

# THE HUMAN PARADOX OF MINING

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A portrait of the  
future miner.



## About DRA's Future of Mining Series

The mining industry is one laden with contradictions. On the one hand we must produce faster, smarter and more lucratively than before, and on the other we must consider the environment, sustainability and even the end consumer. Is there a common ground to achieve mutually beneficial outcomes on this uncharted and, often unstable, terrain?

We've seen accelerated strategies in environmental, social and corporate governance (ESG), digitisation and automation since the outbreak of the COVID-19 pandemic. Change has become business as usual and compared to a long history of using the past as our compass, the industry is now looking to the future as a driver of fundamental and sustainable change.

Disruptive technologies continue to shape and reshape our picture of the future. There's no clear or definitive image of what that will look like but we unpack some fundamental elements of what success might look like in our next horizon. Share our journey, as we imagine the workforce of tomorrow, explore socially conscious mines of the future, weigh up the risks, investigate new business models and get real with artificial intelligence.

In DRA's Future of Mining Series, we take a look at the challenges the industry is facing. We leverage the knowledge from our expert team of advisors to highlight some considerations for mining companies and its value chain to navigate the future with confidence. Join us as we step into tomorrow.

# THE HUMAN PARADOX OF MINING



There's no doubt that the mining landscape is changing. Conventional views are giving way to innovative thinking and we're seeing reliable methodologies of the past are less likely to succeed in the future. Advances in technology around artificial intelligence (AI), automation and blockchain are beginning to penetrate the mining industry.

Our question shouldn't be if these developments will shape the future of mining, as they most definitely will, but rather, what could that future look like and, very specifically, what does it mean for the people who's lives and livelihoods depend on the mine?

A future that's brighter, greener, more equitable and sustainable is the promise of AI. The transformation to a more digital tomorrow has immense potential for safety outcomes, increased productivity and profitability for investors, improved efficiency for operators and greater sustainability measures for the environment and a consciousness of the needs of the global population. But, the road to tomorrow is anything but straight and narrow.

Not only are we navigating the increased cost pressures of extracting metals and minerals, on the other side of the gold coin we also have the very real and daunting

responsibility of the industry to ensure green jobs are good jobs, and we aren't there just yet. Decarbonisation will surely create new sets of winners and losers. Successes won't be limited to fossil fuel companies alone, but also the communities dependent on carbon-heavy work. It's predicted that millions of jobs will be displaced<sup>1</sup> and with people's livelihoods on the line, the Just Transition is a contentious topic around the globe. What is a Just Transition – how do we guarantee an equitable future and how do we transition with no lag? The COVID-19 pandemic and resulting economic fallout caused significant hardship. The pandemic has exposed how urgently we need a just transition and a finite process of social dialogue and planning between workers, employers, and government, and meaningful engagement with other critical stakeholders.

Many regions, towns and communities are economically dependent on industries that others may see at the heart of the green problem. It's no surprise that words like 'transition' and 'decarbonisation' are often met with fear – of unemployment, economic disruption and fragmented communities. There's a clear sense of desperation, and the voices from under the dark cloud have overwhelming counter arguments.

In emerging countries, the mining industry is a large employer of workers. This is, in some countries, due to government regulation. In other emerging regions it's driven by economics. Whatever the case, the result is that many under privileged communities are often entirely dependent on mining as a source of income.

However, they are not alone. Developed countries have their challenges too. Many workers in the mining industry are FIFO (fly in fly out), with large regional communities benefiting from the economic flow of mining dollars.

97 MILLION  
ROLES WILL  
EMERGE



85 MILLION  
JOBS  
DISPLACED



**67%**

of engineering firms interviewed in the UK report internal skills gaps in engineering or technical skills.



**44%**

Report gaps in these skills at a **technician** or **skilled craft level**.

**41%**

Report gaps in these skills at a **professional level**.



**36%**

Report gaps in these skills at an **operative** or **semi-skilled levels**.

High-cost countries have led the charge toward automation and robotics, to reduce costs and make the mine viable. The result is an increase in technology, improvement in safety and a change in the type of labour needed.

However, technology knows no boundaries. Technologies developed in one country will eventually make their way into another. If they don't, and government regulation precludes the use of technology that displaces workers, those mines run the risk of falling victim to cost economics. This becomes a lose-lose situation.

The difference between developed countries and underdeveloped countries is the degree of vulnerability of the communities in emerging economies. These are groups who are least capable of rebounding from worker reduction.

The decline of fossil fuel industries has proved traumatic. In South Africa, the coal value chain accounts for 5% of GDP, and provides employment for about 200 000 workers. With unemployment in the country at an all-time, staggering high of 34.5% - coal may be a dirty word

for some but a necessity for others. Removing coal from South Africa will likely see the implosion of its economy.

In the wake of COVID-19, global economies are under pressure. Developed countries like the U.K. report an unemployment rate of 3.8% and fears of geographically skewed job losses in the transition to net-zero have raised more than a few eyebrows. Analysts predict that one in five jobs in the U.K may be affected by the transition<sup>4</sup>.

In Australia, the early closure of the Eraring power station (in 2025) is anticipated to result in around 1,400 workers becoming unemployed immediately upon closure<sup>5</sup>, job losses 40% higher than initially anticipated. A direct result of the 2050 net-zero emissions target.

And, conversations and arguments are echoed from country to country, there is little trust and confidence in new and sufficient opportunities in the 'green sector'.

In a 2020 report issued by the World Economic Forum, analysts predict that across all industries 85 million jobs may be displaced by 2025, with 20% of workers in the mining industry at risk of being affected due to technological shifts. The report predicts that 97 million new roles could emerge<sup>2</sup>, but is the industry prepared? How do we solemnly ask people to choose between health and earning an income? For all the talk of the 'good' jobs to be created by decarbonisation, the tangibility of such gains remains unclear.

## AN ERA OF TRANSITION

The 2022 Global Risks Report<sup>3</sup> cites "climate action failure" as the biggest risk over the next decade. Physical risks linked to climate action failure are the most documented, such as an increase in the frequency and severity of extreme weather.

Without question, the climate crisis is the biggest long-term threat facing humanity, yet the risks linked to the transition receive more attention. A disorderly transition can trigger economic volatility, deepen unemployment and increase societal and geopolitical tensions.

Inaction is also not an option. In the mid-to-long term, countries unable to transform risk losing competitive advantage through a higher cost of carbon, reduced resilience, falling behind on technological innovation and limited leverage in trade agreements.

Yes, green jobs can be transformative. They can be targeted to address unemployment among youth and provide a transitional point for those leaving the armed forces. They can also provide new lines of work for marginalised communities. But are green jobs at the point of being good jobs? It would seem, depending on whether you are in a developed or an emerging economy, perhaps – not yet.

Transitions are seldom smooth. For every job that is lost, a new line of work must be created. In an inclusive net-zero transition, proactive frameworks will need to be linked to wider patterns of unemployment and economic support. Labour policies must work hand-in-hand with decarbonisation policies to stimulate economic and community growth. Without this link, unemployment will be another failure in our journey to net-zero and frictions between environmentalists and labour will continue.

Experts warn businesses to prepare for a disorderly transition<sup>7</sup>. Immense technological, economic and societal changes are needed to decarbonise industry. The steam engine, the age of science and mass production, and the rise of digital technology have all fundamentally changed the world around us. The green industrial revolution will be no different. The time to prepare was yesterday.

## REIMAGINING THE TALENT BATTLEGROUND

Thirty years ago, working in mining looked vastly different to what it is today. Back then, the mine of today would almost be regarded as science fiction. Today's mine is conscious of diversity and inclusion, is a fast adopter of new technologies and automation and is safety conscious. In the nineties, few would have imagined child-minding facilities on mines, driverless trucks, and remote operation of processing plants. If we cast our minds to the future, could we start to imagine what the next 30 years holds for the industry and its people?

As new technologies are introduced, what role will these advances play and what work will look like in digitally enabled, tech-savvy mining operations? COVID-19 exposed the siloed nature of mining companies and accelerated the adoption of digital technologies, AI, and analytics, reducing disconnection but blurring the portrait of the future miner even further.

Automation is indeed a powerful influencer in shaping the industry, new and scarce skills will be required

to maintain operations and traditional recruitment strategies will no longer be relevant. It's essential to question what 'green' jobs might look like – and how they may differ from current work. If green jobs must be the driving force towards a new decarbonised economy, are we doing enough to fill the skills gap that we know is coming?

Talent journeys of the future will require strategic thinking. 20% of a mining organisation's talent pool is predicted to have obsolete skills in three years from now<sup>6</sup>, where does that leave us? Do we leave them behind? Do we begin the search for an AI guru? Or do we think differently about hiring, firing and on-the-job learning? Is there an opportunity to begin internal training programs within an organisation and get ahead of the curve? Can we gear our workforce to be 'future ready'?

New jobs and livelihoods aren't created from thin, clean air. Universities and educational courses often lag industry needs. There's a clear and definitive need to train for skills of the future, yet very few institutions offer something of sustainable value. Perhaps this presents an opportunity for organisations to invest in their people, reskilling and upskilling to gain competitive advantage over others and drive sustainability of work and operations. Organisation like Google, Arup, Aurecon and many others have built internal "universities" to future ready their workforce. This provided a solution to the lag we often find in available course content and required skills. These organisations simply couldn't wait for mainstream courses to become available; it was a much better proposition to upskill their existing worker and gain the benefits of their new skills immediately.

New roles and skills also require new remuneration strategies. Around 81% of oil and gas workers surveyed in the U.K. would consider leaving the sector but are concerned about job security<sup>8</sup>. Offshore wind projects in the country have been found to used irregular migrant labour, paying substantially below the minimum wage and demanding extensive working hours. In Germany, unemployment levels imposed low wages for solar panel manufacturers and in the USA, non-unionised employees working on utility-scale solar projects are paid substantially less than others working elsewhere<sup>9</sup>. Solar parks or wind plants require intensive labour in the build phase, but once set up and connected – only a small staff compliment is required for ongoing monitoring and maintenance. Small scale projects are ad-hoc and offer little income security. Apprehensions about clearing the dust are understandable.

## THE NET-ZERO SKILLS ISSUE

The majority of today's workforce is motivated by the climate crisis, already training for net-zero, and considering options for moving to and between new clean energy fields.

The concern lies within those sectors of professionals that face the most change. The highly skilled employees of energy-intensive industries, oil and gas production and their respective supply chains. Can skills from carbon-heavy industries be transferred to new jobs in the renewables sector? Some strategies and opportunities will require training programmes but others seem to be able to navigate the shift. Plumbers and pipefitters in the gas sector are likely to transfer their skills to green hydrogen with little effort. Oil rig workers already have the skills and awareness of working at height to find a new home in the offshore wind sector.

This may seem plausible and relatively straight forward, yet core skills are often treated as distinct. Oil and gas

workers looking to move to the offshore wind industry have encountered more than a few obstacles in their path. The two sectors often disregard training courses from the other and require further study in course work at often overlaps. Often, having two qualifications is simply not a viable option in today's fast paced world. Graduating professionals will find themselves behind the curve and possibly in major debt before they've even applied for the role.

This is a confluence of problems. Businesses and their leaders face some pressing questions about their future talent pipelines and human capital strategy. In the past, organisations took little to no responsibility for an employee's education or training, but does that mindset have a place in the 'new world'?

If history isn't to repeat itself, in the hardships caused by the loss of thousands of coal mining jobs throughout the latter stages of the twentieth century, we will need to take responsibility for having the skilled workforce in the right place at the right time.

### Share of jobs at high risk of automation by 2030, by region and industry sector





Could small, multi-disciplinary innovation teams be taught design thinking, design-led innovation, disruptive innovation, sustaining innovation, digital transformation and so forth, and apply these skills to real project challenges? Could they identify digital solutions that can solve some of the operational issues on site? Safety challenges could be rethought and bottlenecks uncorked.

Should mining companies, all companies, lean into bespoke, micro-credentialed learning for their employees that enables technology to be absorbed over the course of a project? How do we and should we embed micro-credentialing into our organisational environments? How can industry be a provider of technological or educational uplift? What are the considerations for differing skills levels and operational discrepancies across geographies?

There are many complexities to be considered, not least of which is the inequality in access to basic and tertiary education in different parts of the world. How do we create a collective societal responsibility towards growing the skills of the future? Those skills that are sustainable, values-based and fair. And, can we use mining projects to do so?

Developing and enhancing human skills and capabilities through education, learning, conversation, and meaningful work are key drivers of economic success, individual well-being and societal cohesion. The global shift to a future of work is defined by an ever-expanding cohort of new technologies, new sectors and markets, global economic systems that are more interconnected than in any other point in history, and information that travels fast and spreads wide. Yet the past decade of technological advancement has also brought about the looming possibility of mass job displacement, untenable skills shortages and a competing claim to the unique nature of human intelligence now challenged by artificial intelligence.

Developing new jobs and new skills to perform those tasks is an essential part of the net-zero transition and represents both a challenge and an opportunity. The internet radically changed a multitude of jobs and sectors, and its influence is still unravelling today. Low carbon technology and the transition to net-zero is already disrupting major industries and has the potential to have a similar positive impact. So, if our leadership today is purposeful, could we create a tomorrow of sustainable, shared prosperity?



## Sources:

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