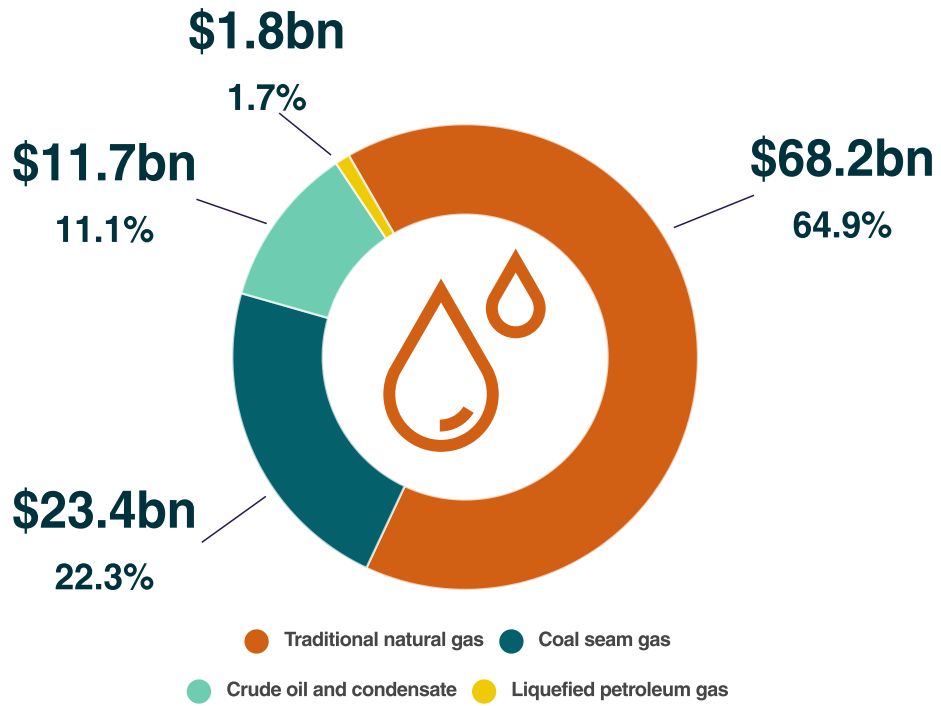
128 Statista. *Leading exporting countries of liquefied natural gas worldwide in 2022*. 2024.

129 Geoscience Australia. *Oil*. 2021.

130 IBISWorld. *Industry at a glance*. 2024.

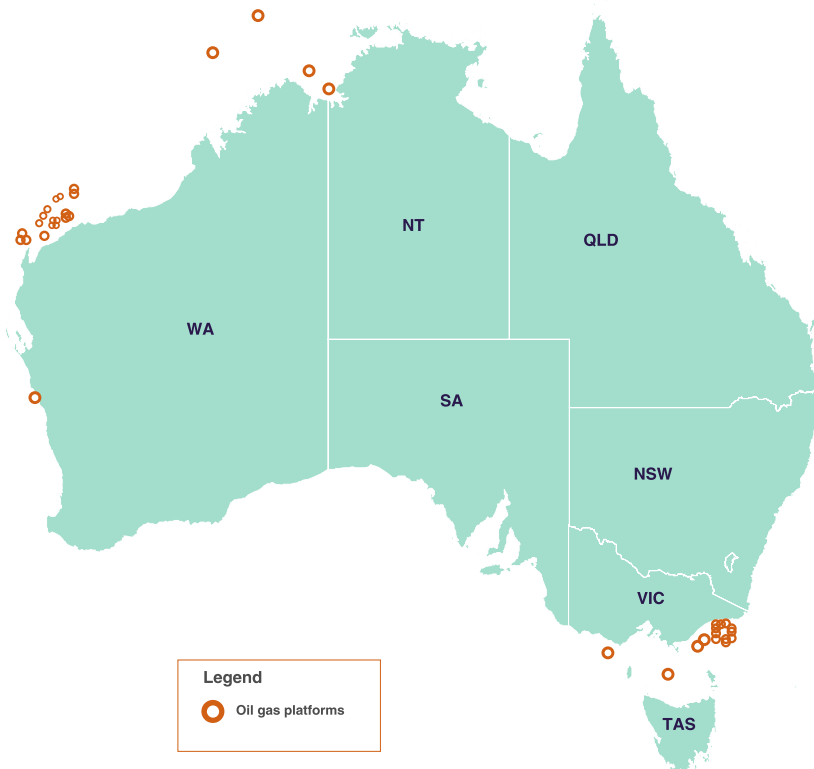
131 Geoscience Australia. *Oil*. 2021.

Figure 29: Oil and Gas Extraction Value by Resource Type



Source: IBIS World. B0700 - Oil and Gas Extraction in Australia.2024

Figure 30: Location of offshore oil and gas platforms



Source: Geoscience Australia. Gas, 2023

About 93 per cent of identified conventional gas resources are located offshore along the North West Shelf of Australia.¹³² Based on 2021 production rates, the estimated life for Australia's identified conventional gas resources is 41 years if all identified contingencies to development are mitigated, which includes 18 years of reserves life.¹³³

Coal seam gas (CSG) is expected to remain Australia's most important unconventional gas resource in the near term. CSG is already a major source for domestic gas and LNG exports in eastern Australia. Almost all reported CSG reserves and contingent resources are located in Queensland; the remainder are in New South Wales.¹³⁴ Based on 2021 production rates, these identified CSG resources would have an estimated life of 36 years if all identified contingencies to development are mitigated, which includes 18 years of reserves life.¹³⁵

There are 19 potential new projects in the pipeline over the next five years, of which 15 are new developments.¹³⁶ Their combined value would inject an additional \$80 billion into Australia's engineering, construction and related industries by 2028, and would require nearly 4,000 new production workers in the natural gas industry to operate them over the long term.¹³⁷ 10 of these new projects are in Western Australia, with the remainder split across the remaining states and territories.¹³⁸

132 Geoscience Australia. *Gas*. 2023.

133 Geoscience Australia. *Australia's Energy Commodity Resources*. 2023.

134 IBISWorld. *Industry at a glance*. 2024.

135 Geoscience Australia. *Australia's Energy Commodity Resources*. 2023.

136 Australian Resources and Energy Employer Association. *Resources and Energy Workforce Forecast (2023-2028)*. 2023.

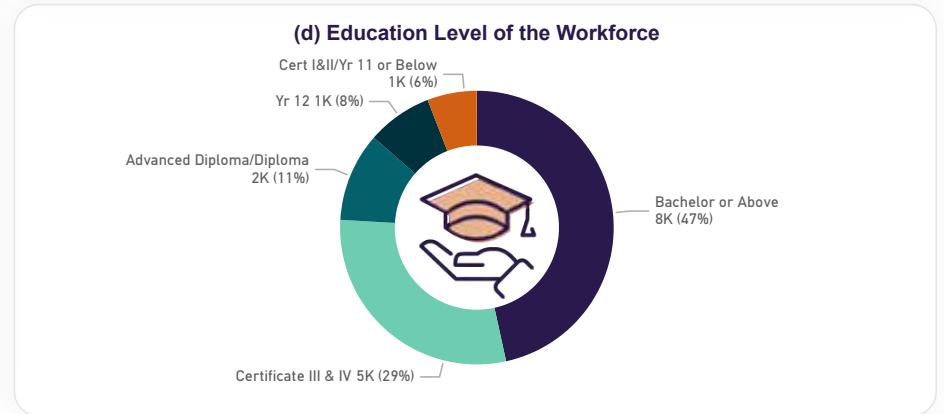
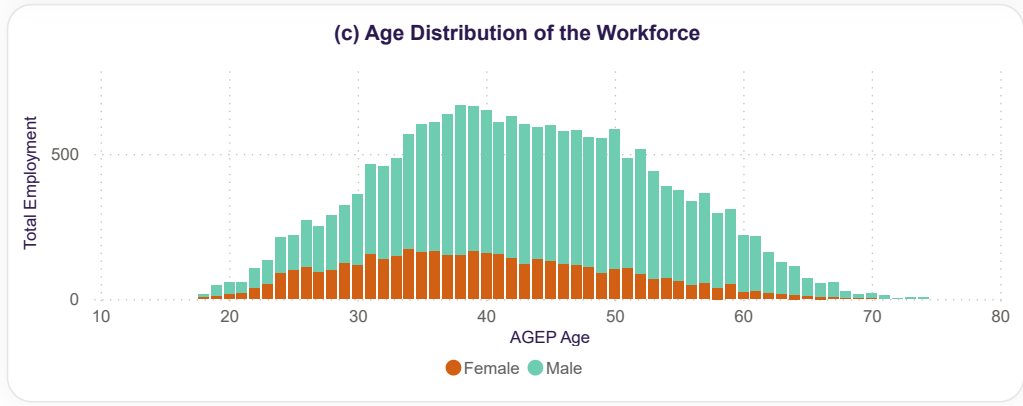
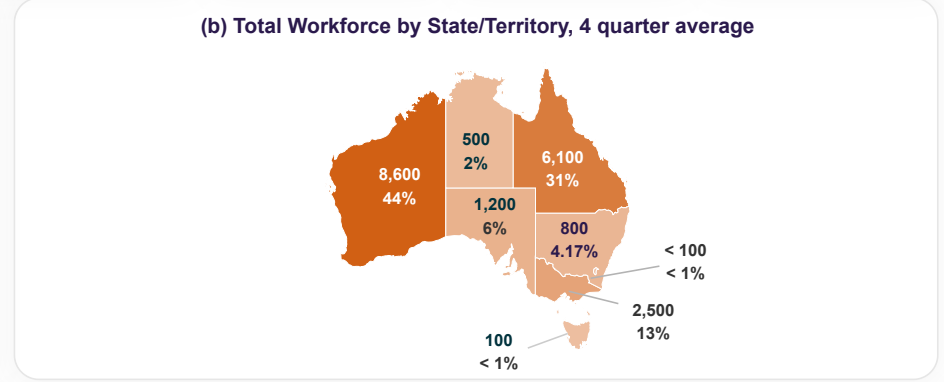
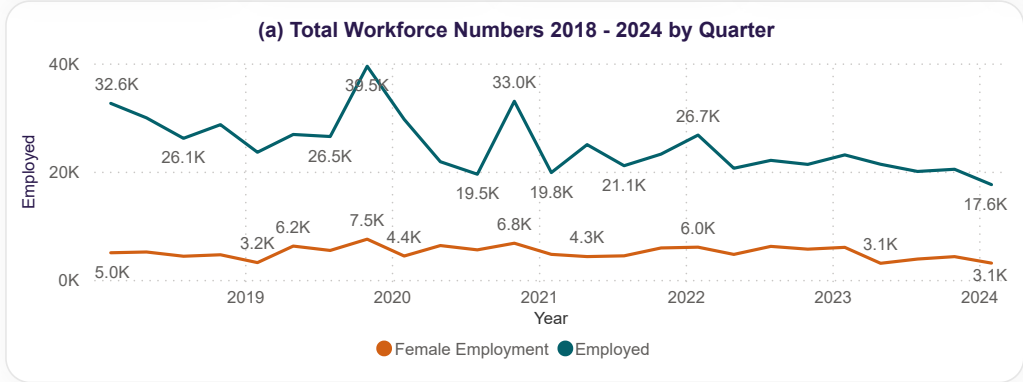
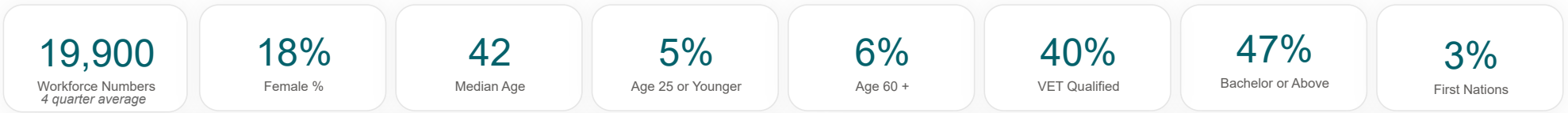
137 Australian Resources and Energy Employer Association. *Resources and Energy Workforce Forecast (2023-2028)*. 2023.

138 Australian Resources and Energy Employer Association. *Resources and Energy Workforce Forecast (2023-2028)*. 2023.



Oil and gas extraction workforce demographic insights

Figure 31: Oil and gas extraction workforce demographic insights

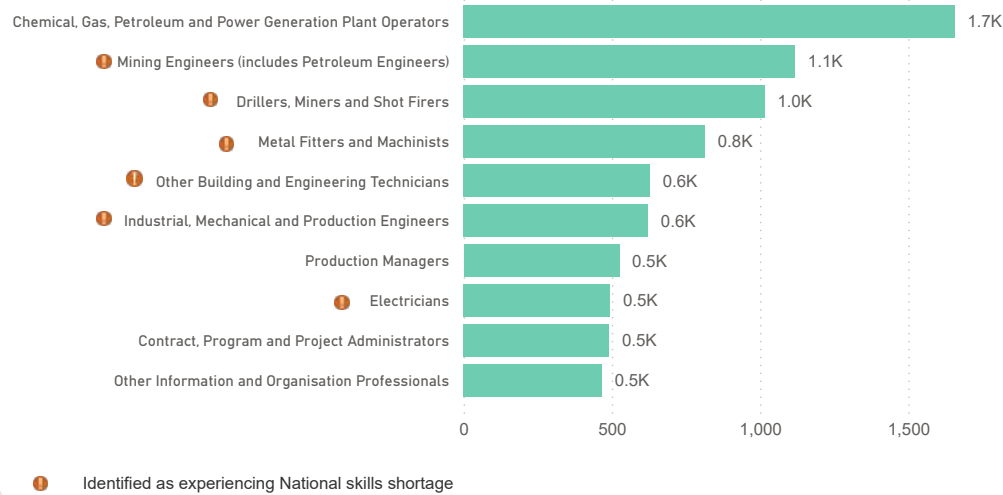


Sources: **(top row)** Workforce Numbers and Female %: ABS Detailed Labour Force Survey (Table EQ06, Four-Quarter Average), May 2023 - February 2024 | Median Age, Age 25 or Younger, Age 60+, VET Qualified, Bachelor or Above and First Nations: ABS Table Builder 2021 Census - counting persons, 15 years and over by 2-digit level INDP Industry of Employment **(a)** ABS Detailed Labour Force Survey (Table EQ06, Original), Reference Period: February 2024 **(b)** ABS Detailed Labour Force Survey (Table EQ06, 4-quarter Average), Reference Period: February 2024 **(c)** Census of Population and Housing (AGEP Age and SEXP Sex), 2021, TableBuilder **(d)** Census of Population and Housing (HEAP Level of Highest Educational Attainment), 2021, TableBuilder. Notes: Workforce Numbers are rounded to the nearest 100.

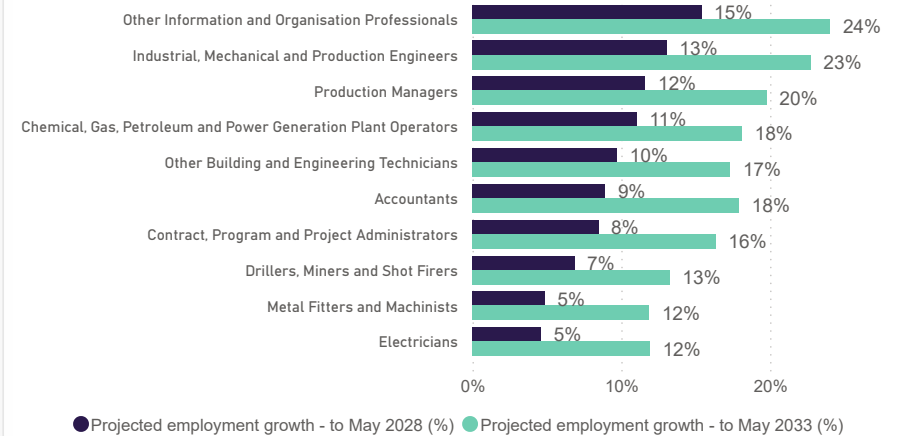
Oil and gas extraction workforce occupation insights

Figure 32: Oil and gas extraction workforce occupation insights

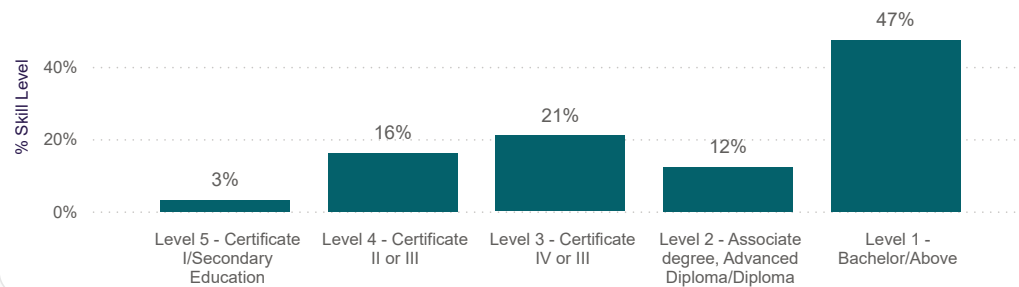
(e) Top 10 ANZSCO Occupations by Workforce Numbers



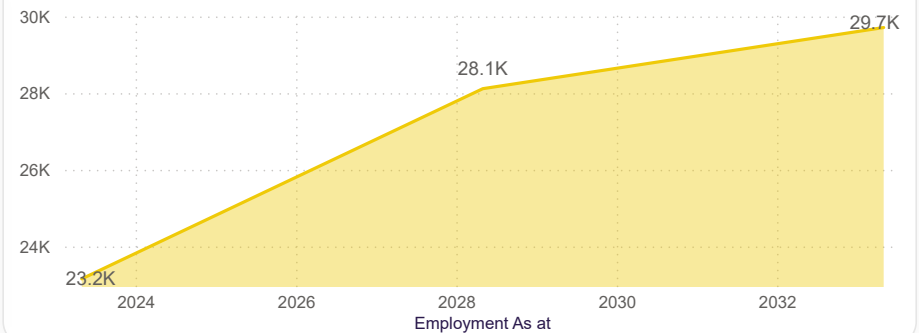
(f) Employment Projections by ANZSCO Occupations



(g) Oil and Gas Extraction Workforce Occupation Skill Level Commensurate with



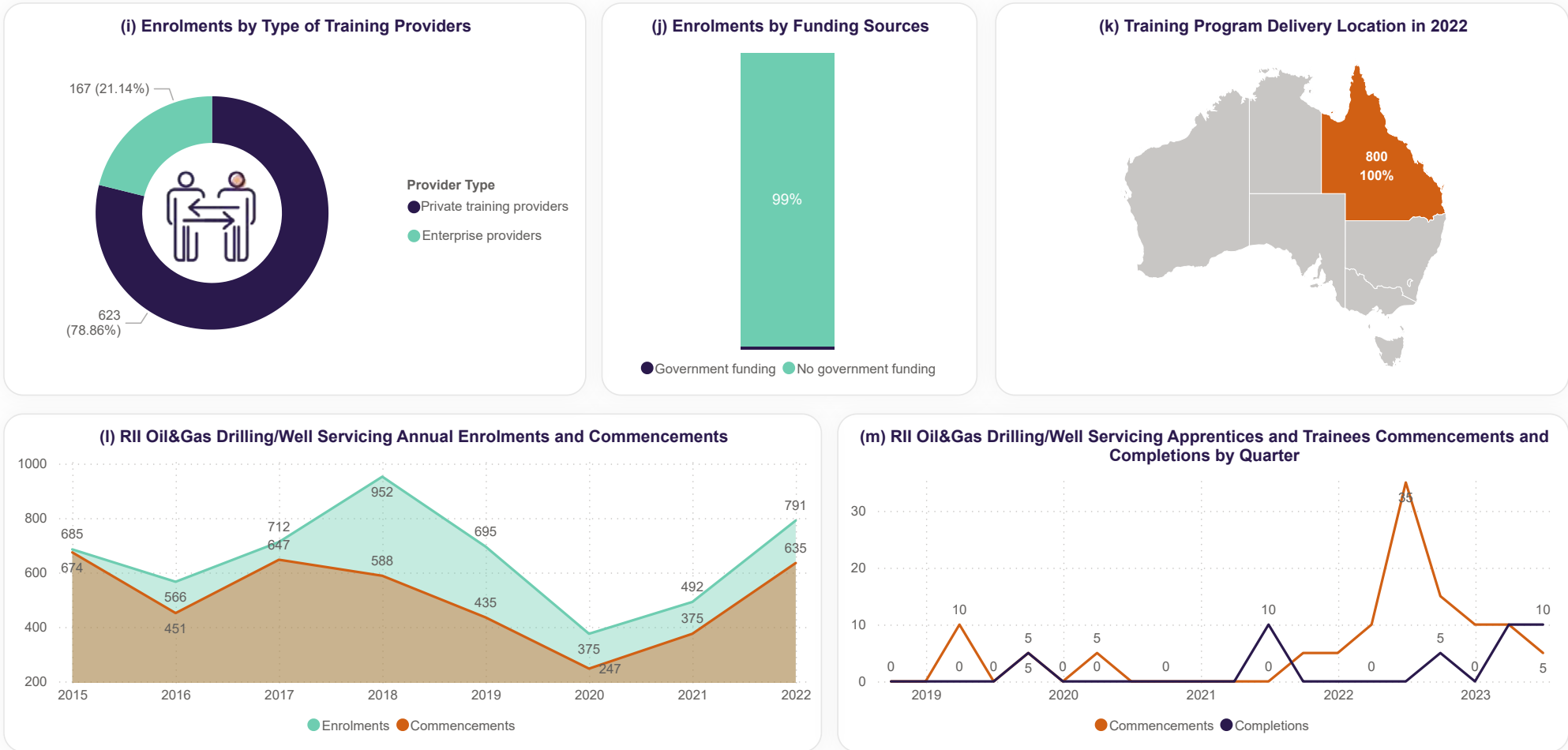
(h) Employment Projections of Oil and Gas Extraction



Sources: (e) ABS Table Builder 2021 Census - INDP Industry of Employment, OCCP Occupation | JSA Skills Priority List 2023. 4-dig SPL(ANZSCO 2013) (f) Employment Projections produced by VU for JSA (May 2023 to May 2033) (g) ABS Table Builder 2021 Census - employment, income and education (OCSKP Occupation Skill Level by INDP Industry of Employment) (h) Employment Projections produced by VU for JSA (May 2023 to May 2033)

Oil and gas extraction training package insights

Figure 33: Oil and gas extraction training package insights



Sources: (i) NCVER. 2023. TVA program enrolments 2022 (VOCSTATS). Adelaide (j) NCVER. 2023. TVA program enrolments 2022 (VOCSTATS). Adelaide (k) NCVER. 2023. TVA program enrolments 2022 (VOCSTATS). Adelaide (l) NCVER. 2023. TVA program enrolments 2015-2022 (VOCSTATS). Adelaide, December (m) NCVER. 2023. Apprentices and trainees, Sep 2018 - Jun 2023 (VOCSTATS). Adelaide

Oil and Gas Extraction Workforce Demographics

The oil and gas extraction workforce has declined over the past five years from 29,300 in 2018 (four-quarter average, February 2018 to November 2018) to 19,900 in 2023-2024 (four-quarter average, May 2023 to February 2024)¹³⁹. However, projections from the JSA employment projections suggest that the workforce will rebound to 29,700 by 2033.¹⁴⁰

This rebound in workforce size will be challenging based on the fact that 6 out of the sub-industry's top 10 occupations are experiencing skills shortages as reported by the 2023 Skills Priority List.¹⁴¹ Tellingly, with the exception of the industry-specific ANZSCO occupations of Chemical, Gas, Petroleum and Power Plant Operators (most common) and Petroleum Engineers (second most common), the sub-industry requires similar skilled occupations as other sectors within the mining industry. This includes roles such as Driller, Miners and Shotfirers (third most common), Metal Fitters and Machinists and Electricians.

The geographical distribution of the workforce mimics the locations that foster the greatest commercial activity in oil and gas extraction, with Western Australia accounting for 44% of the workforce, Queensland for 31%, Victoria 13% and the remainder distributed across the remaining states and territories.

Western Australia's and Victoria's workforce operates in significantly different fashion to that in Queensland and New South Wales, with the majority of work occurring offshore on remote oil and gas platforms.¹⁴² With Queensland and New South Wales activity being centred around onshore unconventional gas extraction, their workforce is more likely to be located close to communities and townships. The remote operations of Western Australia and Victoria have strong similarities, and the ensuing challenges, of the mining industry's FIFO operations.

Not unlike other parts of the mining industry, the oil and gas extraction sector has a relatively low percentage of females in its workforce (18%).

A unique aspect of the oil and gas extraction industry workforce is its age profile. Whilst many other sectors actively try to attract younger workers, the oil and gas extraction industry's workforce is centred around middle-aged workers. The industry has a median age of 42, with only 5% of workers below the age of 26 and only 6% aged 60+. This may be a reflection on the highly specialized skills needed by the sector and, at least insofar as offshore operations, the remote and harsh working conditions.

47% of the industry's workforce is classified as Skill Level 1, requiring at least a Bachelor degree or above. This is followed by Skill Level 3 roles, which typically reflect experienced tradespeople. Only 3% of roles are classified as suitable for unskilled workers.

The RII training package focuses on well servicing training, with the take-up of this training being focused on the land-based operations in Queensland.

¹³⁹ Australian Bureau of Statistics. *February 2024 - Labour Force, Australia*, Detailed - 'Table EQ06'.

¹⁴⁰ Jobs and Skills Australia. *Employment Projections*, 2023

¹⁴¹ Jobs and Skills Australia. *Skills Priority List*, 2023

¹⁴² Geoscience Australia. *Oil*, 2021.



Exploration and other mining support services overview

Exploration, including petroleum exploration, is the foundation of the mining, oil, and gas industry and the economic benefits it delivers to the nation. It isn't geology that creates Australia's competitive advantage in mining, oil, and gas; it is the geoscientists and other exploration professionals who discover and unlock our mineral and petroleum wealth. Ensuring a strong supply of highly skilled geoscientists and exploration professionals is vital to the long-term success of Australia's mining, oil, and gas industry and its economy.

Both mineral exploration activities are highly correlated with commodity prices [Figure 34](#), and while petroleum exploration followed a similar pattern until 2016, recent global events, such as COVID, and the war in Ukraine, have disrupted the relationship [Figure 35](#). Over time, commodity price cycles have repeatedly shown that exploration budgets are among the first items a mining company cuts to manage its costs. This creates an ongoing boom-bust cycle for exploration activity and geoscience employment that often cuses highly skilled professionals to leave the industry for alternative employment.

Figure 34: Australia's exploration expenditure and commodity price cycles



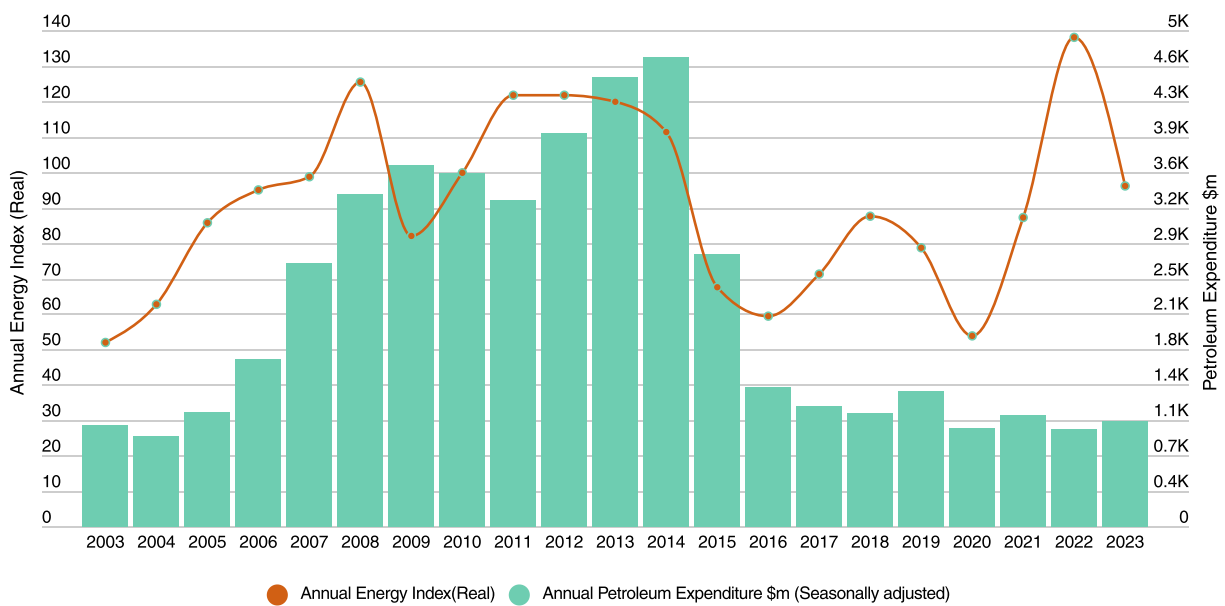
Sources: Australian Bureau of Statistics, *Mineral and Petroleum Exploration, Australia*, released 4 December 2023; World Bank, Commodity Markets website.

Present industry conditions and commodity prices are supporting high levels of mineral exploration activity. Exploration expenditure in 2022-23 was at an all-time high with companies investing \$4.1 billion on exploration programs at mineral deposits across Australia, 7% higher than the previous record set the year before, [Figure 35](#).¹⁴³ New records were set for exploration expenditures for copper, nickel, and other commodities (including lithium and rare earth elements), while gold exploration remained at high levels and still accounted for around one-third of exploration expenditures.¹⁴⁴

143 Australian Bureau of Statistics, *Mineral and Petroleum Exploration, Australia*, released 4 December 2023.

144 Australian Bureau of Statistics, *Mineral and Petroleum Exploration, Australia*, released 4 December 2023.

Figure 35: Petroleum Exploration Expenditure and Energy Index



Sources: ABS, Mineral and Petroleum Exploration, Australia, TABLE 6a(Reference Period: March 2024), Expenditure by onshore and offshore | World Bank Commodity Price Data (The Pink Sheet)

Australia’s petroleum exploration expenditure in 2023 was \$1.06 billion, slightly up from the \$0.97 billion in 2022 but still below the highs of 2010-2020. The increase was driven by an increase in onshore exploration, which rose from \$591 million in 2022 to \$664 million in 2023. Offshore exploration has remained largely steady.¹⁴⁵ In addition to global oil prices, petroleum exploration is at least in part influenced by the Australian government’s release of offshore acreage in Commonwealth waters for petroleum exploration activities. The Government hasn’t released acreage since 2022.

While the record mineral exploration expenditure can be seen as a positive for the sector, it should be viewed in the context of the business cost pressures that have affected most parts of the Australian economy. Exploration activity has been no different from other sectors in experiencing rising fuel, labour, and supply chain costs. Although expenditure increased by 7%, the number of metres drilled decreased by 9.9% in the same period, albeit remaining at still very high levels.

Analysis of drilling activity over the long term confirms not only the cyclical nature of mineral exploration but also that, despite the mining boom and significant increase in the size of the mining industry, there has been no long-term increase in drilling activity in Australia. The number of metres drilled during the latest commodity price cycle is broadly consistent with the level of activity in the 1990s and post-GFC commodity price spike.¹⁴⁶

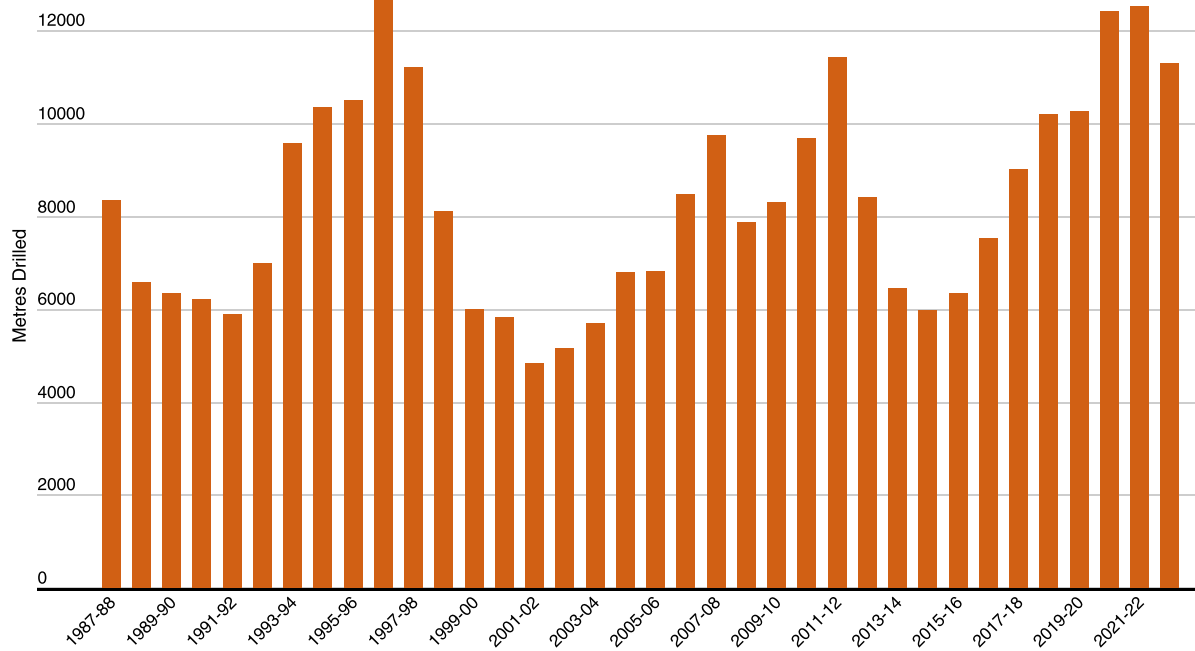
The increased role of geophysics, geochemistry, and data analysis in exploration programs is one explanation for the absence of activity growth in drilling. Exploration programs are increasingly using innovative approaches to better target ore bodies and design drilling programs. Nevertheless, drilling is

¹⁴⁵ Australian Bureau of Statistics, *Mineral and Petroleum Exploration, Australia*, released 4 December 2023

¹⁴⁶ Australian Bureau of Statistics, *Mineral and Petroleum Exploration, Australia*, released 4 December 2023.

still required in accordance with the standards set by the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (the JORC Code¹⁴⁷) to measure a mineral resource or reserve. As such, the relatively low level of drilling activity in the last 10 years is reflected in the low growth in the Economically Demonstrated Resources of many commodities within Australia in the same period.¹⁴⁸

Figure 36: Mineral exploration metres drilled in Australia



Sources: Australian Bureau of Statistics, Mineral and Petroleum Exploration, Australia, released 4 December 2023.

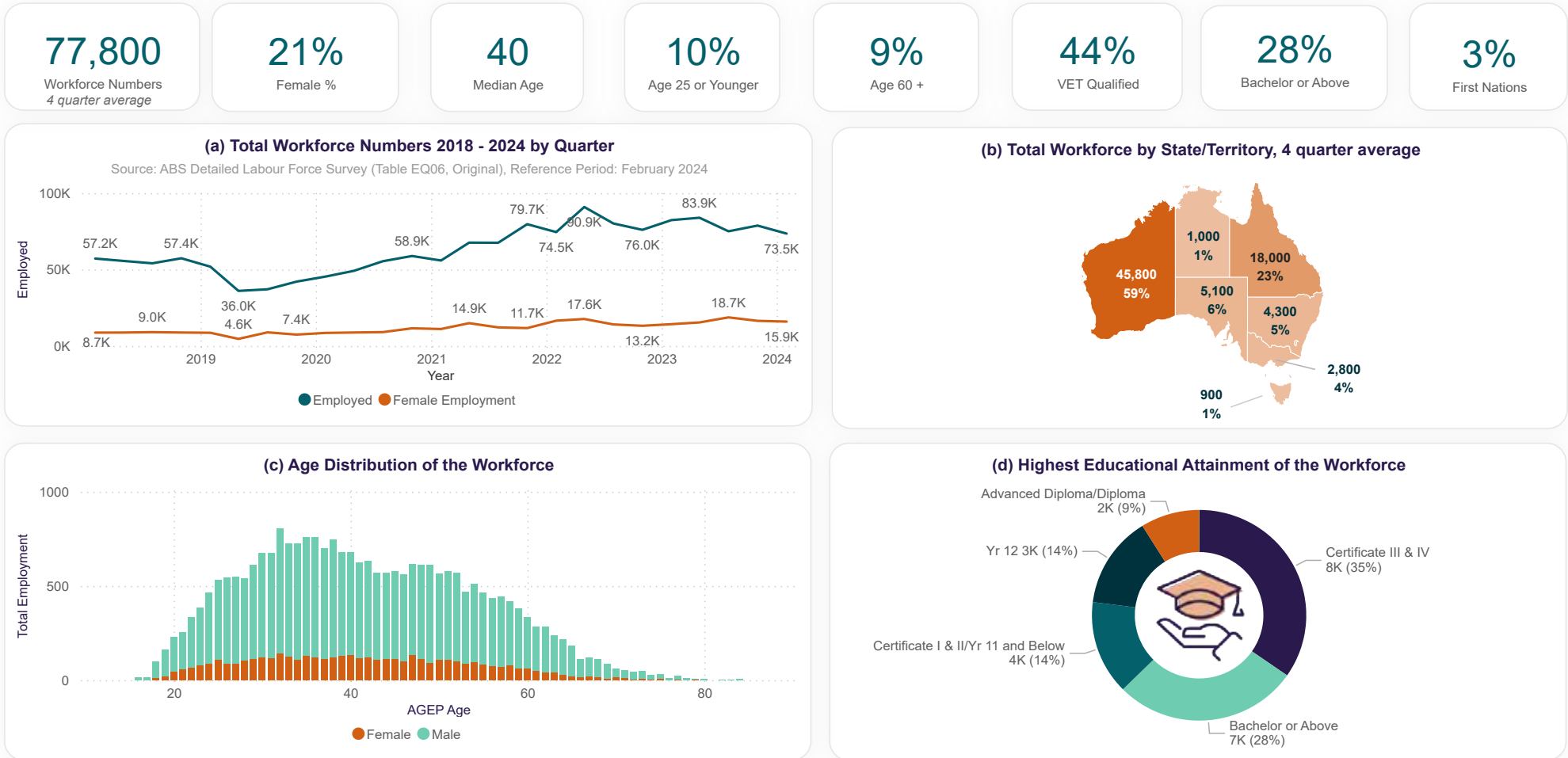
147 Australasian Joint Ore Reserves Committee (JORC), *What is the JORC Code?*

148 Geoscience Australia, *Australia's Identified Mineral Resources 2023*, released 18 March 2024.



Exploration and other mining support services workforce demographic insights

Figure 37: Exploration and other mining support services workforce demographic insights

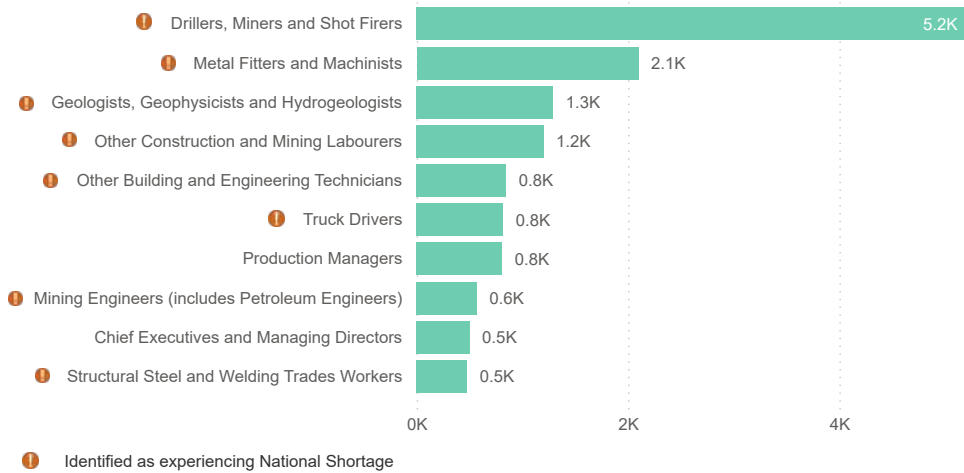


Sources: **(top row)** Workforce Numbers and Female %: ABS Detailed Labour Force Survey (Table EQ06, Four-Quarter Average), May 2023 - February 2024 | Median Age, Age 25 or Younger, Age 60+, VET Qualified, Bachelor or Above and First Nations: ABS Table Builder 2021 Census - counting persons, 15 years and over by 2-digit level INDP Industry of Employment **(a)** ABS Detailed Labour Force Survey (Table EQ06, Original), Reference Period: February 2024 **(b)** ABS Detailed Labour Force Survey (Table EQ06, 4-quarter Average), Reference Period: February 2024 **(c)** Census of Population and Housing (AGEP Age and SEXP Sex), 2021, TableBuilder **(d)** Census of Population and Housing (HEAP Level of Highest Educational Attainment), 2021, TableBuilder **Notes:** Workforce Numbers are rounded to the nearest 100.

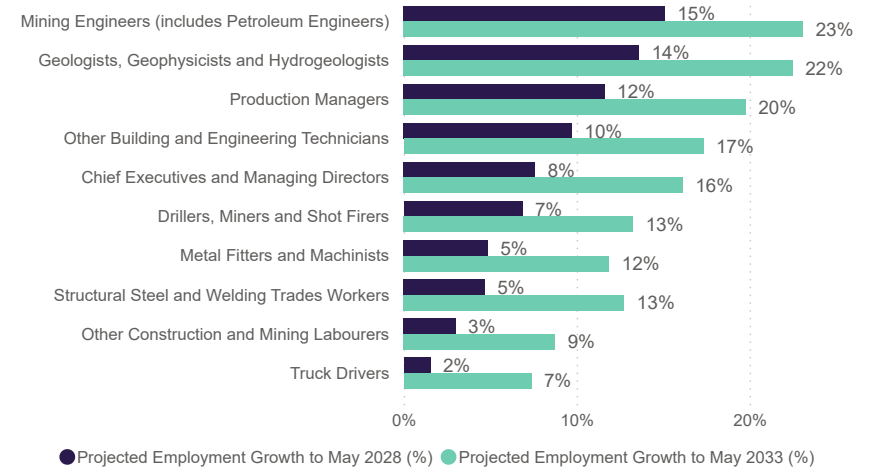
Exploration and other mining support services workforce occupation insights

Figure 38: Exploration and other mining support services workforce occupation insights

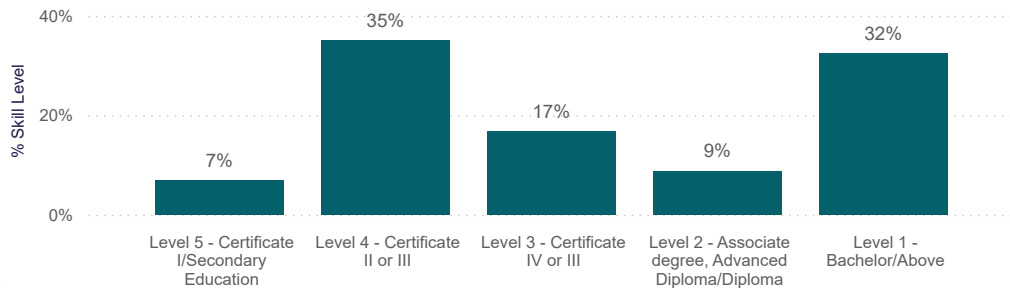
(e) Top 10 ANZSCO Occupations by Workforce Numbers



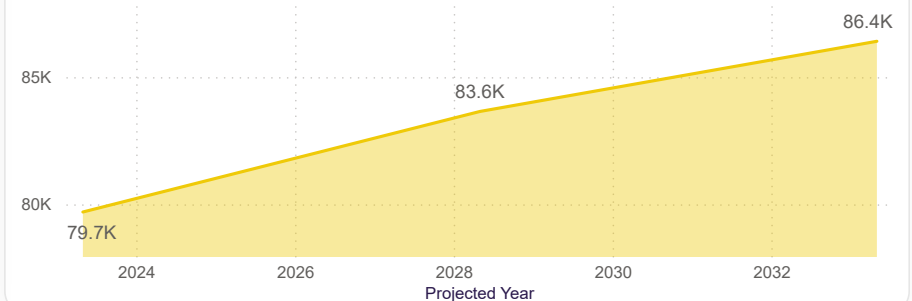
(f) Employment Projections by ANZSCO Occupations



(g) Exploration and Other Mining Support Services Workforce Occupation Skill Level Commensurate with



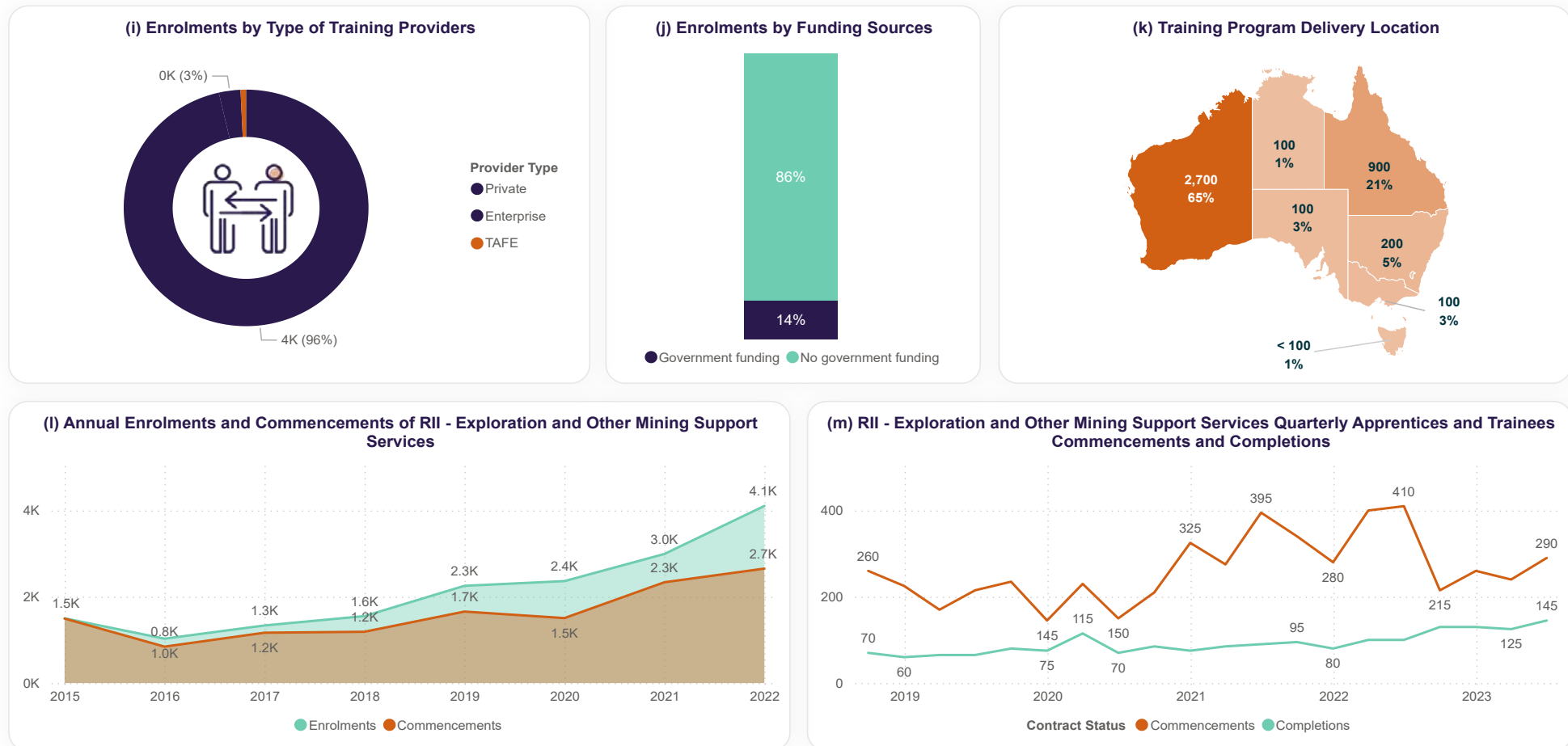
(h) Employment Projections of Exploration and Other Mining Support Services



Sources: (e) ABS Table Builder 2021 Census - INDP Industry of Employment, OCCP Occupation | JSA Skills Priority List 2023. 4-dig SPL(ANZSCO 2013) (f) Employment Projections produced by VU for JSA (May 2023 to May 2033) (g) ABS Table Builder 2021 Census - employment, income and education (OCSKP Occupation Skill Level by INDP Industry of Employment) (h) Employment Projections produced by VU for JSA (May 2023 to May 2033)

RII exploration and other mining support services training package insights

Figure 39: RII exploration and other mining support services training package insights



Sources: (i) NCVER. 2023. TVA program enrolments 2022 (VOCSTATS). Adelaide (j) NCVER. 2023. TVA program enrolments 2022 (VOCSTATS). Adelaide (k) NCVER. 2023. TVA program enrolments 2022 (VOCSTATS). Adelaide (l) NCVER. 2023. TVA program enrolments 2015-2022 (VOCSTATS). Adelaide, December (m) NCVER. 2023. Apprentices and trainees, Sep 2018 - Jun 2023 (VOCSTATS). Adelaide **Note:** Figure (m) Apprentices and Trainees commencements and completions are rounded to nearest 5. 2. Figure (k) The enrolments are rounded to nearest 100.

Exploration and other mining support services workforce demographics

With an overall workforce of just under 78,000, the exploration and other mining support services sector has been steadily expanding from 41,800 workers in 2019 (four-quarter average, February 2019 to November 2019)¹⁴⁹. JSA's Employment Projections anticipate a further 8% growth through 2033, which would see the workforce consist of 86,400 workers.

A challenge for the sector in continuing its workforce expansion is the fact that 8 out of the sector's top 10 occupations number of workers are identified by the 2023 Skills Priority List as experiencing a shortage, [Figure 38 \(e\)](#). Tellingly, all top 6 occupations are experiencing a skills shortage, including the highly specialised roles of geologists, geophysicists, and hydrogeologists.¹⁵⁰

Geologists, geophysicists, and hydrogeologists roles in the exploration sector, which are also identified as critical clean energy occupations, are forecast to grow by 22.5% over the coming years, [Figure 38 \(f\)](#). Coupled with persistently high vacancies in the market this occupation is one of the sector's key pain points.^{151 152}

Geologists, geophysicists, and hydrogeologists roles in the exploration sector, which are also identified as critical clean energy occupations, are forecast to grow by 22.5% over the coming years

Equally important are drillers and driller's offsiders, who are qualified through the VET system. These workers are also in shortage and are expected to grow by over 13% in the coming nine years, [Figure 38 \(f\)](#).

Not unlike metal ore mining, much of the exploration and other mining support services workforce is in Western Australia (59%), followed by Queensland (23%) and South Australia (6%), [Figure 37 \(b\)](#).

The sector has a female workforce representation of 21%, with younger workers (10% < 25) just staying ahead of those who are nearing retirement (9% 60+). With a greater reliance on specialised occupations – such as geologists, metallurgists, and mining engineers – it is not surprising that this sector has the highest proportion of its workforce with the highest qualification coming from higher education (28%), [Figure 37\(d\)](#). VET still plays an important part, especially for drillers and driller's offsiders, with 44% of the workforce having a VET qualification as their highest qualification attained, [Figure 37\(d\)](#).

Enrolments within relevant RII qualifications for this sector broadly follow the workforce's geographic distribution around Australia, with overall enrolments growing in line with the industry's workforce. By the end of 2022, 4,100 students were enrolled in relevant RII qualifications for this sector, [Figure 38 \(i\)](#). Noting that enrolments are related to commencements, the trend of increasing commencements and enrolments is expected. The growing gap could reflect several factors that would need further investigation; these include students opting for longer courses, deferring their studies, or shifting to part-time study. Each of these choices delays their completion, increasing the discrepancy between commencements and enrolments.

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

150 Jobs and Skills Australia. *'Skills Priority List'*. 2023

151 Jobs and Skills Australia. *'Employment Projections'*. 2023

152 Jobs and Skills Australia. *Internet Vacancy Index*, ANZSCO4 Occupations, States and Territories – Feb 2024 (4-quarter average). 2024

Exploration and other mining support services key workforce drivers

Exploration drilling can be a physically demanding, albeit well-paid, occupation that requires working in some of Australia's most remote regions.¹⁵³ Occupations within the exploration drilling sector offer a unique opportunity for workers seeking variety, high pay, and manual labour. Variety comes in the form of a very project-based work environment, especially for those who work for drilling and exploration contractors, creating a higher level of transiency for the sector.

As highlighted in this sector's [overview](#), exploration and drilling expenditure follows the cyclical nature of commodity pricing, creating a greater level of flux in the workforce. It is not surprising that the combination of harsh working conditions, transiency and work flux has been shown to bring about staff turnover rates 2 to 3 times higher than other mining sectors.¹⁵⁴ This will continue to create significant workforce planning challenges to the sector, though technological advancements may assist.

drones, more advanced unmanned aerial vehicles, automatic spectroscopic scanning of drill cores and automatic data processing are examples of technologies that are emerging in the exploration sector

Much like other sectors within the mining industry, technological innovations are rapidly changing the way some tasks are performed. The use of drones, more advanced unmanned aerial vehicles, automatic spectroscopic scanning of drill cores and automatic data processing are examples of technologies that are emerging in the exploration sector.¹⁵⁵

Other locally led innovations in the drilling and exploration space include the introduction of Hyperspectral logging technologies (HyLogging), which greatly improves the accuracy and efficiency of mineral sample characterisations.¹⁵⁶

While such innovations are designed to achieve more with the existing workforce, they could also help attract new entrants to the industry. Equally, advanced technologies in this sector could also create the challenge of having to upskill the existing workforce with higher digital skills.

¹⁵³ Australian Drilling Industry Association. *Looking for a Career in Drilling?* 2024.

¹⁵⁴ D. S. Houghton. *Long-distance Commuting: a new Approach to Mining in Australia*. The Geographical Journal. 1993

¹⁵⁵ Kazuya Okada. Breakthrough Technologies for Mineral Exploration. *Mineral Economics* 35. 2022.

¹⁵⁶ CSIRO. *HyLogging: saving millions through automated drill core logging*. 2019.





**Mining and
Automotive**
Skills Alliance

The Mining and Automotive Skills Alliance (AUSMASA)
is a Jobs and Skills Council funded by the
Australian Government Department of Employment and Workplace Relations.

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Appendix

Key stakeholders and engagement strategies

Appendix A

AUSMASA recognises the important contribution industry, peak bodies, unions, STAs, government departments (both state and federal), the education sector and other JSCs make in the successful execution of AUSMASA's workforce planning, industry stewardship, training product development and implementation, promotion, and monitoring functions.

[Appendix E](#) lists the key stakeholders currently being engaged with by AUSMASA, noting this list is constantly expanding and evolving. [Appendix E](#) identifies key stakeholders by industry (mining and automotive), by government department and education provider type (public and private).

Within the mining and automotive industry stakeholder lists, further classification is made for employers, unions, OEMs, industry associations, and peak bodies.

Employers and unions are critical for receiving granular feedback on industry movements, challenges and opportunities at specific sites and among particular job roles. On the other hand, industry and peak bodies can provide valuable industry-wide insights on trends, challenges, and opportunities and are often able to leverage their large membership base to gain in-depth survey data.

OEMs provide up-to-date intelligence on the technologies that will shape the future workforce of the mining and automotive industries and are often keenly involved in training initiatives for such new features.

STAs and government departments are key sources of policy priorities, including funding training, investment in TAFE infrastructure, strategies impacting work health and safety, and localised workforce transformation challenges.

Public and private education providers are critical for ensuring the delivery considerations of training products are understood, with providers also offering industry insights from a training and education perspective.

AUSMASA acknowledges the vital importance of its partnership with DEWR, JSA, and the NCI as key contributors to the success of the JSC model. Close working relationships with DEWR, JSA, and the NCI are upheld at the executive leadership level.

It should be noted AUSMASA is applying a diverse range of strategies to ensure key stakeholders are consulted, and projects are driven by industry needs, considering the needs and perspectives of individual states and territories.

Existing engagement activities

Appendix B

AUSMASA has implemented a range of strategies to engage with and be informed by key stakeholders. These activities are identified below.

Direct stakeholder engagement

AUSMASA is keenly interested in connecting widely with the mining and automotive industries, and while several formal engagement mechanisms are detailed below, the Industry Engagement team within AUSMASA stands ready and willing to engage with stakeholders at any time.

The AUSMASA team regularly attends and supports key industry events, conventions, and conferences around Australia to connect with a wide array of stakeholders. The Industry Engagement team is prepared to connect as required with interested stakeholders to discuss concerns and insights or explore opportunities for the mining and automotive industries. Such meetings can occur in person or online.

AUSMASA has staff based in Western Australia, Queensland, and Victoria and regularly visits other states and territories in both metropolitan and regional locations.

AUSMASA aims to respond to industry enquiries within 2 business days.

Strategic Workforce Advisory Panels (SWAP)

AUSMASA's Strategic Workforce Advisory Panels represent a key tripartite engagement strategy. In this strategy, key industry insights and trends are shared with AUSMASA, and recommended projects are considered for endorsement.

Each panel consists of 15 members, including employers, unions, education provider peak bodies (both TAFE and private RTOs), industry associations, and OEMs. The selection of each panel's members was completed in September 2023, and each panel meets 4 times per year.

The composition of each SWAP panel was guided by a range of strategic objectives, including the desire to aim for gender balance, broad geographic representation, a diversity of organisation types and the appointment of members with detailed industry insights.

The membership composition of both SWAPs is available in [Appendix D](#) of this plan.

Technical Advisory Groups (TAGs)

Technical Advisory Groups (TAGs) are established in support of specific projects and are designed to provide subject matter expert advice and guidance throughout the training product development process.

The number of TAGs constituted at any given time will depend on the quantum of projects underway with AUSMASA. TAGs consist of 12–15 members, with meetings generally occurring monthly for the duration of the project.

As per the guiding principles of SWAPs, TAG members will comprise employers, unions, relevant industry groups and associations as well as education providers.

Industry and education provider roundtables

AUSMASA aims to hear from industry all throughout Australia, noting different regions, rural and remote communities, and certain locations have unique opportunities and challenges that need to be understood.

In addition to the engagement strategies already identified, AUSMASA conducts a range of industry and education provider roundtables, forums, and workshops throughout Australia. These roundtables are open to any interested stakeholder and are offered free of charge.

Roundtables allow participants to hear directly from AUSMASA about the status of current and planned projects. The roundtables feature a facilitated session whereby participants can directly share their insights into candidate attraction and retention issues and opportunities, how well the VET system and current qualifications are serving their needs, and any emerging trends the industry feels will have an impact in the near future.

The insights gained by these roundtables feed directly into AUSMASA's stakeholder insights ecosystem and are used to inform future bodies of work to assist the industry.

Roundtables are run separately for each industry.

State Training Authorities and government departments

AUSMASA values the importance of maintaining collaborative engagement with all relevant STAs and applicable government departments, both state and federal.

Members of AUSMASA's executive leadership team organise engagements with STAs and government departments through regular communication and meetings.

Planned engagement activities

Appendix C

Additional engagement activities are planned to be introduced soon to further enhance AUSMASA's ability to gain valuable industry insights.

Skills Forum 2024

Building on the success of 2023's CMEV, [Critical Minerals Electric Vehicle Skills Forum \(page 20\)](#), AUSMASA will host a Skills Forum in the second half of 2024.

This forum will bring together key stakeholders from across the automotive and mining industries, including employers, unions, OEMs, education providers and government, for a facilitated deep dive into the skills, challenges, and opportunities facing both industries.

As was the case with CMEV, AUSMASA will employ the Rapid Consensus Building approach to the day's activities to derive meaningful plans and next steps for both industries. **Details for the Skills Forum are being finalised.**

The AUSMASA Pulse of the Industry Survey

A new engagement strategy AUSMASA will discuss with key stakeholders is the concept of a broad-ranging survey to gain insights into attraction and retention, emerging trends and satisfaction with specific qualifications and programs.

Noting AUSMASA's stakeholders, especially key industry bodies, have access to large databases of industry participants, it is envisaged that any such survey would be conducted in partnership with these organisations.

Discussions around how such a survey would work are planned to commence in June 2024 with the first survey proposed for October–November, in time to add insights into the next annual workforce plan.

Briefing sessions for STAs and industry regulators

Following on from the dedicated introductory meetings held by AUSMASA with STAs in 2023, the Training Products and Implementation team have commenced regular briefings to keep STAs and industry regulators abreast of projects being undertaken by AUSMASA and seek specific feedback on state and territory priorities.

Creation of a Thought Leadership Network

The mining and automotive industries are at the forefront of technological innovation and exciting new trends and opportunities. While many of AUSMASA's engagement strategies focus on understanding the industry's current and emerging needs, it is equally important to keep an eye on the future pipeline of technology, disruption, and opportunities.

AUSMASA will look to establish a Thought Leadership Network to bring together futurists and experts in the technologies that will shape the future of the mining and automotive industries and other key industry leaders. **The Thought Leadership Network is in its early stages of conceptual development.**

Collaboration with other Jobs and Skills Councils

AUSMASA is privileged to work alongside 9 other dedicated JSCs, who all share the common aim of assisting the industries we represent to thrive.

Many of the challenges and opportunities faced by the mining and automotive industries are shared by others too. Innovative and impactful solutions often benefit from collaborative efforts.

The CEOs of all 10 JSCs meet at least quarterly to share lessons and challenges and identify opportunities for collaborative solutions. In addition to these quarterly CEO meetings, AUSMASA is proposing to discuss 2 additional JSC-wide collaboration opportunities with the other JSCs.

The first proposal will be to work on a large multi-industry career map, highlighting the career entry, progression, and mobility available in Australia's modern workforce. The ability to jointly explore inter-industry linkages, entry and exit points between industries and the shared skills required to make such journeys possible would offer deeper insights into common development opportunities within each JSC's respective training packages and serve as a visual tool for career exploration.

Secondly, AUSMASA proposes the joint hosting by all JSCs of a 'State of the Nation' forum, with a particular focus on technology and its impact on future workforces across multiple industries. The ability to get key stakeholders from multiple industries to collaborate and explore potential solutions to a changing workforce landscape could give rise to an ongoing signature event for the JSC network.

AUSMASA also recognises the mining and automotive industries are naturally closely aligned with other industries, such as oil and gas, transport and logistics, manufacturing, digital skills, and building and construction. It makes sense to seek out close working relationships with the JSCs supporting these industries.

This plan has already highlighted opportunities to work with Future Skills Organisation on improving digital literacy skills and Public Skills Australia on first responder training in relation to EV accidents.







Additionally, AUSMASA will work with BuildSkills Australia, who share elements of the RII training package. This will ensure any work on the package considers the needs of both the mining and civil construction industries.







Engagement with Industry Skills Australia, which represents the transport industry, will likely revolve around the shared exploration of the impact of hydrogen and driverless technologies on heavy transport and opportunities that arise as part of the broader critical mineral strategy as it relates to supply-chain implications from increased onshore refining and processing.

Finally, engaging with the Powering Skills Organisation, which represents energy, oil and gas, and renewables, will likely revolve around shared workforce challenges between mining and the oil and gas industry, noting numerous critical trade roles are shared across both industries.

SWAP members

Appendix D

Mining SWAP Members	Name	Title	Organisation
	Ben Lewis	Managing Director	One Key Resources
	Elizabeth Gibson	General Manager	Construction Material Processors Association
	Jodie Badcock	Chief Executive Officer	Resources and Engineering Skills Alliance
	Karolina Szukalska	General Manager of Workforce and Innovation	Minerals Council of Australia
	Osama Ali	Regional Manager	Product Safety and Compliance, Caterpillar
	Robert Petherbridge	Executive Director of Commercial Business	TAFE Queensland
	Scott Layton	Leadership Projects	BHP

Mining SWAP Members	Name	Title	Organisation
	Shane Roulstone	National Organising Director	Australian Workers Union
	Stephen Watts	Industry Safety and Health Representative	Queensland's Mining and Energy Union
	Tim Westcott	Director and Vice President	Australian Drilling Industry Association
	Troy Cook	Strategic Workforce Advisor	Into Work/MAS National
	Vanessa Skipworth	General Manager	Tasmanian Minerals, Manufacturing and Energy Council
	Zane Hughes	Project Lead Researcher	Cooperative Research Centre for Transformations in Mining Economies

Key Stakeholders

Appendix E

Mining Industry Stakeholders

Employers	Industry Associations / Peak Bodies
Arafura Rare Earths	Association of Mining and Exploration Companies (AMEC)
BHP	Austmine
BHP Mitsubishi Alliance	Australasian Institute of Mining and Metallurgy (AusIMM)
Evolution Mining	Australian Drilling Industry Association (ADIA)
Fortescue	Chamber of Minerals and Energy WA (CME)
Glencore	Coal Services NSW
Idoba	Construction and Mining Equipment Industry Group (CMEIG)
IntoWork	Construction Material Processors Association (CMPA)
Locating Unlimited	Minerals Council of Australia (MCA)
Minerals Resources	Resource and Engineering Skills Alliance (RESA)
One Key Resources	Resource Industry Training Council (RITC)
Programmed Skilled Workforce	Tasmanian Minerals, Manufacturing and Energy Council (TMEC)
Rio Tinto	Australian Resources & Energy Employer Association (AREEA)

Mining Industry Stakeholders (cont.)

Original Equipment Manufacturers	Unions
Barmincio	Australian Workers Union (AWU)
Caterpillar	Mining and Energy Union (MEU)
Hastings Deering	
Hitachi	
Komatsu	
Liebherr	
Murray Engineering	
Normet	
Westrac	
William Adams	
Epiroc	
3ME Technology	

Education Providers

Public Education Providers	Private Education Providers
Box Hill Institute	Aveling
Canberra Institute of Technology (CIT)	I-CAR
Central Queensland University (CQU)	Independent Tertiary Education Council of Australia (ITECA)
Central Regional TAFE (WA)	Komatsu
Charles Darwin University	Monarch
Griffith University	MTA Institute
Bendigo Kangan TAFE	MTA NSW
North Metropolitan TAFE (WA)	MTA SA/NT
North Regional TAFE (WA)	MTA WA
South Metropolitan TAFE (WA)	MTAQ
South Regional TAFE (WA)	Trainwest
Central Regional TAFE	Volkswagen Group Australia
Sydney University	Westrac
TAFE Directors Australia (TDA)	WorkSafe Connect
TAFE NSW	
TAFE QLD	
TAFE SA	
TasTAFE	

Summary of identified areas of focus

Appendix F

Mining industry

Higher education and pathway opportunities

M1. AREA OF FOCUS

Reversing the trend of declining enrolments in engineering (especially mining-related) and Earth Sciences degrees is key. Initiatives such as Degree Apprenticeships may assist the higher education sector, and industry, to attract, support and retain students into such specialised fields. Industry would be well placed to work closely with the higher education sector in exploring how Degree Apprenticeships could be adopted.

M2. AREA OF FOCUS

AUSMASA will investigate initiatives such as higher apprenticeships. This work, coupled with ongoing work to identify the skills needs and career progression pathways for critical roles within the mining and automotive industries, will aim to offer innovative solutions for industry.

M3. AREA OF FOCUS

AUSMASA will monitor the changes to trainer qualification requirements in addressing trainer shortages and accessibility of vocational education and training, while also working closely with other JSCs to explore broader strategies required to encourage more people to consider engaging with the VET sector as a trainer and assessor.



M4. AREA OF FOCUS

AUSMASA will conduct further research into both the unequal geographical distribution and the longer-term decline of RII qualification enrolments within the metal ore mining sector.

Community perceptions of the mining industry

M5. AREA OF FOCUS

AUSMASA will continue to work closely with industry and the National Careers Institute (NCI) to explore ways of better promoting the full breadth of career opportunities within the mining industry.

Diversified workforce

M6. AREA OF FOCUS

The industry should continue to encourage and support female employment opportunities across all occupations within the mining industry, with the aim of addressing the existing gender pay gap and ensuring comprehensive workforce diversification.

Digitisation and automation

M7. AREA OF FOCUS

AUSMASA, in partnership with industry and employee representatives, will ensure digitisation and automation training programs and support mechanisms are in place to harness each worker's existing skills and impart new skills.

Technological advancement

M8. AREA OF FOCUS

Given digital skills and digital literacy is a core aspect of technological advancement, AUSMASA will continue to work closely and collaboratively with the JSC responsible for digital skills – the Future Skills Organisation – while conducting its own work around skills mapping.

Mine closure and post-mine land use

M9. AREA OF FOCUS

AUSMASA will continue to work closely with industry and CRC TiME to define what VET programs could be developed to support this important workforce need.

Cultural reform

M10. AREA OF FOCUS

AUSMASA proposes to collaborate with other JSCs to develop an accredited training program, with supporting resources, for developing safe and respectful workplaces. This program would be made available across multiple training packages.

Mental Wellbeing

M11. AREA OF FOCUS

Research is required to quantify the effects of mental health issues on productivity and compensation claims within the mining industry.



M12. AREA OF FOCUS

AUSMASA proposes to collaborate with other JSCs, especially HumanAbility, to investigate the appropriateness of current mental health training programs and packages for remote workers such as those in the mining industry.

First Nations employment and engagement

M13. AREA OF FOCUS

AUSMASA will continue to monitor First Nations training, apprenticeships, and job outcomes to identify best practices and assist in addressing the challenges faced by First Nations individuals in securing and thriving in mining careers. By analysing these outcomes, the industry will have the data it needs to implement targeted strategies and improve support.

Coal Industry – Workforce transformation

M14. AREA OF FOCUS

While capturing the transition to electrification using ANZSCO presents some difficulties, AUSMASA welcomes the release of JSA's Clean Energy Capacity Study and looks forward to providing key insights into this workforce transformation challenge.

M15. AREA OF FOCUS

The VET sector must be ready and responsive to the future transformation of the coal industry workforce. AUSMASA will work closely with the industry to ensure innovative and engaging training programs are available.

Critical minerals

M16. AREA OF FOCUS

Given the significant implications critical minerals will have on Australia's mining and economic future, AUSMASA proposes that the ABS consider creating a new ANZSIC code. This initiative will facilitate and allow accurate workforce planning data to be produced quarterly through the ABS's Labour Force survey.

M17. AREA OF FOCUS

A key priority for AUSMASA will be to work closely with industry and relevant government bodies in identifying any skills gaps within the current workforce and emerging skills required to assist in making these critical mineral strategies a reality. A particular focus will be on determining if current processing-related qualifications will be fit for purpose in relation to onshore refining and processing of critical minerals.

Update on 2023 Identified Opportunities

Appendix G

The following opportunities were identified in AUSMASA's 2023 Initial Workforce Plan 'The Future is Now'. An update on each opportunity is provided below.

Opportunity 1

Given the significant changes happening within the automotive industry with the ongoing growth of battery EVs (light, heavy and mobile plant), the emergence of hydrogen and feedback on the suitability of vocational preparation qualifications in sufficiently promoting all aspects of an automotive career path, AUSMASA proposes to conduct a targeted review of the AUR training package to ensure key elements remain fit for purpose.

Elements of the review would focus on:

- Qualifications with historically low or no enrolments.
- The ability for training providers to train students on the required modern equipment/vehicles to produce credible training outcomes, creating a benchmark of what best practice looks like.
- The potential and desirability of mechanical trade qualifications to incorporate sufficient elements of both EV servicing technology and internal combustion engine (ICE) technology to prevent the need for dual-qualifications and/or skill sets to equip the workforce with the necessary skills to operate in an environment where both types of vehicles will be prevalent for decades to come.

Potential changes to the package's vocational preparation qualifications to ensure they adequately prepare students for higher-level VET training within the automotive industry and suitably expose students to a broad range of skills and vocational opportunities.



STATUS: This opportunity has been progressed via a number of separate projects.

- The qualifications with historically low and no enrolments has been advanced to a fully funded AAS project.
- Equipment requirements and benchmarking of best practice has been captured as part of the CMEV 10-point Strategic Plan and is being viewed as a key Industry Stewardship activity. This will include exploring ways of supporting industry and the VET sector as it relates to accessing appropriate equipment for training.
- The design of mechanical trade qualifications in light of both ICE and EV technologies is progressing with further industry engagement, which will include discussion of how Government EV targets could best be met by upskilling and/or growing the workforce.
- Potential changes to the package's Certificate II qualifications are being progressed via a pilot Automotive Demonstration Project in support of the Qualification Reform Design Group activities.

Opportunity 2

The AUM and RII training packages should also be reviewed for qualifications with historically low or no enrolments, determining their ongoing fit for purpose or other strategies to promote their uptake.

STATUS: Project commenced, see [current projects](#) for more information



Opportunity 3

The Gen-Z research undertaken by AUSMASA has been particularly insightful for establishing Generation Z's views towards the mining industry. While the automotive industry believes that a number of those findings would also hold true for their industry, there is no data to support those views.

Understanding Generation Z's perceptions of the automotive industry would assist in developing specific vocational preparation courses and inform strategies for better promoting the industry to potential new entrants.

As such, a research project to identify the public perception of the automotive industry is proposed.

STATUS: Project commenced, see [current projects](#) for more information

Opportunity 4

AUSMASA proposes to work with key mining industry employers with the view of establishing a research project that collects de-identified exit interview data and explores reasons for workers choosing to change employers within the industry or leave the industry altogether.

Such data would provide valuable insights into what workforce attraction and retention strategies are working, why people choose to leave the industry completely and what role, if any; training opportunities, or lack thereof; or challenges in adapting to new technologies or processes played a part in the worker's decision to leave.

STATUS: Reevaluating best approach, noting Jobs and Skills Australia is conducting research into occupation mobility (Data of Occupation Mobility (DOM)) that should meet the desired outcome of this priority.

Opportunity 5

Understanding the current skills landscape, especially for key roles in both the mining and automotive industries, coupled with a skills map of what will be required in the future for both existing and any new roles, is critical for the development of responsive training packages that meet current and forecasted skills gaps.

AUSMASA proposes undertaking a comprehensive skills mapping exercise for key roles in both industries, for both the current and future state. The key roles of focus will be based on the top roles identified for each industry in this Workforce Plan and further refined through stakeholder feedback.

Aspects of such a project would include:

- Current skills identification of key roles in both industries
- Skills identification of future needs, be they for the same roles or, in the case of role augmentation or transformation, new roles (i.e., critical minerals processing, service and repair of hydrogen vehicles or end-of-life recycling of batteries)
- The development of both present state and future state 'personas'
- Comprehensive skills gap analysis
- Mapping of identified skills against current qualifications

STATUS: Project commenced, see [current projects](#) for more information



Opportunity 6

Utilising the insights gathered from the skills-mapping project, it is proposed that the RII training package elements that deal with mineral processing are reviewed to ensure they are fit for purpose in supporting increased critical minerals onshore refining and processing activities.

STATUS: Pending completion of the skills-mapping project

Opportunity 7

As identified in this plan, car detailers represent a sizable component of the automotive industry workforce. Car detailers would generally be classified as ANZSCO Skill Level 5 occupation where the level of skill is commensurate with an Australian Qualifications Framework (AQF) Certificate I or compulsory secondary education and possibly some on-the-job training. Given car detailer's existing engagement with the industry, AUSMASA proposes to explore what support, including potential Language, Literacy and Numeracy training, is necessary to encourage car detailers to consider a trade in the industry (Light Vehicle Mechanic, Auto Electrician etc).

STATUS: Further industry engagement and research required



Opportunity 8

It has already been identified that skilled migration should play an important part in helping to address skills gaps in the mining and automotive industries. Evidence to date suggests that it is failing to have the full desired impact.

AUSMASA proposes to engage with industry and others to ascertain key barriers to fully utilising skilled migration to assist in addressing skills shortages. As part of this, AUSMASA will seek to understand the relative contribution of employer-sponsored visas to each sector.

This project would also explore the role of Australian international education programs aligned with the mining and automotive industries, with a focus on producing graduates and could assist with skills shortages.

STATUS: Established as a key engagement project for AUSMASA within its industry stewardship remit. Ongoing stakeholder engagement taking place with updated findings and recommendations within this workforce plan.

Opportunity 9

Complementing the skills-mapping project, AUSMASA proposes to undertake a thorough career progression-mapping exercise for both the mining and automotive industries, exploring current pathways for people to join the industries through entry into, through and beyond the VET environment.

Insights gained from this career pathway map could inform the development of new qualifications and skill sets, which could include:



- Specific qualifications and skill sets aimed at helping secondary students, career changers or workers impacted by workforce transformation to gain access to the mining and automotive industries.
- Revised and/or new qualifications and skill sets designed to assist in career progression aligned with the skills that the industry will need both now and in the future.
- Development of higher-education qualifications and/or programs to help workers prepare for and access university-grade disciplines in demand by the mining and automotive industries. Examples could include degree apprenticeships and associate degrees, noting that this supports the focus of the Employment White Paper on higher apprenticeships.

STATUS: Project commenced, see [current projects](#) for more information

Opportunity 10

AUSMASA proposes to monitor the impact of industry initiatives to improve workplace culture, especially as it relates to bullying and sexual harassment. The most useful source of data to inform such progress would be from mining industry employers themselves based on internal reporting and investigation of incidents.

Additional insights would be gained from any changes in trends recorded by the Workplace Gender Equality Agency (WGEA), state-based commissioners and/or regulators and the Australian Human Rights Commission.

STATUS: Updated insights and observations provided in this workforce plan

Opportunity 11

Valuable insights can be learned from investigating how other countries tackle similar skills challenges in their workforce. AUSMASA plans to gain a greater understanding of overseas skills and training strategies with a view of using this to inform other activities identified in this section of the workforce plan.

STATUS: Project scoping continuing

Data Methodology

Appendix H

Explanatory Notes to workforce demographic and occupational insights

AUSMASA's workforce analysis is based on the 2 key government classification systems: ANZSIC and ANZSCO.

- **ANZSIC** (Australian and New Zealand Standard Industrial Classification) classifies businesses into industry sectors, based on the primary activities they are engaged in.
- **ANZSCO** (Australian and New Zealand Standard Classification of Occupations) categorises all occupations and jobs using the skill-based classification.

The total workforce numbers are calculated by aggregating the workforce numbers of ANZSIC 3-digit groups from the Australian Bureau Statistics (ABS) quarterly Labour Force Survey (LFS).

The workforce numbers have been adjusted by averaging the figures for the last four quarters (May 2023 to February 2024) to accommodate the volatility and seasonal impacts on quarterly employment. This methodology also applies to Figure b - total workforce by State/Territory in each data dashboard.

To correctly capture the workforce cohorts relevant to each sub-industry, instead of LFS data, 2021 census data has been utilised to show the workforce characteristics in the age distribution (Figure c), highest education attainment (Figure d), workforce numbers by top occupations (Figure e) and workforce skill levels (Figure g).

Employment Projections

The employment projections in this report (pages 5, 7, 13 and figures f and h of data dashboards) are based on employment projections produced by Victoria University for Jobs and Skills Australia. It is noted the projections are based on a starting point of employment estimated in May 2023 using ABS LFS, which may not align with the employment figures from the latest LFS data (February 2024). It is advised to interpret the projections as how current trends could be expected to play out rather than the precise predictions of the future.

Explanatory Notes to Training Package Insights

The training package enrolments have been grouped by the qualifications that support relevant sub-industries.

- AUM qualifications have been mapped to Automotive Manufacturing sub-industry.
- AUR retail qualifications have been mapped to Automotive retail and wholesale sub-industry.
- AUR service and repair qualifications have been mapped to Automotive repair and maintenance sub-industry.
- RII Coal qualifications have been mapped to Coal mining sub-industry.
- RII field exploration and drilling operations qualifications have been mapped to the Exploration and Other mining support services sub-industry.
- The other RII qualifications are shared among the Metal Ore and Non-metallic mineral and quarrying.

Caveats in interpreting the training package data

The Civil infrastructure qualifications under RII training packages have been excluded as these qualifications are outside of AUSAMSA's scope. BuildSkills Australia is responsible for RII civil infrastructure qualifications.

Data gaps and limitations

- As addressed in the Critical Minerals section, there is a limitation with ANZSIC classifications in identifying the workforce for critical minerals. Even with the most granular level of ANZSIC codes, the workforces for critical minerals have been distributed across multiple ANZSIC classes with the other resource types that are not critical minerals. It would be beneficial to have a dedicated ANZSIC group to reflect the critical mineral workforce.
- Although NCVER enrolment data is useful in identifying trends, the ability for JSCs to also have access to statistical data on enrolments and completions by education providers would be highly useful. Such data could be used to inform specific engagement activities. It is noted that such data would be sensitive and incapable of being published but would still prove useful for internal strategic decision-making.
- NCVER data on apprenticeship commencements and completions is highly useful, though additional insights such as student progression (in terms of time and unit progression) at the time of apprenticeship discontinuation would aid in better identifying opportunities for intervention and redress

The following NCVER data shows enrolment data for the RII Mining training package under AUSMASA's remit. At the time of publication of the 2024 Workforce Plan, the most current enrolment statistics available were for 2022. AUSMASA will provide updated statistics to its stakeholders once 2023 enrolment data becomes available.

TRAINING PACKAGE ENROLMENT DATA, 2022 (page 1)

Resources and Infrastructure (RII Mining Qualifications only)	Total Enrolments	% Male	% Female & Other	Commencements	Total Completions	Apprentices / Trainees	International students	Release Status
RII30120 Certificate III in Surface Extraction Operations	7,043	76%	21%	6,781	707	2,426	0	Current
RII20120 Certificate II in Resources and Infrastructure Work Preparation	4,376	80%	19%	4,219	1,191	65	0	Current
RII20220 Certificate II in Surface Extraction Operations	2,758	75%	22%	2,624	338	226	6	Current
RII30719 Certificate III in Emergency Response and Rescue	2,602	83%	16%	2,091	1,219	0	2	Current
RII31820 Certificate III in Drilling Operations	1,769	98%	2%	1,078	443	606	15	Current
RII20920 Certificate II in Drilling Operations	1,675	95%	5%	1,146	599	462	0	Current
RII30115 Certificate III in Surface Extraction Operations	1,501	84%	16%	624	314	523	0	Superseded
RII30420 Certificate III in Resource Processing	1,433	75%	24%	1,421	128	171	0	Current
RII40220 Certificate IV in Surface Coal Mining (Open Cut Examiner)	1,215	83%	14%	1,155	68	0	0	Current
RII20320 Certificate II in Underground Coal Mining	1,111	88%	12%	1,080	19	161	0	Current
RII20420 Certificate II in Underground Metalliferous Mining	661	79%	21%	601	253	51	0	Current
RII30220 Certificate III in Underground Coal Operations	600	96%	4%	545	68	87	0	Current
RII20215 Certificate II in Surface Extraction Operations	529	90%	10%	333	29	26	0	Superseded
RII40920 Certificate IV in Drilling Operations	508	97%	2%	324	137	168	1	Current
RII20515 Certificate II in Resource Processing	419	94%	6%	366	15	17	0	Superseded
RII21120 Certificate II in Oil & Gas Drilling (Onshore) and Well Servicing	418	92%	2%	341	121	10	0	Current
RII50120 Diploma of Surface Operations Management	377	88%	12%	341	126	19	0	Current
RII40420 Certificate IV in Underground Coal Operations	308	97%	3%	235	44	0	0	Current

TRAINING PACKAGE ENROLMENT DATA, 2022 (page 2)

Resources and Infrastructure (RII Mining Qualifications only)	Total Enrolments	% Male	% Female & Other	Commencements	Total Completions	Apprentices / Trainees	International students	Release Status
RII32220 Certificate III in Well Servicing Operations	207	100%	0%	154	40	0	0	Current
RII40120 Certificate IV in Surface Extraction Operations	206	94%	4%	194	64	9	0	Current
RII20213 Certificate II in Surface Extraction Operations	190	87%	12%	174	0	0	0	Superseded
RII30415 Certificate III in Resource Processing	159	89%	11%	115	26	37	0	Superseded
RII20115 Certificate II in Resources and Infrastructure Work Preparation	141	70%	29%	126	0	0	0	Superseded
RII30320 Certificate III in Underground Metalliferous Mining	122	87%	7%	112	26	8	0	Current
RII30113 Certificate III in Surface Extraction Operations	98	78%	15%	67	0	0	0	Superseded
RII50620 Diploma of Drilling Operations	87	100%	0%	69	31	0	0	Current
RII40320 Certificate IV in Underground Metalliferous Mining Operations	85	93%	6%	51	30	0	0	Current
RII41220 Certificate IV in Well Servicing Operations	80	100%	0%	65	24	0	0	Current
RII50920 Diploma of Underground Coal Mining Management	78	85%	15%	64	14	0	0	Current
RII51020 Diploma of Well Servicing Operations	76	100%	0%	73	40	0	0	Current
RII31619 Certificate III in Trenchless Technology	72	100%	0%	59	19	60	0	Current
RII10115 Certificate I in Resources and Infrastructure Operations	69	55%	45%	69	33	0	0	Current
RII32020 Certificate III in Drilling Oil & Gas (Onshore)	66	97%	0%	55	37	0	0	Current
RII41120 Certificate IV in Drilling Oil & Gas (Onshore)	55	100%	0%	46	38	0	0	Current
RII50115 Diploma of Surface Operations Management	53	89%	11%	2	15	0	0	Superseded

TRAINING PACKAGE ENROLMENT DATA, 2022 (page 3)

Resources and Infrastructure (RII Mining Qualifications only)	Total Enrolments	% Male	% Female & Other	Commencements	Total Completions	Apprentices / Trainees	International students	Release Status
RII50820 Diploma of Drilling Oil & Gas (Onshore)	49	96%	0%	32	33	0	0	Current
RII40213 Certificate IV in Surface Coal Mining (Open Cut Examiner)	35	60%	34%	30	0	0	0	Superseded
RII41319 Certificate IV in Emergency Response Coordination	35	83%	17%	31	2	0	0	Current
RII20520 Certificate II in Resource Processing	24	75%	25%	22	5	25	0	Current
RII30520 Certificate III in Mining Exploration	24	92%	8%	28	10	0	0	Current
RII40315 Certificate IV in Underground Metalliferous Mining Operations	20	100%	0%	13	0	0	0	Superseded
RII20415 Certificate II in Underground Metalliferous Mining	18	100%	0%	14	20	0	0	Superseded
RII31815 Certificate III in Drilling Operations	18	89%	11%	0	0	11	0	Superseded
RII60320 Advanced Diploma of Underground Coal Mining Management	18	100%	0%	9	9	0	0	Current
RII30111 Certificate III in Surface Extraction Operations	17	88%	12%	11	0	0	0	Superseded
RII40415 Certificate IV in Underground Coal Operations	17	100%	0%	0	0	0	0	Superseded
RII60415 Advanced Diploma of Drilling Management	16	100%	0%	6	11	0	2	Current
RII40115 Certificate IV in Surface Extraction Operations	15	100%	0%	17	6	0	0	Superseded
RII30315 Certificate III in Underground Metalliferous Mining	14	100%	0%	2	6	8	0	Superseded
RII40215 Certificate IV in Surface Coal Mining (Open Cut Examiner)	14	100%	0%	7	0	0	0	Superseded
RII60220 Advanced Diploma of Extractive Industries Management	11	100%	0%	5	3	0	0	Current

TRAINING PACKAGE ENROLMENT DATA, 2022 (page 4)

Resources and Infrastructure (RII Mining Qualifications only)	Total Enrolments	% Male	% Female & Other	Commencements	Total Completions	Apprentices / Trainees	International students	Release Status
RII50915 Diploma of Underground Coal Mining Management	10	100%	0%	0	0	0	0	Superseded
RII32218 Certificate III in Well Servicing Operations	6	100%	0%	0	0	0	0	Superseded
RII41115 Certificate IV in Drilling Oil & Gas (On shore)	6	100%	0%	0	0	0	0	Superseded
RII60215 Advanced Diploma of Extractive Industries Management	6	67%	33%	0	0	0	0	Superseded
RII20915 Certificate II in Drilling Operations	5	100%	0%	0	0	4	0	Superseded
RII30715 Certificate III in Mine Emergency Response and Rescue	4	100%	0%	0	4	0	0	Superseded
RII20620 Certificate II in Mining/Field Exploration	2	100%	0%	2	0	2	0	Current

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