MINERALS COUNCIL OF AUSTRALIA

INQUIRY INTO AUSTRALIAN UNIVERSITY GRADUATES

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1. EXECUTIVE SUMMARY

The future success of Australia's minerals industry – and in turn the nation's prosperity and resilience – will depend on university graduates with the skills, experience and qualifications required to meet current and emerging workforce needs.

There is a clear and growing misalignment between graduate outcomes and labour market demand, reflected in persistent shortages in key disciplines including mining engineering, metallurgy, geoscience and related STEM fields, along with declining enrolments and limited industry exposure.

If this is not fixed, mining will be handicapped in its ability to support economic growth and meet strong and growing demand for our energy resources, metals and critical minerals.

While Australia's universities continue to provide solid technical foundations, many graduates enter the workforce without the applied, cross-disciplinary and digital capabilities required in modern, technology-enabled mining operations.

Closing this gap requires concerted, urgent and coordinated action across higher education, industry and government.

This submission focuses on two core issues: boosting the quality and sustainability of minerals-related university programs, and better alignment between graduate skills and industry needs.

Structural pressures are affecting course viability; the domestic pipeline in key disciplines is fragile, and there is a clear need for improved integration of industry-informed capability development within tertiary education.

A coordinated, system-wide response can build on existing reforms – including the Universities Accord, the proposed Australian Tertiary Education Commission, and the work of Jobs and Skills Australia – with effort focused on implementation and alignment, rather than adding more layers of duplication.

Priority actions include:

- Expanding Commonwealth Supported Places in mining-relevant and strategically important disciplines, particularly in regional institutions
- Introducing targeted course viability funding for low enrolment but high-impact programs
- Embedding industry and workforce data into tertiary planning, funding and performance frameworks
- Prioritising strategic disciplines and diversified STEM pathways, including interdisciplinary and applied learning models.

These measures will strengthen alignment between education outcomes and workforce demand, support the sustainability of critical programs and improve graduate work readiness.

2. THE IMPORTANCE OF TERTIARY EDUCATION TO INDUSTRY

Mining in Australia is a sophisticated and technologically advanced enterprise that requires a highly skilled and adaptable workforce. In 2025, the mining industry employed more than 300,000 workers across Australia in secure, full-time, highly paid jobs.[1]

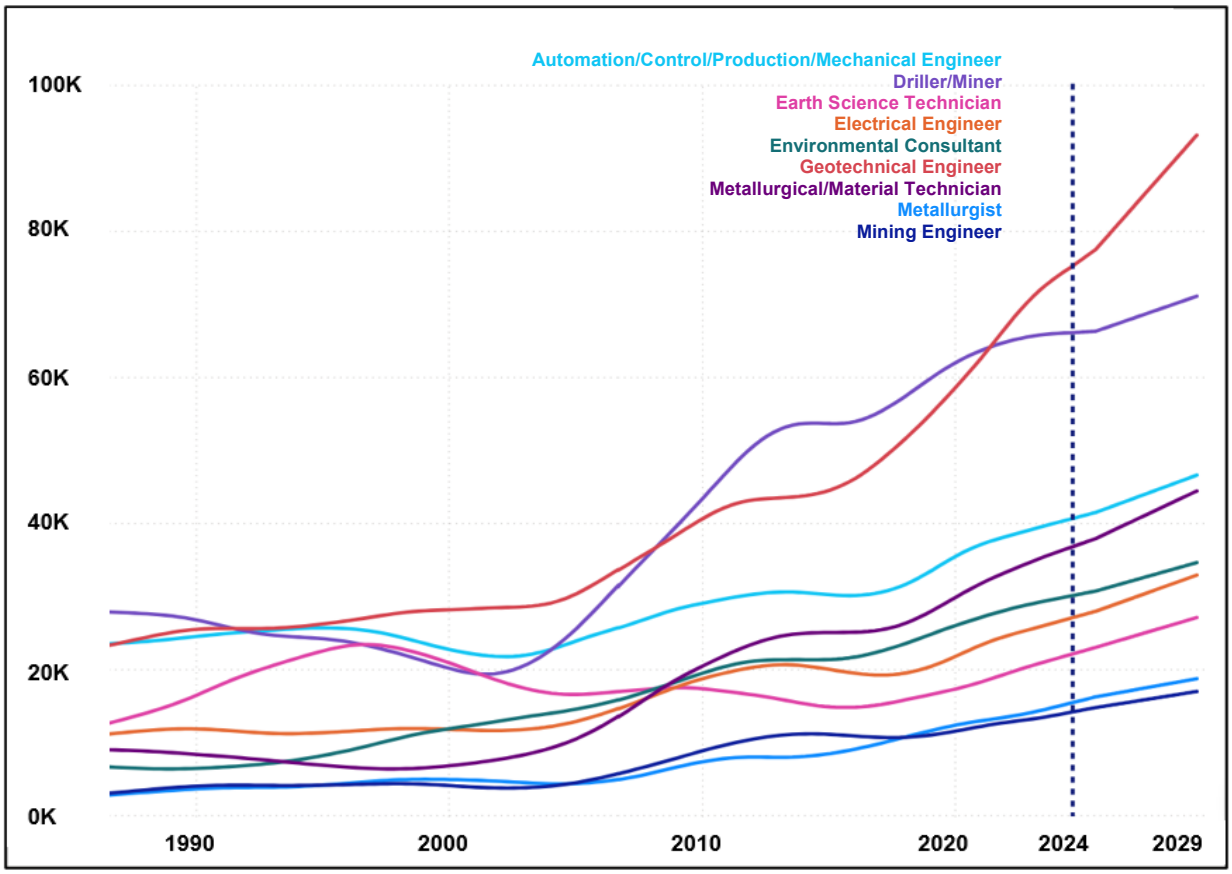
The soaring demand for Australia's world class metals and minerals will continue to be driven by increasing global urbanisation, electrification and investment in low-emissions power generation. If Australia is to make the most of these global megatrends, our industry must attract and retain a diverse, highly skilled workforce.

This means urgently expanding and future-proofing the mining skills pipeline to meet current and emerging workforce demands and to reduce or eliminate persistent labour shortages across a range of critical scientific fields and professional occupations, including engineers, metallurgists, geologists and other specialist engineering disciplines.

This is no longer an abstract future problem, but a clear and present danger for Australia's minerals sector.

Over the past decade, the mining workforce has grown by more than 80,000 jobs, with a further 70,000 projected to be added by August 2029. This sustained growth, including projected increases of more than 20 per cent across most core technical occupations such as engineers, geoscientists and technical specialists, is within a tightening labour market and has contributed to acute skills shortages across the industry.

Figure 1: Employment trend by occupation (including predictions from 2024-2029)



Source: 2025, La Trobe University Minerals Industry Workforce Profile Dashboard

[1] Australian Bureau of Statistics, *Labour Force, Australia, Detailed, Quarterly: February 2026*, 26 March 2026, table 6.

Skilled workers are already in high demand for infrastructure projects, such as technology and low-emissions energy, the 2032 Brisbane Olympics, defence, advanced manufacturing, AI and cybersecurity.

Meanwhile, Australian mining cannot find enough people to fill critical roles including geotechnical and processing engineers, metallurgists, geologists and mine surveyors.

Australia's higher education system has a critical role in strengthening and expanding the pipeline of graduates in these disciplines to meet current shortages and support sustained industry growth.

Universities and industry must work in lockstep to ensure graduates are equipped with the technical, digital and interdisciplinary capabilities required in modern mining operations.

Without targeted investment in tertiary education capacity and capability, Australia risks falling short of the skills needed to sustain productivity and competitiveness in the resources sector – risking not only the future success of mining, but future national prosperity and resilience.

3. QUALITY OF UNIVERSITY EDUCATION IN AUSTRALIA

Australia's higher education system and the mining industry

Strong and viable minerals-related university programs, including mining engineering, geoscience and metallurgy, give Australia the capacity to maintain a competitive, innovation-driven minerals sector and support critical minerals supply chains.

They equip graduates with the technical and operational capabilities required for safe, productive and sustainable resource development.

While these programs build essential foundational capability, there remains a gap between graduate readiness and the practical demands of industry, requiring employers to invest further in skills development.

This mismatch is compounded by the contraction or closure of key specialist departments, even as demand for skilled graduates rises.

Universities including Newcastle and Macquarie have closed entire departments, while others have merged schools or reduced course offerings.

In some cases, continued provision now depends on significant industry support, such as the $1.25 million grant from the NSW Minerals Council to the University of Wollongong. This trend threatens Australia's long-term capability in critical disciplines and underscores the need for coordinated action to sustain these programs.

These critical system-wide pressures are reflected not only in the current capability gap but in the fragility of the graduate pipeline itself, which is constrained by structural barriers across both undergraduate pathways and program sustainability.

Mining engineering provides a clear example of the structural challenges facing minerals-related university programs in Australia. Box 1 outlines the instability of the graduate pipeline.

Box 1: Mining engineering – recovery masking structural fragility

- Graduate numbers fell sharply from 282 in 2015 to 68 in 2021 before recovering to 320 in 2025, largely driven by postgraduate coursework
- This masks ongoing weakness in undergraduate completions, which have remained low since 2019 and sit below indicative viability thresholds
- As a result, many mining engineering schools are increasingly reliant on Masters programs, often supported by full-fee international students
- While lifting overall numbers in the short term, this approach raises ongoing sustainability concerns, given variable international demand and uncertain retention in the Australian workforce.

Source: Australian Network of Mining Engineering Educators (ANMEE), *2025 Australian Graduate Mining Engineering Statistics Report*.

This case study highlights a broader issue across specialised STEM disciplines: headline graduate numbers may appear to have stabilised, but the underlying domestic pipeline and long-term viability of university programs remain fragile without continued external support and industry collaboration.

History repeating: enduring challenges in specialist minerals education

These pressures are not unprecedented and reflect structural challenges confronting specialised minerals-related education over several decades. In the late 1990s, unsustainably low enrolments were identified as a material risk to the quality and continuity of Australia's professional workforce.

The MCA's *Back from the Brink* review concluded maintaining high-quality minerals education required long-term, structural responses including stronger industry-university collaboration and diverse, industry-aligned pathways, rather than measures such as merging under-subscribed programs.

These findings led to the establishment of the Minerals Tertiary Education Council (MTEC) in 1999 as an enduring partnership to strengthen education quality and secure a sustainable pipeline of specialist professionals. Box 2 provides a snapshot of some of the outcomes delivered through MTEC.

Box 2: MTEC outcomes

- Building awareness of engineering careers among Indigenous secondary students through the Indigenous Australian Engineering Schools program, delivering strong outcomes including 98 per cent Year 12 completion, 25 per cent progression to STEM and 80 graduates in 2023
- Delivering nationally coordinated capstone metallurgy training through the Metallurgical Education Partnership, producing all four-year trained Australian extractive metallurgists and sustaining critical skills capability
- Providing advanced, field-based training for geologists through the National Exploration Undercover School, with graduates in strong industry demand, 45 per cent female participation and 267 early-career professionals trained to date
- Modernising mining engineering curriculum through partnerships with Curtin University and Central Queensland University, incorporating industry-aligned content, improving industry-academia-community linkages and driving increased enrolments (50-100 per cent)
- Expanding access to mining education through the *Foundations of Modern Mining* micro-credential, a global online six-course program reaching over 12,000 learners across 145 countries and supporting both entry pathways and workforce upskilling
- Testing early exposure through the Minerals Industry Experience Program, an industry-led paid placement for first-year STEM students, building early capability, strengthening career interest in resources, and improving work-readiness and alignment with industry pathways.

The minerals sector is contributing to improved education outcomes and graduate readiness by supporting diverse, industry-aligned education pathways aligned with broader government priorities, including the Universities Accord and Jobs and Skills Australia's workforce planning.

This approach links student outcomes with Australia's innovation, productivity and clean energy objectives while reinforcing the value of closer collaboration between industry and universities in delivering more applied and relevant graduate capabilities for the mining sector.

Breaking barriers: safeguarding the strength and viability of minerals related programs

Maintaining the quality and breadth of Australia's mining and STEM higher education offerings will require targeted policy measures, particularly to support courses of strategic importance with relatively low enrolments. High-quality university graduate outcomes will depend on targeted policy action to strengthen workforce pipelines and sustain industry-critical disciplines.

Opportunities to prioritise interventions to address workforce alignment and course viability include:

- Expanding Commonwealth Supported Places for mining-relevant courses and strategically important disciplines, particularly in regional institutions

  Expanding CSP would strengthen workforce pipelines, particularly in regional institutions where industry operates. Targeted CSP growth aligned with national skills priorities would boost participation, improve retention, and ensure critical capabilities are developed in the communities that power Australia's resource economy.

- Introducing course viability grants

  Offering practical support for universities offering low enrolment/high-impact programs such as mining engineering, earth sciences, and metallurgy would safeguard disciplines which back national resilience. A targeted funding mechanism that recognises strategic value over enrolment volume would help secure Australia's capacity in resource security, energy and critical minerals delivery and infrastructure development.

4. ALIGNMENT OF GRADUATE SKILLS WITH INDUSTRY NEEDS

Emerging capability gaps

Australia's tertiary education system should produce well-rounded, job-ready graduates equipped with both deep technical expertise and the practical, transferable skills to thrive in modern workplaces.

Higher education supercharges the mining sector's capacity to innovate and remain globally competitive, providing advanced skills and knowledge for our future workforce. As our industry changes rapidly to meet growing and evolving demand, roles are also switching up and demanding a broader mix of capabilities from graduates.

Mining companies now seek professionals skilled in not only traditional engineering and scientific disciplines, but also in areas like data analytics, digital systems, automation, robotics, artificial intelligence, and communications. As digitalisation transforms roles across mining (while mine planners use digital twins, mechanics require proficiency in high-tech diagnostic systems), hybrid skill sets are increasingly important across all qualification levels.

Graduates' employability and work readiness are holding the industry back. Though technical knowledge from Australian universities is strong, employers in mining and related industries often report gaps in practical problem-solving, technology integration and other real-world competencies.

To close these gaps, increased focus on work-integrated learning, industry placements and modern teaching methods is needed across university offerings. Initiatives such as the MCA's Minerals Industry Experience Program (MiEX, detailed in Box 3 below) show how early exposure to industry and practical, applied learning can build student capabilities and interest in mining.

Box 3: Early pipeline activation – Minerals Industry Experience Program

Through MiEX, first-year university STEM students gain immersive exposure to the sector, improving awareness, interest and work-readiness from the outset of tertiary study.

Across the first two cohorts, 140 students demonstrated strong outcomes, including:

- Capability uplift: Participants across the first two MiEX cohorts reported an average self-assessed capability improvement of around 30% over the two-week program
- Career intent: Approximately nine in ten participants, across both cohorts, indicated they are considering a career in the minerals industry after completing MiEX
- Perception change: Over 90% of participants in each cohort emerged with a positive perception of the mining sector post-program
- Pathway/major changes: Roughly one in five participants (in each cohort) changed or plan to change their study path or major in favour of a mining-related discipline following the program.

Bridging the gap between graduate readiness and industry demand

While Australian universities continue to produce graduates with strong technical foundations, roles and skill requirements in the mining industry are changing rapidly. The integration of digital technologies, automation and artificial intelligence are reshaping job design and creating more hybrid, cross-disciplinary roles.

These roles require applied capability and a broader mix of skills than traditional training pathways typically provide. As a result, many graduates enter the workforce well-qualified but not fully prepared for the practical and evolving demands of modern mining operations.

Technical capability remains essential but is no longer enough. As roles become more complex and technology-enabled, graduates must do more than demonstrate disciplinary knowledge; they need to apply that knowledge in practice and operate across increasingly integrated systems.

Developing these capabilities, including applied, cross-disciplinary and digital skills, should be embedded within STEM programs, rather than treated as an option or add-on. This will require more deliberate collaboration between industry and universities based on complementary policy settings.

Active reforms and need for coordination, not duplication

The MCA urges the Committee to build on the significant national reform agenda currently underway to reinvigorate Australia's tertiary system and strengthen alignment with future workforce needs. In doing so, the Committee should consider how to leverage existing reforms and established statutory bodies to deliver outcomes and minimise duplication.

These efforts should focus on stronger alignment between higher education outcomes and workforce needs through coordinated, data-informed and industry-aligned policy settings.

The Australian Universities Accord process identified critical issues and opportunities relevant to this inquiry, including bridging the gap between graduate outcomes and industry needs and safeguarding strategically important courses.

The MCA's submission to the Accord panel emphasised the importance of aligning higher education with the demands of innovation, the net zero transition and new technologies and recommended measures such as protecting key mining-related disciplines and supporting diversification of STEM pathways to address skills shortages.[2]

In addition, the forthcoming Australian Tertiary Education Commission, which the MCA strongly supports, is intended to provide national oversight and encourage data-driven, industry-informed decisions across tertiary education.

Embedding data and employer insights into policy and funding decisions will be crucial to ensure courses, qualifications and other offerings remain relevant to evolving workforce requirements.

As the nation's independent workforce planning and skills foresight agency, Jobs and Skills Australia (JSA) plays a pivotal role in advising government on labour market and skills policy by providing an authoritative, forward-looking and industry-informed evidence base to underpin workforce planning and policy development.

JSA's data-driven insights complement the Universities Accord reforms and the proposed Australian Tertiary Education Commission by aligning tertiary education, training and funding decisions with evolving industry needs, ensuring those efforts are grounded in robust evidence and add to rather than duplicate existing efforts.

This can be achieved through:

- Embedding industry and workforce data and employer insights into tertiary planning and funding decisions into course design, funding allocations and performance measures:

  This would support more responsive and relevant education offerings. A more systematic, data-informed approach would ensure graduates are equipped with capabilities aligned to evolving labour market needs

- Prioritising mining-critical disciplines and diversified STEM pathways:

  This would would strengthen capability in areas of national importance. Targeted policy settings that support interdisciplinary programs and flexible delivery models would help address persistent skills shortages while maintaining depth in critical technical capabilities.

[2] Minerals Council of Australia, *Submission to the Australian Universities Accord discussion paper*, 11 April 2023.

5. LIFTING GRADUATE OUTCOMES THROUGH BETTER ALIGNMENT

Australia's higher education system plays a critical role in supporting the capability of the mining industry and the broader economy. The primary challenge stretches beyond the number of graduates produced to whether graduates have the skills, experience and qualifications required to meet current and emerging workforce needs.

Persistent mismatches between graduate outcomes and labour market demand along with fragility in key disciplines highlight the need for a more coordinated and targeted response.

This includes sustaining strategically important courses, expanding work-integrated learning and embedding industry-informed capability development across tertiary education.

Existing national reforms, including the Universities Accord, the proposed Australian Tertiary Education Commission and the work of Jobs and Skills Australia, provide a strong foundation.

Effort should focus on implementation, alignment and the systematic integration of industry data into planning and funding decisions.

With the right policy settings, Australia can deliver a tertiary education system that is responsive, sustainable and aligned to workforce needs, ensuring graduates are job-ready and industry can access the skills required for long-term growth, prosperity and national resilience.