



MINERALS COUNCIL OF AUSTRALIA
SUBMISSION TO THE EXPERT REVIEW OF AUSTRALIA'S
VOCATIONAL EDUCATION AND TRAINING SYSTEM

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EXECUTIVE SUMMARY

The Minerals Council of Australia (MCA) welcomes the opportunity to make a submission to the expert review of Australia's vocational education and training (VET) system.

This submission has been prepared in consultation with industry and is endorsed by the NSW Minerals Council, Chamber of Minerals and Energy of Western Australia and the Queensland Resources Council.

Mining in Australia is a sophisticated and technologically advanced enterprise that requires a highly skilled and adaptable workforce. New capabilities and skills are needed and there are opportunities to attract a broader range of people to the industry. This will require adjustments to tertiary level - higher education and the vocational education and training - landscape and to a lesser extent, primary and secondary education.

The future minerals workforce will be more diverse, geographically distributed and digitally connected. It will require broad ranging skills and competencies using both accredited and non-accredited training. Its productivity will be bolstered by new tools of automation, robotics and artificial intelligence.

Productivity supports prosperity by ensuring a more efficient allocation of labour and capital. Renewing productivity growth requires the application of new ideas on how work is done and the tools that can be deployed. The imperative of safety is a further driver. The design of the mining workplace is evolving to meet this reality. To embrace these workplace design challenges, and thus maintain Australia's competitive advantage in mining, new skills are required, enhancing and augmenting those of the existing workforce and providing opportunities for new workers. Flexible labour markets expand the range of these new opportunities.

The nation's most pressing challenge is creating the education, training and workplace framework that provides the skills, capability and flexibility to maintain and enhance Australia's international competitive advantage. This is especially important for the minerals industry. In securing the future minerals workforce, government will need to work closely with industry to ensure that accredited training is responsive to industry needs and that the broader education and training landscape is flexible, varied and sustainable.

An evolving workforce, meaningfully connected and supported to learn, grow and work with purpose is a key industry priority. The newly established MCA Workforce and Innovation Committee are progressing the workforce and innovation agenda through the lens of supply, demand, and pathways; highlighting and reimaging the industry's capabilities to innovate, engage and leverage diversity.

The MCA supports the reforms advanced by Resources 2030 Taskforce and the Productivity Commission to generate a high-quality education system that promotes skills formation and prepares students for technology adoption, use and diffusion, including:

- Developing a more coordinated national tertiary curriculum for earth sciences and resources sector qualifications at vocational education and training (VET) and higher education levels
- Introducing a more graduated system of student assessment to signal to employers the level of proficiency in VET
- Developing an objective VET accreditation system that signals the quality of skills, regardless of how they are acquired, to encourage the growth and acceptance of new models of skills formation that are faster, cheaper and more flexible
- Improving student outcomes by providing affordable, high quality university education with qualifications that are relevant to labour market needs

- Mapping jobs of the future and skills gaps.

The MCA further recommends:

- Government does not put blanket requirements on skills funding as part of licencing or other regulatory arrangements
- Allocating funds from the Skilling Australians Fund proportionally to each industry's use of the temporary skilled migration program
- Implementing and evaluating pilot programs to test models, interventions and initiatives
- Re-positioning VET as a valid pathway to securing the right skills for the changing nature of work and skills
- Deliver a campaign to increase awareness and understanding of the offerings and establishing a stronger narrative on the broader post-secondary education eco-system.

The compatibility of skills and capabilities needed for the future minerals workforce means that implementation of these policy recommendations will have economic and social benefits.

1. AUSTRALIAN MINERALS INDUSTRY

The Australian resources sector employs around 245,200 people in high-value, high-wage, high-skilled jobs, mostly in remote and regional Australia. Average weekly earnings (full-time adult) in the resources sector are \$2,659 per week, more than 65 per cent higher than the national average of \$1,606 per week.¹

A large proportion of the workforce is highly skilled, 67 per cent hold a Certificate III level qualification or higher, above the national average.² More than four per cent of the workforce is currently apprentices and trainees.³ One in five workers also hold a bachelor degree or higher.⁴

Quality and responsive training and workforce development are a crucial mechanism to ensure a supply of skilled workers enter and remain in the industry. MCA advocates for uninterrupted skills pathways, regardless of business cycle. This means the funding and provision of quality training throughout the cycle, supported by industry and associated education and training institutions, and reinforced by a valid policy base.

It is important to consider the broad funding, policy and regulatory settings that support lifelong attainment of relevant, portable and transferable skills.

Leveraging investment in education and training

The Australian minerals industry spends more on training per employee than most industry sectors (5.5 per cent of payroll) and the industry is a strong user of the vocational education and training system.⁵ In 2017, 30 per cent of mining employers used accredited training (the third largest user) and 60.5 per cent used non-accredited training (the fourth largest).⁶

Considering whether training was meeting their skills needs in 2017 mining employers reported a satisfaction rating of 70.3 per cent with accredited training and 97 per cent satisfaction rating with non-accredited training. A discrepancy clearly remains in the industry's confidence that accredited training is responsive and industry-led to provide its skilling needs.⁷

The minerals industry contributes significantly to the education and training of its workforce and by extension the Australian population more broadly when skills attained in our industry are transferred to other jobs in the broader economy. The industry sees its investment in areas of skills development in high demand areas and training initiatives with Indigenous and local employment as targeted and offering a mutually beneficial return on investment with the community.

The mining industry shows consistent leadership in its funding of training and education and creative initiatives to address specific problems. For example, through the Minerals Tertiary Education Council (MTEC), the MCA supports collaborative initiatives at 17 universities across Australia. MTEC builds capacity in higher education in the disciplines of mining engineering, metallurgy and minerals geoscience and partners with universities and other providers to address the professional skills requirements in the minerals industry. MCA members have invested more than \$50 million of unencumbered funds over the past decade in these programs, benefiting more than 4,500 graduates.

Delivering creative and targeted initiatives responsive to ongoing and emerging needs is a most pressing issue for governments and the MCA welcomes the commitment of all governments

¹ Australian Bureau of Statistics, [Labour Force, Australia, Detailed, Quarterly, Aug 2018](#), ABS cat. no. 6291.0.55.003, released on 20 September 2018. [Average Weekly Earnings, Australia, May 2018](#), ABS cat. no. 6302.0, released on 16 August 2018.

² Minerals Council of Australia, [Miners at Work](#), Canberra, 2018; and Australian Bureau of Statistics, 2016 Census, [Census Table Builder – Highest Level of Educational Attainment and Industry of Employment](#), viewed 30 November 2018.

³ National Centre for Vocational Education Research (NCVER) – [Apprentice and trainees 2018 – March Quarter](#) (released 3 September 2018).

⁴ Department of Education, [Industry Outlook: Mining](#), Canberra, 2014; and Australian Bureau of Statistics, 2016 Census, [Census Table Builder – Highest Level of Educational Attainment and Industry of Employment](#), viewed 30 November 2018.

⁵ NCVER, [Training and education activity in the minerals sector](#), 20 March 2013.

⁶ NCVER, [Employers' Use and Views of the Vocational Education and Training \(VET\) System](#), 26 October 2017.

⁷ Minerals Council of Australia, [Submission to the Senate Select Committee on the future of work and workers inquiry](#), January 2018, p10.

through the Council of Australian Governments' Energy Council. More work is needed. Governments should not, however, put blanket requirements on skills funding as part of licencing or other regulatory arrangements as this will constrain the flexibility and creativity that we need to respond.

The Skilling Australians Fund

The *Skilling Australians Fund* prioritises the funding of apprenticeships and traineeships in occupations that are in high demand and currently rely on skilled migration or have future growth potential, including in regional Australia.⁸

Apprenticeships and traineeships continue to be an important pathway into the minerals industry and a stable source of talent to meet current and future needs, as evidenced by the ongoing consistency in the number of apprentices and trainees year-on-year. Currently, apprentices and trainees make up 4.3 per cent of the minerals workforce.⁹

Noting industry investment to training and education and commitment to apprenticeships and traineeships, along with the significance of industry to regional employment, the policy perspective and parameters of the levy imposed to raise revenue for the *Skilling Australians Fund* fails to achieve the demand-driven and industry-led imperative proposed.

While employing skilled migrants through the Temporary Skills Shortages visa program is seen as a last resort, their contribution to our industry is highly regarded. It cannot be traded off to meet other governmental objectives, especially into a funding pool for which there is no guarantee that those funds will be invested back into our industry.

With the challenges of practical application and allocation of the fund, in particular the perceived cross-subsidisation of other industry sectors, the MCA suggests funds be allocated proportionally to each industry's use of the temporary skilled migration visas to support skilling and upskilling for that and ancillary industries.

To date, training outputs delivered through the fund have demonstrated no direct effect on the rate in which high demand skills for the industry are obtained. Our commitment in these areas however will continue regardless of industry use of the TSS visa program or access to the fund.

Current state of play in minerals higher education and training

Specialist minerals disciplines have suffered significant declines in recent years. In mining engineering, the future domestic pipeline of graduates is going to be significantly impacted with less than 50 expected to graduate in 2020. This is less than a third that graduated five years ago. While enrolments in mining engineering traditionally follow commodity prices, since 2016 they have not increased when commodity prices have.

PwC found that

As mining companies continue to invest and focus on innovation and digitisation, the demand for digitally skilled candidates will increase. And while traditional engineering roles will continue to remain relevant, the need for people who are competent in AI, robotics, data analytics and mechatronics will be key for future fit mining organisations. The mining businesses of the future will see a convergence of perspectives between mining engineers and newer-age digitally focused roles.¹⁰

Whilst the traditional occupations and associated skills will remain relevant and essential to the future minerals workforce, they will be enhanced and complemented by a suite of broader skills and capabilities. This notion is supported by Business Council of Australia who noted that a

⁸ Minister for Citizenship and Multicultural Affairs, [Explanatory Statement: Migration \(Skilling Australians Fund\) Charges Act 2018; Migration \(Skilling Australians Fund\) Charges Regulation 2018](#), viewed 30 November 2018, p4.

⁹ National Centre for Vocational Education Research (NVCER) - [Apprentice and trainees 2018 – June quarter](#), released 3 September 2018, viewed 23 January 2018.

¹⁰ PwC, [Aussie Mine 2018](#), November 2018.

qualification based on just technical skills and knowledge is unlikely to be enough, as employers are looking for workers with a mixture of skills, values and behaviours.¹¹

The broader skills and capabilities important to the future minerals workforce include core technical skills coupled with cognitive or 'soft skills' and interpersonal skills, as well as technological literacy and specialist skills in complementary disciplines.¹²

The VET sector would be well placed to facilitate the diversity of options needed to deliver these skills, for example developing a matrix of these skills through short courses, skill sets or micro-credentials and contextualising them to core content of specific qualifications. This would require coordination across government, academia and industry to ensure that these options are funded, assessed and assured whilst also aligning with the relevant regulations, standards and frameworks.¹³

These issues have been identified by the Resources 2030 Taskforce as part of attracting and supporting the skilled minerals industry workforce, including developing a more coordinated national tertiary curriculum for earth sciences and resources sector qualifications at the higher education and VET levels.¹⁴

The industry supports the recommendations of the taskforce and the Productivity Commission for reform across the entire Australian education landscape to meet the future workforce requirements for the industry and Australia.¹⁵

Supporting inclusion, prosperity and regional development

While this submission focuses on VET in the context of the future minerals workforce, the minerals industry also considers education and training through the lens of broader regional development and prosperity. This recognises the minerals industry's long-standing recognition of its role and responsibility to contribute to the sustainable development of its host communities and regions.

From an education and training perspective, this role includes supporting the development of skills and capabilities within its own workforce that are valuable in the broader economy as well as contributions to regional education and training outcomes as part of a company's social investment program, where appropriate.

For example, skills and capabilities gained in the minerals industry are compatible with and transferrable to a range of other sectors. This includes qualifications in trades, warehousing and logistics, environmental science and other disciplines which are highly-sought after by the agriculture, tourism and manufacturing sectors.

Company social investment programs may often include support for programs encouraging primary and secondary school students and young people to pursue careers in science, technology, engineering, mathematics and trades. Partnerships with local training providers and universities are also common. Such investments support the broader skills and capability development within a community and region.

¹¹ Business Council of Australia, [Future-Proof: Protecting Australians Through Education and Skills](#), 2017, p. 7, 15, 18, as seen in changing in Department of Education and Training, [Changing work requires new skills and learning methods](#), Department document, Australian Government, December 2018, p3.

¹² Minerals Council of Australia 2018 Minerals Industry Education Summit, Melbourne, 17 May 2018.

¹³ Australian Qualifications Framework Review Panel, [Review of the Australian Qualifications Framework Discussion Paper](#), December 2018, Australian Government, p19.

¹⁴ Department of Industry, Innovation and Science, [Resources 2030 Taskforce Australian resources – providing prosperity for future generations](#), Canberra, September 2018

¹⁵ Productivity Commission, [Shifting the Dial: 5 Year Productivity Review](#), Report No. 84, Canberra, 3 August 2017, p. 82.

2. CHANGING NATURE OF WORK AND SKILLS

Industry's workforce of the future

Technological innovation will continue to change the nature of work in mining and skills requirements. The minerals industry is proactively assessing the composition of the future minerals workforce and the skills requirements considering the increasing role of automation, robotics and artificial intelligence that will see Australian mining continue to be at the forefront of innovation in the creation of new jobs.

Central to this work is the development of a sector capability framework identifying priority areas for skilling and upskilling related to technological advances to ready the current and future workforce for these opportunities.

Deloitte research indicates that globally 69 per cent of mining companies are looking at introducing remote operations and monitoring centres, 29 per cent robotics and 27 per cent unmanned drones, with technologies enabling work to be moved to locations which can support a more diverse and inclusive workforce, including primary carers and people with physical disabilities.¹⁶ A diverse, distributed and connected workforce will consider problems and opportunities in new and unique ways, using creativity and diversity of thinking to deliver innovative solutions.

The Productivity Commission correctly identifies skills formation as a Government priority because technology adoption, use and diffusion (the long-run drivers of productivity) require people with the right skills.¹⁷ There is additional value in improving skills formation from foundational to advanced, because it gives people better job security, income and job satisfaction. These effects are not well measured in the official statistics, but have major implications for prosperity and quality of life more broadly. The Productivity Commission rightly points out that

...the current skills system has fractures that put at risk its capacity to deal with the future labour market changes. There are deteriorating results among school students. The VET system is in a mess, and is struggling to deliver relevant competency-based qualifications sought by industry. Leading segments of the university sector are more focused on producing research than improving student outcomes through higher-quality teaching.

Delivering a flexible, functional and fluid tertiary education system at the post-secondary VET and higher education level is critical to meeting the skills needs of the sector, especially as specialist skills associated with innovation and technology adoption increase.

Innovation and technology adoption

Over the past ten years, there has been a dramatic change in the fundamental skills and capabilities, processes, roles, and organisational models that are needed to run an operational mine. Whilst business pressures to improve safety and increase productivity contribute to this change, much of this new change is driven or enabled by technology.¹⁸

BHP deployed autonomous trucks and blast hole drills in its Western Australia iron ore operations and fully automated production drill rigs across iron ore operations in February 2018.¹⁹ Launching its first integrated remote operations centre in Perth in 2013, the company deployed unmanned aerial vehicles at its Queensland coal mines and implemented an integrated remote operations centre in Brisbane. Planning is underway for a third IROC for Olympic Dam in South Australia.²⁰

BHP is also utilising artificial intelligence to improve supply chain decision-making, including scheduling track movements and the dispatch of trains carrying iron ore. BHP also created the

¹⁶ Deloitte. *The digital revolution – Mining starts to reinvent the future*, February 2017.

¹⁷ Productivity Commission, *Shifting the Dial: 5 Year Productivity Review*, Report No. 84, Canberra, 3 August 2017, p. 83-84.

¹⁸ G Yeates, 'The changing nature of work in mining', address at the Minerals Council of Australia 2018 Minerals Industry Education Summit, Melbourne, 17 May 2018.

¹⁹ Andrew Mackenzie, Chief Executive Officer, BHP, *A strategy for every cycle*, speech at FT Commodities Summit – The start of a new cycle, Lausanne, Switzerland 20 March 2018, viewed 24 May 2018.

²⁰ See Andrew Mackenzie, Chief Executive Officer, BHP, *Driving value and returns (slides)*, 10 May 2016; Mike Henry, President Operations, Minerals Australia, BHP, *Address to the IMARC Gala Dinner*, address at the International Mining and Resources Conference, Melbourne, 9 November 2016; Ry Crozier, 'BHP to build remote ops centre for Olympic Dam', *iTnews*, 28 November 2017; and Luke Griffiths, 'BHP's \$600m spend on Olympic Dam to lay foundation for long-term growth', *The Advertiser*, 4 August 2017.

Maintenance Centre of Excellence that operates across three Australian sites in Adelaide, Brisbane and Perth.²¹

In 2019, Rio Tinto will deliver their ‘mine of the future’ through a world-first, fully networked mine at Koodaideri. The mine will be intelligent and more than just automated from trains through to workshops. Its machines will talk to each other and eventually start telling their distant operators in Perth what they might best do next.²² Rio Tinto has stated that

Koodaideri is a game-changer for Rio Tinto. It will be the most technologically advanced mine we have ever built and sets a new benchmark for the industry in terms of the adoption of automation and the use of data to enhance safety and productivity.²³

An important point of difference between Australian and other global mining jurisdictions is that Australia’s resources sector is a global technology leader and one of the most productive industries in the world. This compares to other Australian industries that are often reliant on technological progress in other countries.²⁴

The mining industry spent \$1.9 billion on research and development (R&D) in 2015-16 – the equivalent to 11 per cent of all business R&D spending in Australia.²⁵ Innovation and associated technology adoption will alter the current and future workforce, including the way traditional skilled trades and professionals interface with these new technologies.

The mining sector is a prolific inventor and developer of specialised technologies, with a total of 6,539 Australian mining inventions filed for patent between 1994 and 2011 by operating miners, the Mining Equipment, Technology and Services (METS) sector, and publicly funded entities like CSIRO.²⁶ The R&D tax incentive is an effective, economy-wide, market-driven measure that should be maintained in its current form with no restriction on eligibility on the basis of industry, firm size, R&D intensity or any other arbitrary criterion.

The changing nature of work and skills

The changes in the way work is done will affect the type and mix of skills and knowledge that graduates need and the ways that providers deliver education, which in turn need to be reflected in the framework that supports funding, assurance and alignment.²⁷

As the nature of work changes and evolves, workers will need skills and capabilities that are adaptable, transferable, relevant to the needs of the future economy, and which are not able to be easily replicated by technological advances.²⁸ There is an active transformation of skill capabilities through access to technology and soft skills are central to the skill profile of Australia’s future workforce.²⁹

In a time where the linear world of work is disappearing and it is anticipated that young people will hold more than ten jobs across five industries throughout their career, the skills and capabilities that employers are seeking continue to evolve, with a pronounced shift to seeking ‘soft skills’ and weighting them equally with ‘test scores.’³⁰

²¹ D Jurgens, Chief Technology Officer, BHP, ‘[Which technologies will boost mining safety and productivity](#)’, *BHP*, 1 November 2017; and Ry Crozier, ‘[BHP Billiton creates maintenance innovation centre](#)’, *iTnews* 9 November 2016.

²² M Stevens, [Rio’s mine of the future is now](#), Australian Financial Review, 30 November 2018, Companies and Markets, p32.

²³ C Latimer, [Rio Tinto approves \\$3.5b ore mine in the Pilbara](#), The Sydney Morning Herald 29 November 2018, , viewed 30 November 2018.

²⁴ Productivity Commission, [Shifting the Dial: 5 Year Productivity Review: Supporting Paper No. 1: Productivity and Income – The Australian Story](#), Canberra, 3 August 2017, released on 24 October 2017, pp. 24, 26, 85.

²⁵ Australian Bureau of Statistics, [Research and Experimental Development, Businesses, Australia, 2015-16](#), ABS cat. no. 8104.0, released on 15 September 2017.

²⁶ E Francis, [The Australian Mining Industry: More than Just Shovels and Being the Lucky Country](#), IP Australia, 2 June 2015, pp. 6, 22, 30.

²⁷ Productivity Commission, [Shifting the Dial: 5 year Productivity Review](#), 2017, p. 87; and Department of Jobs and Small Business, [Australian Jobs 2018](#), Australian Government, 2018, p. 29; as seen in Australian Qualifications Framework Review Panel, [Review of the Australian Qualifications Framework Discussion Paper](#), December 2018, Australian Government, p12.

²⁸ Autor D.H. 2015, [Why are there still so many jobs? The history and future of workplace automation](#), Journal of Economic Perspectives , Vol. 29 No. 3 pp. 3-30; as seen in Department of Education and Training, [Training product reform – what is the case for change?](#), Department document, Australian Government, November 2017, p5.

²⁹ Senator, the Hon Zed Seselja, [Australia’s Future Workforce, the opportunities and challenges](#), Address at the [Navigating Technology and Jobs of the Future Summit](#), 2018, Australian Information Industry Association, Canberra.

³⁰ J Owens, [Artificial Intelligence, machines and the GIG economy](#), targeted stream at the [Navigating Technology and Jobs of the Future Summit](#), 2018, Australian Information Industry Association, Canberra.

The Department of Education and Training identified that skills combining specific technical skills and knowledge with foundation skills are anticipated to be difficult to automate without a substantial drop in the quality of service offered.³¹

The MCA is currently examining the minerals industry skills landscape - now and into the future - through the lens of an innovation study focused on automation, digitisation and other technology adoption.

This study is framing the evolution of work and skills through the dominant drivers of change shaping that future, including shifting workforce expectations, convergence of technology, robotics and artificial intelligence, social and demographic shifts and blind-disruptors.

The study is considering the skills likely to be most resilient and increasingly important for occupations in the minerals industry. In so doing the industry will develop key strategies and initiatives to support the workforce through contemporary training/education offerings and strategic workforce planning to benefit from drivers of change shaping the work and skills landscape into the future.

PwC has previously identified the training requirements for the mining, drilling and civil infrastructure (MDCI) workforce are evolving in response to changes in the sector as a whole. They identify key trends impacting the MDCI sector and, subsequently, the MDCI workforce, include:

- An increased demand for workforce agility and the ability to move between sectors and industries in response to market demand. This is particularly pertinent to the MDCI sector given the boom and bust cycles it is subject to
- Increased investment in the infrastructure industry from the Australian government, leading to an increased demand for civil infrastructure skills and the relevant training to support this workforce
- The impact of emerging technology on ways of working, with new techniques and equipment requiring new training units to be developed to ensure workers have the most up to date skills and knowledge
- An increased focus on safety measures in the MDCI sector to meet regulatory requirements and ensure the safety of workers in challenging and hazardous environments
- A need to support the development of managerial skills alongside technical competence as workers progress into leadership roles.³²

In considering how government, academia and industry tackle challenges associated with the changing nature of work and skills and deliver the talent and skills required will require a suite of flexible, creative and coordinated responses. For example, mapping industry need through a multidisciplinary lens and creating a flexible environment where someone from a traditional field can become an expert in an unrelated, contemporary field such as cyber security.³³

While Industry Growth Centres are working at a sector level and the existing Department of Jobs and Small Business information programs forecast future employment needs and market information, the MCA work underway is developing a skills map to be considered in the context of the future skills needs and completed in close collaboration with industry.

³¹ Autor D.H. 2015, [Why are there still so many jobs? The history and future of workplace automation](#), Journal of Economic Perspectives, Vol. 29 No. 3 pp. 3-30; as seen in Department of Education and Training, [Training product reform – what is the case for change?](#), Department document, Australian Government, November 2017, p5.

³² PwC, [Industry skills forecast and proposed schedule of work Mining, Drilling and Civil Infrastructure](#), Sydney, May 2018

³³ G Brodman, *Preparing today for the jobs of tomorrow*, panel at the [Navigating Technology and Jobs of the Future Summit](#), Australian Information Industry Association, 2018, Canberra.

Science, Technology, Engineering and Mathematics – STEM

Science, technology, engineering and maths-related (STEM) skills are increasingly important to live and work in a globalised world, with an estimated 70 per cent of all future jobs projected to be stem-related.³⁴ The World Economic Forum counts STEM literacy as a measure of the future readiness of countries, enabling students to thrive in the ‘known unknown’ of future careers.³⁵

Encouraging and high-grading the supply side of critical STEM skills and connecting emerging talent in schools, universities and TAFE with what a career in the Australian mining sector looks like is important to the future minerals workforce.³⁶

The minerals industry is concerned about the marked decline in participation in science, technology, engineering and mathematics (STEM) subjects in schools over the past decade. Participation in the future minerals workforce will require the development of new capabilities and skills from primary and secondary education through to tertiary and higher education.

Anecdotal evidence suggests that there is a lack of understanding about the connection between studying STEM related subject and career pathways, particularly across learners in VET.

The industry has developed and supported a number of initiatives to increase awareness of an interest in careers in the industry. Aside from more than \$50 million of direct investment in higher education through MTEC, the industry supports established programs including peer-to-peer outreach programs, online resources for teachers and teacher professional development.³⁷

Companies also make individual investments in STEM. For example, MCA member BHP will inject \$55 million over five years to STEM-related activities through the BHP Billiton Foundation.³⁸ The MCA, through its *Gender Diversity White Paper* strategy, has also developed numerous initiatives to increase the number of women in the workforce (currently approximately 13 per cent) in order to deliver both skills and diversity benefits.³⁹

³⁴ Pricewaterhouse Coopers, [A smart move: future-proofing Australia's workforce by growing skills in science, technology, engineering and maths \(STEM\)](#), p14 viewed 23 January 2019.

³⁵ M Timms, K Moyle, P Weldon & Pru Mitchell, [Challenges in STEM learning in Australian Schools](#), Australian Council for Educational Research, 2018, p3, as seen in Cardno, [Sustainability in Action: Australian Mining and the United Nations Sustainable Development Goals](#), October 2018, p24.

³⁶ Minerals Council of Australia 2018 Minerals Industry Education Summit, Melbourne, 17 May 2018.

³⁷ See [Oresome Resources](#), viewed on 19 January 2016. The MCA is also a platinum sponsor of the Teacher Earth Science Education Programme (TESEP), which is endorsed by the Australian Science Teachers Association and long supported the Aurora Education Foundation to inspire the academic and career aspirations and achievements of Aboriginal and Torres Strait Islander people. The MCA and Robogals Asia Pacific share a commitment to building a diverse and inclusive workforce, and have worked together for many years to inspire girls about career pathways in engineering. MCA is Robogals Platinum Partner in 2018.

³⁸ BHP, BHP Billiton Foundation, March 2016

³⁹ Minerals Council of Australia, [Gender Diversity White Paper](#), MCA, March 2014.

3. SKILLING THE FUTURE MINERALS WORKFORCE

Australia's education and training ecosystem needs to cater to a diverse range of learners and learning styles across a range of industries and shifting priority sectors. It is essential that the system is flexible and responsive to changes both across the labour market and within industries. In particular, the system needs to confirm that workers either have the existing skills, or ensure workers have the ability to quickly acquire new skills, to enable them to satisfy evolving job profiles, change jobs or explore other development and career opportunities.⁴⁰

Pathways

The way in which we prepare the current and future minerals workforce will require innovative approaches across the education and training landscape. Providing appropriate, timely and affordable skills, training and development options and pathways for both existing and pipeline workforce whilst connecting the tertiary education landscape at the post-secondary level is important.⁴¹

Pathways that span TAFE, university and include intensive micro-credentialing (mini-qualifications that demonstrate skills, knowledge, or experience in a given capability) will likely become commonplace for the industry, making it easier to both connect with and learn the skills key for our industry.⁴²

The minerals industry will require a VET system for accredited and non-accredited training that is industry-led, demand-driven and responsive to satisfy existing need and cater for the emerging skills of the future. The minerals industry maintains that funding of training should be extended beyond qualifications to include skill sets and units of competence.

Qualifications aligned to automated technology like operations control, process monitoring, interpreting data and problem solving are applicable across a range of current and emerging roles across industry but they are also the same qualifications needed for other control centre roles – like managing shipping movements at ports, or key activities across logistics businesses, and diverse sectors like health care.⁴³

Industry is already leading by example. Collaboration between Rio Tinto, South Metropolitan TAFE and the Western Australian government will deliver high-tech courses in automation for the first time in Australia. These nationally-recognised qualifications, the first to provide pathways to emerging jobs in the area of automation, are expected to be available at Western Australian TAFE Colleges and to high schools from 2019. Rio Tinto has made an initial investment of up to \$2 million for the development of these courses.⁴⁴ Government should consider how this work can be leveraged across the country.

Perceptions

The skills, knowledge and learning gained through quality education are building blocks for healthy and prosperous lives. Quality education also equips people with the tools necessary for innovative solutions to the challenging and complex problems facing the world today.⁴⁵

VET offers an alternative pathway for industry to gain workers with the right skills, by encouraging students and current employees to upskill, re-skill and develop expertise in a particular area by completing just a few units of competency, rather than a full qualification.⁴⁶ Yet broad public perceptions often describe VET as a pathway of 'last-resort' or the 'failed pathway' – perpetuating misinformed views that diminish its perceived value and importance.

⁴⁰ Department of Education and Training, *Training product reform – what is the case for change?*, Department document, Australian Government, November 2017, p7.

⁴¹ Minerals Council of Australia 2018 Minerals Industry Education Summit, Melbourne, 17 May 2018.

⁴² Deakin University, <https://www.deakinco.com/media-centre/news/Benefits-of-micro-credentials-for-business-and-employees>, 24 October 2017.

⁴³ Minerals Council of Australia 2018 Minerals Industry Education Summit, Melbourne, 17 May 2018.

⁴⁴ See Rio Tinto, http://www.riotinto.com/media/media-releases-237_25010.aspx, 8 April 2018.

⁴⁵ Cardno, *Sustainability in Action: Australian Mining and the United Nations Sustainable Development Goals*, October 2018, p24.

⁴⁶ Minerals Council of Australia 2018 Minerals Industry Education Summit, Melbourne, 17 May 2018.

While there is clear awareness of VET a lack of targeted communication to the broader community in regard to VET opportunities has created a disconnect between perception and opportunity – directly impacting on the uptake of VET pathways and limiting the profile of learners that access the system. This is further exacerbated by a public history of fluctuating quality assurance across training providers as well as assessment and evaluation outcomes.

Re-positioning VET as an equally valid pathway for securing the right skills to be prepared for and thrive in the evolving landscape of work is a critical component of any action in response to this review. Complementary campaigns to increase awareness and understanding of the offerings and establishing a stronger narrative on the broader post-secondary education eco-system, coupled with implementing actions from this review that address weaknesses of the current system and introduce new learning pathways and options would contribute to a more sustainable VET system.

To adjust these perceptions, attention needs to be given to improving knowledge, awareness and understanding about career pathways and opportunities created through VET; with a particular focus on learners and their key influencers. For example, whilst young people obtain 58 per cent of the industry knowledge through television or online, 35 per cent through school classes and 29 per cent via family, family and friends or extended family remain the key influencers of career decisions and perceptions of different industries. This influence is based on trust in the information received and relevance of a parent knowing the student best.⁴⁷

Pilot programs

The education experience needs to mirror real life working modes that still complement the technical side of learning. Today we work within and across networks and systems, and are expected to function through agile, borderless, teams or communities of practice that are outcomes focused and may be formed in response to a specific problem, execute their response and disband.⁴⁸

The minerals industry supports and encourages the use of pilot programs. These programs test interventions and models across the education ecosystem to determine best-practice, identify the interventions and pathways that are responsive and relevant, and establish a flexible, stable and sustainable VET system.

Potential pilot programs include:

- Adapting the funding system to facilitate more flexibility and relevance around skills acquisition, including funding units of competence and skill sets⁴⁹
- Shorter modules linked to qualifications and connected to real work content and experience, with flexible and technology enabled delivery modes across the higher and vocational sectors
- Alternative assessment and credentialing options⁵⁰
- Combined, online curriculum that offers academic and skills development; with materials, courses and offerings from multiple locations and providers, enabling students to pick up different parcels of skills and knowledge relevant to their needs, wants and desires, at the right time
- New models of teaching and engaging students, such as threaded degrees, flipped classrooms, interactive and immersive technologies and on-the-job learning
- Programs that offer just-in-time education and training, link training needs to labour market demands and are suitable for upskilling workers based on changing market needs⁵¹

⁴⁷ Minerals Council of Australia 2018 Minerals Industry Education Summit, Melbourne, 17 May 2018.

⁴⁸ Ibid.

⁴⁹ Minerals Council of Australia 2018 Minerals Industry Education Summit, Melbourne, 17 May 2018; Australian Information Industry Association [Navigating Technology and Jobs of the Future Summit](#), 2018, Canberra; and, Australian Government, [Review of the Australian Qualifications Framework Discussion Paper](#), December 2018, viewed 19 January 2019

⁵⁰ University of Melbourne [micro-credentialing](#), web page, viewed 21 January 2019.

⁵¹ Government of Canada, [Aboriginal Skills and Employment Training Strategy](#), program web page, December 2018; and Obvious Choice, [Micro-learning](#) viewed 23 January 2019; and Productivity Commission, [Shifting the Dial: 5 Year Productivity Review](#), 2017, p. 97 as seen in Department

- Cadet style programs for individuals transitioning mid-career or for those long term unemployed
- Threaded pathways that span TAFE, university and short burst, micro credentialing to form learning bridges⁵²
- Adapting existing models to develop a skills mapping system that can track an individual's abilities and knowledge, and map these against current and future skills.⁵³

of Education and Training, [Changing work requires new skills and learning methods](#), Department document, Australian Government, December 2018, p3.

⁵² Minerals Council of Australia 2018 Minerals Industry Education Summit, Melbourne, 17 May 2018.

⁵³ J Clarke, *Technology, Government and the Customer Experience – Telstra*, Address at the [Navigating Technology and Jobs of the Future Summit](#), Australian Information Industry Association, 2018, Canberra.

4. OTHER REVIEWS

This review of VET coincides with the work of the Expert Advisory Group examining the National Regional, Rural and Remote Education Strategy and the Expert Panel for the Review of the Australian Qualifications Framework.

National Regional, Rural and Remote Education Strategy

The National Regional, Rural and Remote Education Strategy is looking in particular at how to establish a national focus for regional, rural and remote education, training and research to enhance access, outcomes and opportunities in regional Australia.

While the Expert Advisory Group will not report until after this review, the challenges have been well defined in the group's *National Regional, Rural and Remote Education - Strategy Framing Paper*, released in December 2018. Of the issues relevant to the vocational sector, the paper argues policy should focus on:

- Building on the current range of innovative delivery methods to increase study options in regional, rural and remote Australia
- Address financial, emotional and social challenges of student who need to relocation
- Recognise additional hurdles that students outside of major centres face.

Part of this can be addressed through better co-operation between TAFEs and universities in the region, including co-locating of teaching and resources, greater mutual recognition of qualifications combined with more funding from governments of regional providers.

During engagement with the Expert Advisory Group, the MCA also noted opportunities for education, training and research policies to better leverage investments by the minerals industry in workforce skills and capability development.

Review of the Australian Qualifications Framework

The Expert Panel for the Review of the Australian Qualifications Framework has been tasked with providing independent and evidence-based advice on the national policy for regulated qualifications in Australia to the Australian Government Minister for Education, the Australian Government Minister for Skills and Vocational Education and the relevant COAG Councils.

While the public consultation process is open and the final report and recommendations of the Expert Panel will be delivered after the VET review, the discussion paper presents a number of possible approaches to modernising the AQF, including formalised recognition of micro-credentials.⁵⁴

Noting that the AQF puts senior secondary school, VET and higher education qualifications into a single, national framework and that this review is focused on VET, it is important that any recommendations and activities stemming from the VET review acknowledge the scope of the review of the AQF and consider the critical interface with the AQF.

Resources 2030 Taskforce

The MCA supports the recommendation of the Resources 2030 Taskforce to develop a more coordinated national tertiary curriculum for earth sciences and resources sector qualifications at post-secondary vocational education and training (VET) and higher education levels and welcomes the COAG Energy Council's commitment to address skills in the resources sector as a priority issue.

The MCA recommends that recommendations and activities stemming from this review are consistent with and complementary to those contained in the Resources 2030 Taskforce Report.⁵⁵

⁵⁴ Australian Government, [Review of the Australian Qualifications Framework Discussion Paper](#), December 2018, viewed 19 January 2019, pp14-18; and Times Higher Education, [Australia Considers formalized recognition of micro-credentials](#), 15 January 2019, viewed 15 January 2019.

⁵⁵ Department of Industry, Innovation and Science, [Resources 2030 Taskforce Australian resources – providing prosperity for future generations](#), Canberra, September 2018.

5. CONCLUSION

The Minerals Council of Australia (MCA) welcomes the opportunity to contribute to the expert review of Australia's vocational education and training system.

Delivering a flexible, functional and fluid tertiary education system at the post-secondary VET and higher education level is critical to meeting the skills needed of the sector and industries more broadly, especially as specialist skills associated with innovation and technology adoption increase.