GLOBAL MINING REVIEW

JANUARY/FEBRUARY 2022
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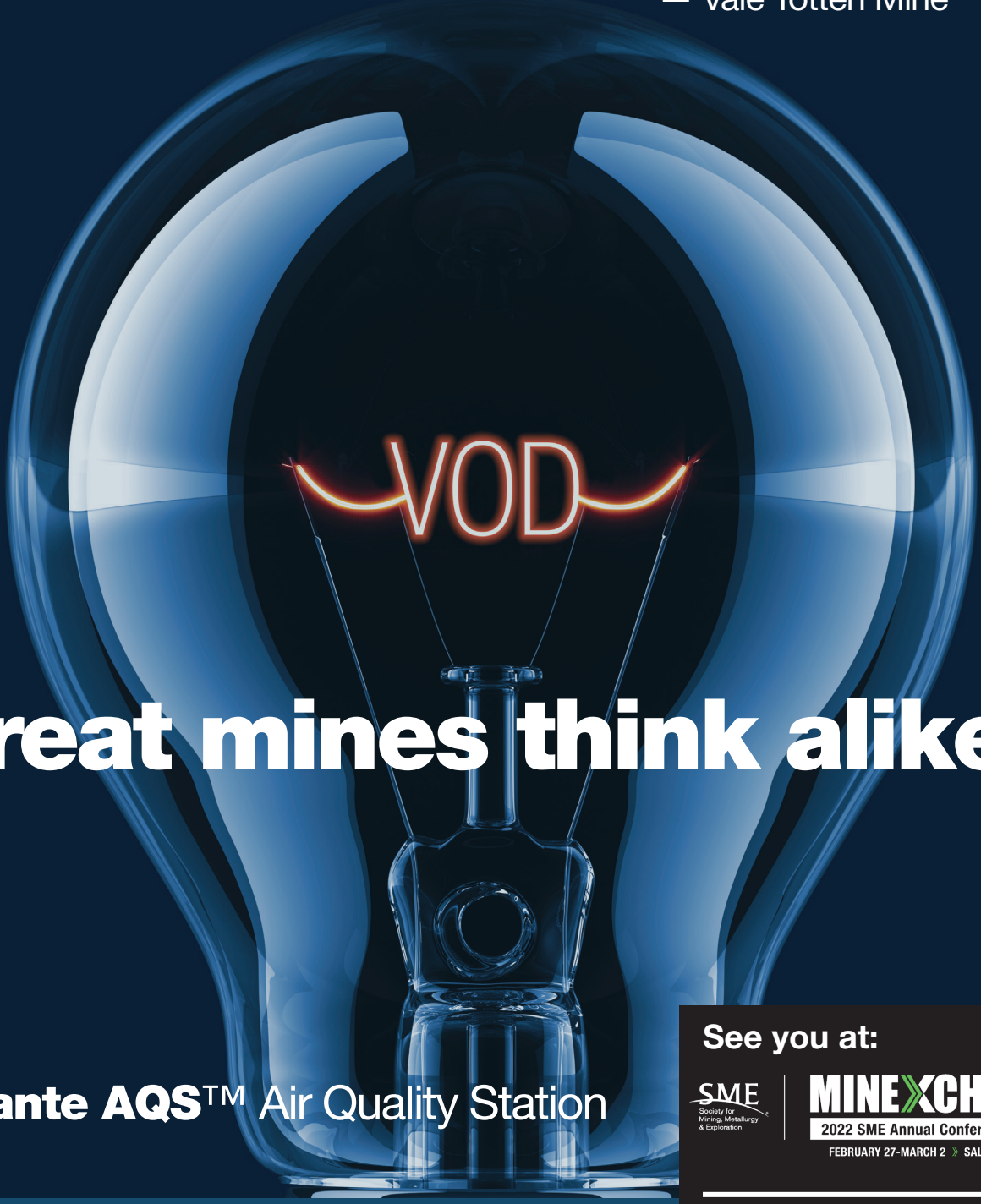
"ENERGY SAVINGS REPORTED IN THE RANGE OF 25% TO 60% ARE VERY ENCOURAGING AS THEY INDICATE THAT POTENTIALLY HALF OF THE ENERGY SPENT FOR VENTILATION COULD BE SAVED."

— Vale Totten Mine



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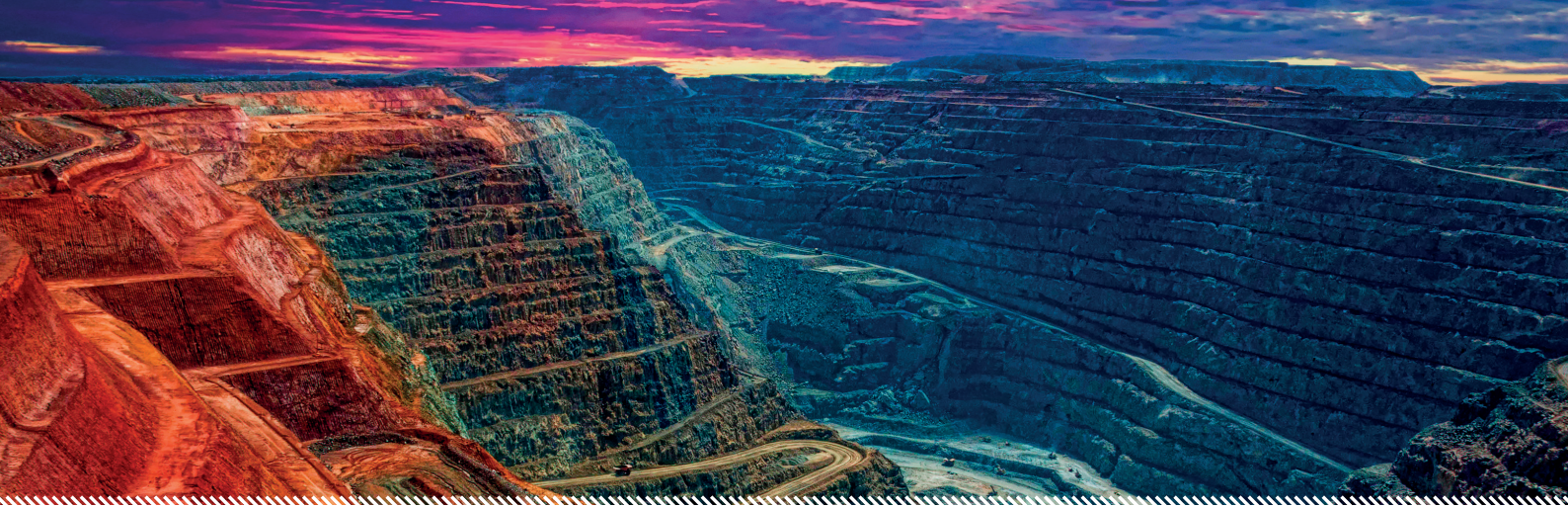

GUEST COMMENT

JEANNETTE MCGILL (VP AND GM, METALS AND MINING)

ASPENTECH

In 2020, the World Bank noted that the production of minerals such as graphite, lithium, and cobalt was on track to grow nearly 500% by 2050 to meet rising demand for clean energy technologies.[1] Despite a shaky and unpredictable economic climate these past two years, that demand has not abated.

In fact, despite ongoing global supply chain woes, new batteries, electric vehicles, infrastructure, and connectivity in electronics are poised to continue driving this massive consumption of metals. We're not talking years down the road either – it starts right now, in 2022.

This being said, the increased consumption of metals presents a dual challenge for digital mines, which will need to balance rising market demand from a globalised economy with the need for sustainability. How do mines maintain a level of operational effectiveness that can support this demand, while facing growing pressures for decarbonisation and greater impacts from climate change?

The dual challenge of accommodating increased market demand and meeting sustainability targets is driving demand for digital mines in 2022. Tackling and supporting digital sustainability in mining operations will require a few key factors.

Firstly, asset-intensive digital mines will need to stay ahead of maintenance requirements to support business imperatives, such as lowering costs and increasing productivity. This will rely on predictive maintenance analytics for precisely determining when equipment is expected to fail and empowering the business to make more informed, real-time decisions accordingly. This insight isn't just about preventing equipment failures and downtime that disrupt operations, it's also about reducing the environmental impacts caused by those failures and achieving greater long-run sustainability in operations.

For example, consider the case of Evolution Mining, a leading Australian gold miner, which is using industrial artificial intelligence (AI) for predictive maintenance, mitigating unplanned downtime and generating new insights into how to support productivity improvements. Another mining company I spoke with recently used this same software to avert what would have been a major equipment failure at its mining site. Had the equipment failed, they would've been facing four days of downtime. By catching the failure ahead of time, they saved themselves from a (literal) million-dollar loss in productivity.

Asset optimisation technologies like these help companies to make significant improvements to their operations' workflows by deploying digitised elements necessary for supporting operational effectiveness.

Secondly, the knock-on effect that industrial AI, predictive maintenance, and other asset optimisation technologies have on mining sustainability must also be taken into account. Deploying these technologies and empowering mining sites to begin producing in more effective and optimised ways creates new opportunities for carbon footprint reductions.

If you're using a predictive maintenance schedule on your truck fleet, for instance, you have more insight into, and proactive control over, things such as tyre wear on the trucks, diesel usage, and emissions control – all of which can be fine-tuned as needed. These digital assets allow companies to report direct improvements in their carbon footprint, driving down energy consumption, water usage, and other wasteful areas.

Predictive maintenance and industrial AI tackle the dual challenge of sustainability and operational effectiveness by reducing environmental footprints and saving businesses money through more optimised production. This combination of analytics and machine learning is a powerful business weapon for creating a more sustainable future, without undercutting business operations at the same time. Ultimately, they allow digital mines to improve business operations, productivity, profitability, and sustainability all at once. GMR

1. 'Mineral Production to Soar as Demand for Clean Energy Increases', *The World Bank*, (11 May 2020), https://www.worldbank.org/en/news/press-release/2020/05/11/mineral-production-to-soar-as-demand-for-clean-energy-increases

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WORLD NEWS

SPAIN Sandfire completes acquisition of MATSA

Sandfire Resources Ltd has completed the US$1.865 million acquisition of 100% of the MATSA Mining Complex in south-western Spain.

The formal completion of the transaction follows satisfaction of the outstanding conditions precedent, including Foreign Investment Authority approval in relation to Foreign Direct Investment in Spain and Competition Authority approval in late December 2021.

With the successful completion of the transaction, Sandfire will exercise operational control and economic ownership at MATSA, effective from 1 February 2022.

The transformational acquisition, which was announced on 23 September 2021, delivers Sandfire 100% ownership of MATSA, located in the world-class Iberian Pyrite Belt in the Huelva Province of Andalusia in south-western Spain.

MATSA is a substantial polymetallic mining complex comprising three underground mines and a 4.7 million tpy central processing facility, with cutting-edge technology and infrastructure, and an extensive resource base with significant growth potential.

The surrounding exploration package, comprising a 2450 km^2 portfolio of mineral rights in exploration in Spain and neighbouring Portugal, offers substantial long-term exploration upside and organic growth potential.

Sandfire will provide updated production and cost guidance for the remainder of FY22 in the coming weeks, following operational control and production plan reviews.

Key integration activities are well advanced with the objective of ensuring an orderly and efficient transition of the MATSA operations into Sandfire's global business at completion. During the period of integration, Sandfire will focus on minimising business disruption at the MATSA operations, working with its high-quality management and operational teams to ensure continuity of existing operations, while maintaining a shared commitment to the highest standards of safety, responsibility, and sustainability.

AUSTRALIA TPG Telecom and Nokia sign MoU for mobile private networks

TPG Telecom has signed a memorandum of understanding (MoU) with Nokia as part of a new partnership to develop and deliver mobile private network innovations for the mining and energy sectors.

The agreement will see TPG Telecom and Nokia collaborate across their extensive portfolio of assets, including: mobile radio 4G and 5G technologies, spectrum, core network, transmission, managed services, Internet of Things (IoT) and industrial applications to provide flexible technology solutions and encourage digital and operational technology transformation in the mining and energy sectors.

The MoU was signed by Jonathan Rutherford, TPG Telecom Group Executive Wholesale, Enterprise and Government, and Anna Perrin, Head of Nokia Oceania at the UTS Nokia 5G Futures Lab in Botany, Sydney.

Mobile private network is an ultra-secure solution for businesses, allowing interconnectivity between people and things using 4G or 5G technology. Within the mining and energy sectors, mobile private network enables new applications and supports existing business services using a local network on their premises, providing protected and reliable performance.

Several specific use cases for the mining and energy sectors will be developed at the UTS Nokia 5G Innovation laboratory to demonstrate the potential and opportunities made possible by TPG Telecom's mobile private networks. Applications will centre around connected workers, connected assets, safe worker and site security, and industrial automation.

As part of the MoU, TPG Telecom and Nokia will also oversee the development of a joint go-to-market sales and marketing pipeline.

It is expected new innovations will come from the partnership, specifically in productivity and worker safety. In one example, 5G terminals will connect machinery and sensor assets to an IoT or operations platform to monitor productivity and safety of workers, while also enabling real-time control and maintenance of mining and energy assets.

5G devices will also enable greater worker communication through improved voice, video and data services, and, in the near future, augmented reality to access complex operational resources in the field.

WORLD NEWS

DIARY DATES

MINEXCHANGE 2022 SME Annual Conference & Expo
27 February – 02 March 2022
Salt Lake City, USA
www.smeannualconference.com

Mines and Money Online Connect – April 2022
05 – 07 April 2022
Online
https://minesandmoney.com/online/

MiningWorld Russia 2022
26 – 28 April 2022
Moscow, Russia
https://miningworld.ru/Home

CIMBC22 – CIM Annual Convention
01 – 04 May 2022
Vancouver, Canada
https://convention.cim.org/

Mines and Money Connect – May 2022
04 – 05 May 2022
London, UK
https://minesandmoney.com/connect/

Investing in African Mining Indaba 2022
09 – 12 May 2022
Cape Town, South Africa
https://miningindaba.com/Home

PDAC 2022 Convention
13 – 15 & 28 – 29 June 2022
Toronto, Canada & Online
www.pdac.ca/convention

To stay informed about the status of industry events and any potential cancellations of events due to COVID-19, visit Global Mining Review's events page: www.globalminingreview.com/events

CANADA West Mining fully executes option agreement for Blue Cove Copper Property

West Mining Corp. has fully executed an option agreement with Dean Fraser. This transaction confirms West will have the right to earn a 100% undivided interest in the Blue Cove Copper Property.

The Blue Cove Copper Property is located at the head of Fortune Bay, in southeast Newfoundland, and is host to significant copper occurrences in outcrop. Several new targets have been identified by prospecting over the past two years, and copper mineralisation can be found locally throughout the claims. The best assay obtained to date from grab samples at the Blue Cove Property returned values as high as 5.1% copper, 33 g/t silver, and 0.27 g/t gold. Copper mineralisation generally occurs in altered volcanic rocks and sediments on the property with the primary copper minerals being chalcocite with more minor bornite and chalcopyrite. Widespread copper oxide is readily visible on many outcrops throughout the property.

The property consists of 232 claims covering a 5800 ha. area, striking 22 km adjacent to the Terrenceville fault structure. Excellent infrastructure also exists in the area, including the nearby town of Terrenceville – which hosts a deep sea port.

CHILE Pampa Metals partners with VerAI Discoveries to explore for copper and gold in Chile

Pampa Metals Corp. has signed definitive documentation with VerAI Discoveries Inc., allowing Pampa Metals to evaluate and explore a series of copper and precious metals targets that have been generated by VerAI using proprietary artificial intelligence methodologies.

The targets are distributed within eight property blocks, wholly owned by VerAI, totalling approximately 18 700 ha., located in parts of central northern Chile. The eight property blocks all lie within similar geographic and geologic areas to Pampa Metals' wholly owned portfolio of projects that totals an additional 62 000 ha.

AUSTRALIA Thiess appointed mining services contractor for the Olive Downs Project

Thiess has been appointed by Pembroke Resources as the contractor for the provision of mining services for the Olive Downs Project in Queensland, Australia.

Under the eight-year contract, Thiess will deliver full-service mining operations, including mine planning, overburden removal, drill and blast, load and haul, water management and rehabilitation of final landforms. This includes the construction of the mine infrastructure, providing all mobile plant and equipment, as well as the statutory operator for the project.

Revenue to Thiess is expected to be AUS$1.5 billion over the first five years, with revenue beyond this term to be finalised.

Thiess will commence operations in 1H23, subject to finalisation of contracts.

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WORLD NEWS

RUSSIA Norilsk Nickel purchases battery mining equipment

Nornickel has implemented a programme to modernise and upgrade the fleet of mining equipment. The company has purchased unique samples of battery equipment for pilot testing in the conditions of the Zapolyarny mine, the first in Russia.

The Zapolyarny mine (Bear Ruchey LLC, part of the Norilsk Nickel Group) has received two new self-propelled battery-powered vehicles – Utimec MF 500 SD (for transporting concrete mix) and Utimec MF 205 PER SD (for transporting people). The machines, manufactured by Normet, arrived in Norilsk in full factory readiness.

The Utimec MF 500 SD Underground Concrete Mixer is environmentally friendly, productive, and the best in its size class. It has a high-power output and a top speed of up to 20 km/h. The all-electric architecture includes the latest lithium-ion battery technology for fast charging and two powerful direct-drive electric motors. The batteries are also recharged while driving downhill and braking, further improving overall performance.

The Utimec MF 205 PER SD bus is designed for the safe transportation of personnel through underground mine workings. Fully reversible all-wheel drive with high traction and instant torque ensures safe and confident driving in difficult road conditions. The new ergonomic FOPS and ROPS compliant cab offers visibility and comfortable driver and passenger compartments. The capacity of the battery bus is 20 people, with two people in the operator's cab.

When fully loaded and moving up the slope, the charge of the bus is enough for 10 km, the concrete mixer for 8 km. Batteries will be charged at stationary posts. It takes 40 min. to fully charge. In addition, the set includes mobile chargers with a capacity of 40 kW for recharging at temporary sludge points. There is also a charging option from a common power supply. The main advantage of such equipment is the absence of harmful emissions into the atmosphere, which is an important condition in the limited space of the mine.

Representatives of Normet from Finland conducted theoretical and practical training for the operators of the Zapolyarny mine on pre-trip inspection and operation of battery machines. Now the equipment is undergoing pilot tests in a mine. The tests will take place within six months, and the task is to evaluate how the equipment behaves in difficult Arctic conditions.

EGYPT Centamin Surkari Gold Mine to transition to owner-operator mining

Centamin has announced that, following an independently managed contractor tender process, the underground operations at its Sukari Gold Mine will transition from contractor-mining to owner-operator mining with immediate effect. This change will deliver significant cost savings and improve operational control and mining flexibility, whilst also enabling the company to upskill the local workforce.

The decision to move to owner mining, following the expiry of the current five-year contract, is a result of a number of reasons.

The 200% increase in Sukari underground proven and probable reserves, as announced in December 2021, underpins an eight-year underground life of mine, with identified near-term growth targets to extend beyond a 10-year life of mine.

The operational leadership at Sukari has been significantly strengthened, with experienced underground expertise and increased investment in the development of the national workforce.

An owner-operator model, including risk-based analysis against the submitted contractor-mining tender proposals, identified significant operating synergies for the broader Sukari operations.

The transition to owner-operator mining is expected to generate long-term cost savings of an average US$19 million/yr from 2023 onwards, compared to the 2021 cost base.

90 000 m of underground drilling is budgeted for 2022, including identified near-term growth targets, to extend the underground beyond a 10-year life of mine and to support the underground expansion study, which is due for completion in 2H22.

A detailed transition plan to owner-operator mining is in place with implementation underway, including utilising a third-party underground mining specialist to assist with workforce training. The company has also executed its contractual right to purchase the current underground mining fleet from the incumbent contractor for a total capital cost of US$10.5 million to be paid in 1Q22.

Following the completion of an independent tender process, the company has awarded Geodrill Limited a five-year contract to provide underground drilling services, including a minimum of 90 000 m/yr of drilling and introducing reverse circulation drilling to the underground, which is faster and enables larger samples to be taken. The contract is to commence in 1Q22.

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REDEFINING THE MINING INDUSTRY

Andrew Swart, Deloitte Touche Tohmatsu Limited, outlines 10 trends that may shape the global mining industry over the next 12 months.

If 2020 set the stage for change in the mining industry, then 2021 cemented its necessity. The ongoing effects of the COVID-19 pandemic on the world of work, along with a continued drive towards digitisation, the growing need to integrate environmental, social, and governance (ESG) commitments with central business functions, as well as the requirement to pivot in response to fast-moving business and operating conditions, have shifted the boundaries that traditionally define how mining companies should look.

Underpinning these drivers is the green energy transition. In November 2021, COP26, held in Glasgow, Scotland, reaffirmed the industry's importance in supplying the metals central to a low-carbon future.

The Bipartisan Infrastructure Deal, passed by the US Congress in November 2021, is a practical example of how the transition to low-carbon energy and transport technologies is reliant upon critical minerals and metals. The US$1 trillion plan aims to source these primarily from within the US.[1] While meeting demand for projects such as these will be a challenge, there is also significant opportunity going forward for businesses to expand their horizons and create new social, environmental, and economic value.

Today, leaders have the chance to reorganise and redefine their company's purpose and forge partnerships to create a more sustainable and attractive future for the industry. The sky is the limit, and that is why in its 14th year, Deloitte's 'Tracking the trends' report focuses on affecting holistic transformation.[2]

Deloitte's experts from across the globe have identified 10 trends that will shape the industry over the next 12 months. The following article provides an overview of each.

Trend 1: Aligning capital allocation to ESG ambitions

While many mining companies have announced ambitious ESG targets over the past five years – decarbonisation being a prime example – most are still grappling with how to move from intent to reality. While much of the focus is currently on climate change, looking to the future, companies should think comprehensively and ensure capital allocation decisions reflect wider ESG commitments.

Investing in a set of businesses, initiatives, and projects that are strategically sound, value-creating, resilient, and sustainable will create portfolios that are advantaged in the minds of investors and shareholders seeking to position mining at the heart of the energy transition.

There are three broad potential portfolio themes to consider. Some companies may prioritise investments geared towards energy management and climate initiatives, specifically those delivering proven economic returns, thus creating an 'economic decarbonisation portfolio'. On the other hand, there are companies that may choose to invest in longer-term net zero commitments, even though some of these investments may not meet the traditional return thresholds. Similarly, some companies may choose to shift more investment into the wider community, using community impact as a way to de-risk the portfolio long term. This is called the 'value beyond compliance portfolio'. Finally, some companies may consider creating a more 'disruptive sustainable portfolio', with greater emphasis on new business models, new alliances within the value chain, greater levels of innovation, and more sustainable greenfield projects.

In reality, portfolios will contain a mix of elements depending on the long-term vision of the organisation and its appetite for risk. However, it is clear that companies need to factor ESG more explicitly into their capital allocation frameworks going forward.

Trend 2: Reshaping traditional value chains for a low-carbon future

As the green energy transition gets underway, the demands of consumers, suppliers and investors are evolving, and calls for greater transparency in metals supply are increasing. This, combined with a projected shortfall in certain commodities, is starting to reshape value chains, portfolios and business models, as well as ushering new players into the market.

To remain relevant, miners could use their climate change commitments, commodities, and services to tell the story of growing, profitable, and sustainable enterprises; ones that are contributing to societal and environmental needs in a positive manner.

Portfolios are changing with companies scrutinising their assets in relation to the impact that they have on their carbon footprint and ESG rankings. For some companies, a portfolio restructure might be on the cards, while others might divest certain assets and refocus the businesses they have to deliver better value, or balance them with new prospects that offer different types of value.

Demand for critical minerals, particularly rare earth elements, is driving some miners to add commodities to their portfolios. For example, Rio Tinto announced plans to build a tellurium recovery plant at its Kennecott operation near Salt Lake City, Utah, in March 2021.[3]

Scope three emissions reporting will also inform future supplier and customer choices for mining companies, thus creating new alliances and partnerships up and down the value chain. There will likely be more of these alliances where downstream automotive and industrial companies may either enter into offtake agreements, or take a stake in the resources.

The drive for green and critical minerals is also attracting companies, such as chemical or technology players, into the traditional mining environment. For example, American Battery Technology Co. is creating an extraction and recycling business in the US based around lithium.[4] Technology provider, Jetti Resources, is another. The company's copper extraction technology has attracted investment from the likes of BHP and Freeport-McMoRan.[5]

Evaluating the impact of operations and products across the value chain is becoming increasingly important, with many companies already looking to enter the circular economy through investments in recycling businesses.

Trend 3: Operating in the new super cycle

2021 saw elevated commodity prices, which heralded the arrival of a new super cycle in mining and metals.[6] While this was good news for most miners, with higher metals prices come government demands for a greater share of mineral wealth. As countries began to recover from the COVID-19 induced recession, the mining industry saw various regulatory measures proposed, as well as a rise in resource nationalism.[6]

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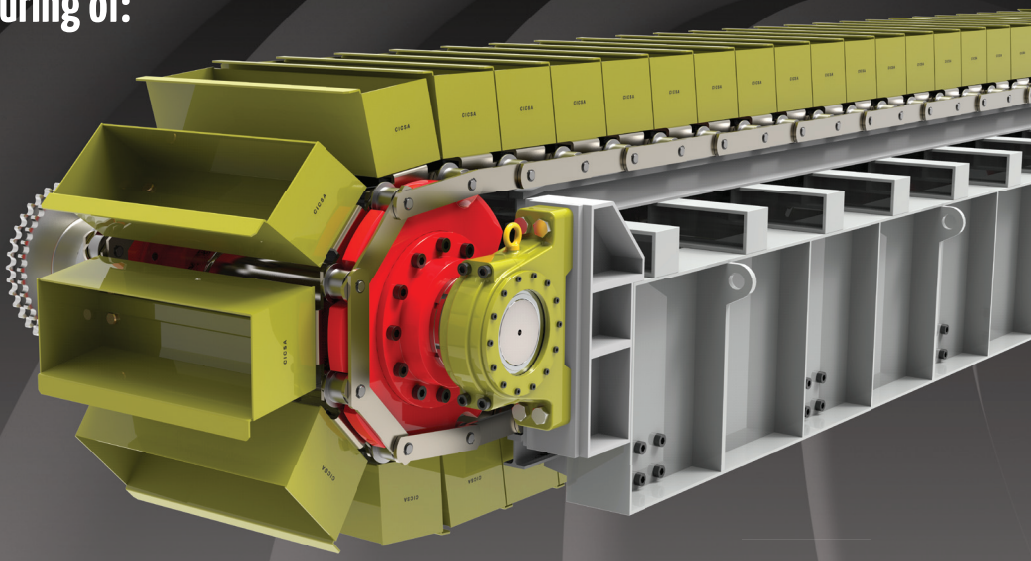

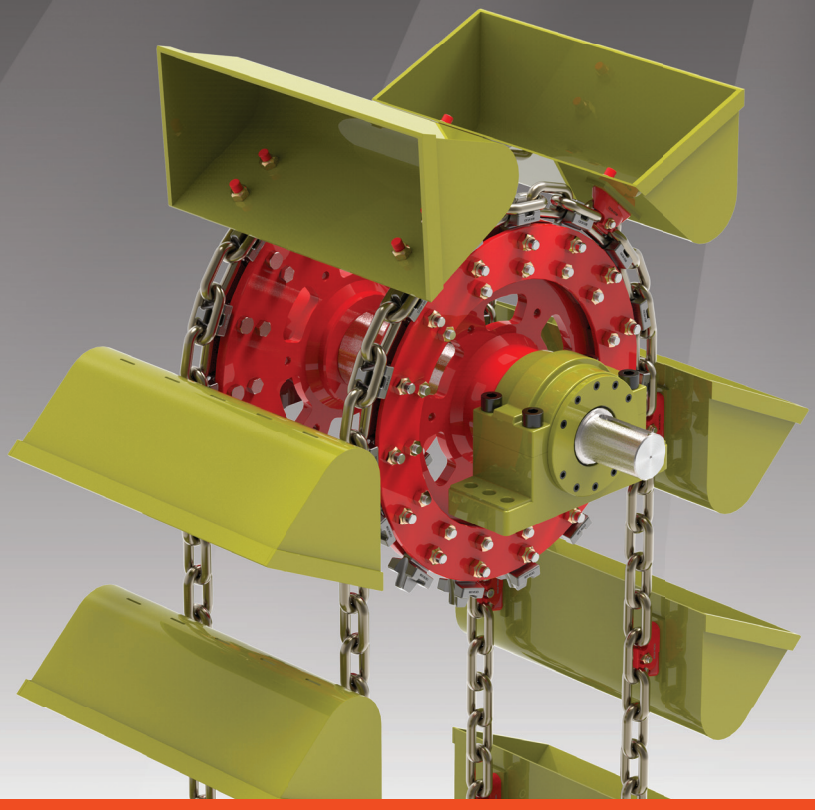

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Resource nationalism can take many forms. The expropriation of the Kumtor gold mine in Kyrgyzstan from Canadian miner, Centerra Gold, is an overt example of how these measures can create considerable operational as well as financial risk.[7]

At the regulatory level, Deloitte has observed changes proposed in the tax regimes of key metal producing countries. For example, Chile accounts for 28% of global copper production and is a growing player in lithium.[8] Under a proposed bill, investors could face additional tax on the production of key resources.[9] Similar trends are seen elsewhere in the world.

Additionally, the international tax system is under reform. In October 2021, using the OECD/G20 Inclusive Framework on BEPS, 136 countries and jurisdictions agreed to implement a plan to tackle tax avoidance. Implementation is expected in 2023 and mining companies must be prepared for change.[7]

Trend 4: Creating operating models to support ESG commitments

Pressure on mining and metals companies to make high-profile commitments that go above and beyond compliance on ESG issues, such as climate change and tailings management, is mounting. ESG cuts across the whole organisation and the operating model needs to reflect this.

Without proper internal structures in place, companies will find it difficult to make progress towards their ESG commitments or prove to investors and ratings agencies that they are honouring them across the organisation.

At a practical level, this requires an operating model that facilitates visibility, accountability and collaboration between departments, along with a clear governance structure. Operational teams need to be properly connected to corporate strategic initiatives, and there should be clarity on how commitments translate into operational processes and even specific roles within functions.

Information should flow unimpeded up and down the organisational structure, incentives need to be aligned, and leaders must be able to check that the promises they have made publicly are being reflected in practices throughout the organisation.

The risk is that if companies do not test their structures or, if a failure in governance occurs, they could lose an important source of capital or be accused of greenwashing. The latter is not just damaging to an individual company's reputation, but to the industry as a whole.

Given the opportunities available to the industry, there has never been a more important time to get on top of this.

Trend 5: Positioning companies for an increasingly competitive labour market

Like many industries, the mining sector has felt the lasting effects of COVID-19 on the labour market. The Great Resignation placed additional pressure on a sector which was already challenged by low recruitment numbers.[10,11] As a result, many miners have decided to re-evaluate their employee value propositions and transform their ways of working.

Digitisation, remote work practices, establishing greater corporate social purpose and the rearchitecture of work, all provide chances for miners to secure a strategic advantage through human capital going forward.

Aligning with a low-carbon future and promoting the role of mining in the energy transition will help miners to attract and retain employees with the valuable and transferrable skill sets needed to create the digitally enabled, agile businesses of tomorrow. It could also open the doors to new recruits who may not have previously considered a career in mining, boosting diversity, equity, and inclusivity across the board.

Trend 6: Establishing a new paradigm for Indigenous relations

Indigenous communities around the globe no longer want to be positioned as stakeholders in transactional style relationships. They are keen to establish a new type of connection with all entities that participate in their environment, including mining companies.

Issues such as decarbonisation and natural resource management, securing diverse talent, and even leadership are all subsets of how Indigenous peoples can help mining companies better relate to and fulfil their responsibilities as actors within a landscape. If they are willing to listen, there is much that miners could learn from traditional landowners who have lived harmoniously with nature for thousands of years.

By working collaboratively with Indigenous peoples in different countries, in order to align on priorities and advance mutual business strategies and goals, particularly around critical mineral deposits, there is a huge opportunity for mining businesses to alleviate trust issues and secure their social and environmental license to operate.

However, before this can happen, a new paradigm for Indigenous involvement in mining must be established. One that is built upon communication, mutual trust, and respect. This will take time and investment, as well as a shift in governance.

Trend 7: Continuing the journey towards innovation-led organisations

Innovation has been on mining companies' agendas for some time but, for most, it has proven tricky to integrate the process with the core business functions and operations. Nonetheless, a number of factors have recently converged, causing executives to reconsider their approach.

There is much that the mining industry could learn from other sectors in this regard. For instance, transport and logistics operations often have lower margins than those seen in mining, but are still profitable thanks to greater efficiencies. The agile ways of working employed

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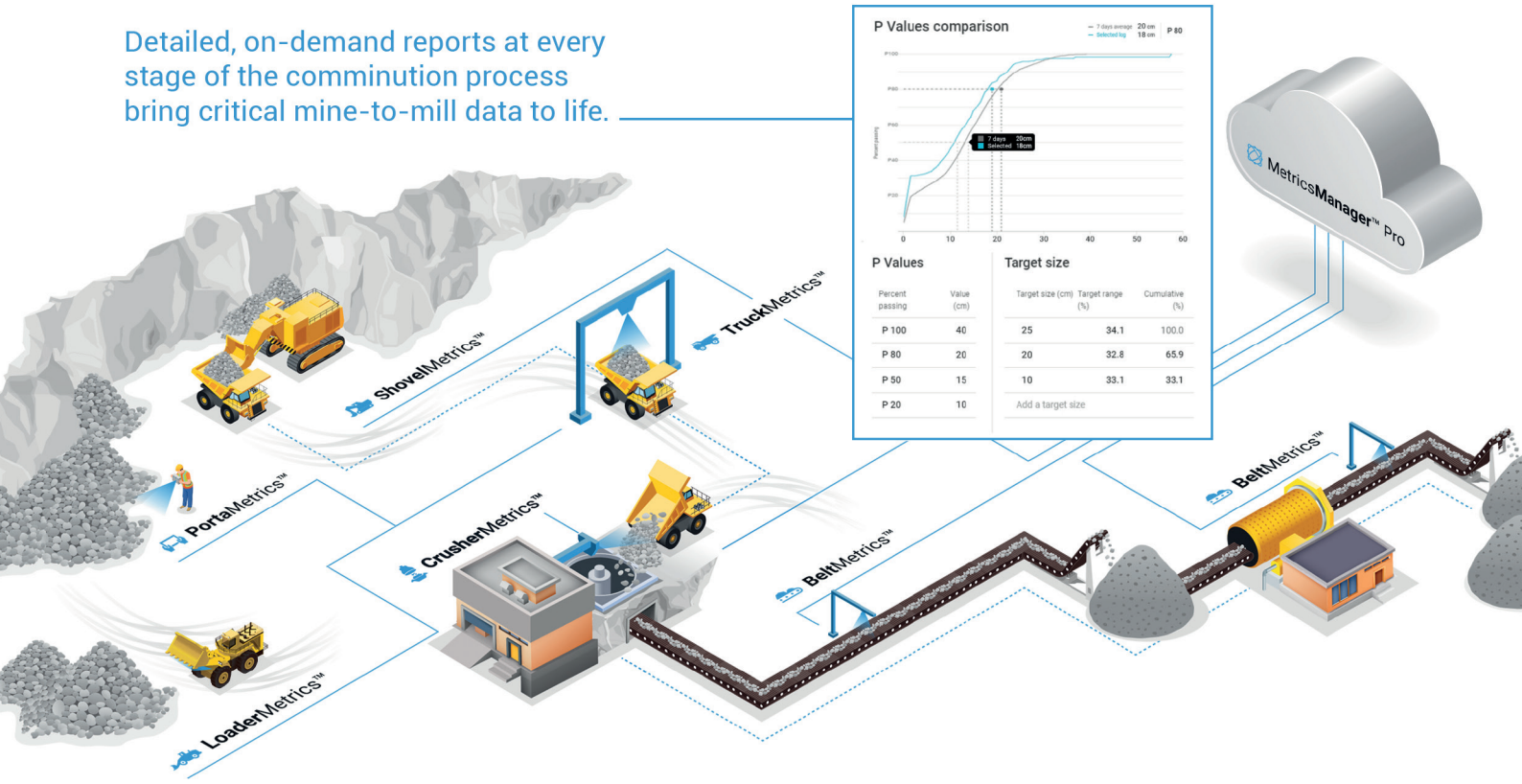

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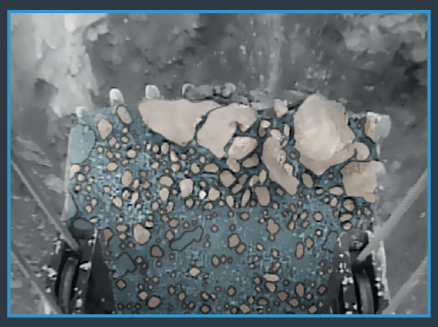

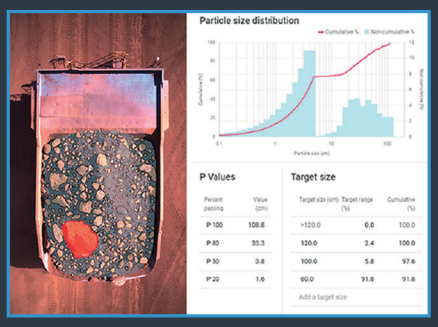

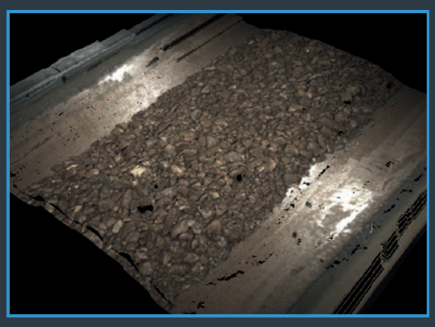

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in the technology and financial services industries could also offer inspiration.

Leadership is key. Companies that are good at innovating will have a wide risk tolerance, and will allow for production fluctuations when testing an idea that could prove valuable. Successful change starts from the top.

There is also a need to shift away from a culture that focuses only on solving immediate problems and moving towards longer horizon issues. Today, there is the technology, data and visibility to do this, and to become truly agile.

Trend 8: Unlocking value through integrated operations

Mining and metals companies are on a journey to drive efficiencies holistically throughout their organisations. Digital transformation has already contributed to this by enabling real-time visibility from mine to market, but many mining companies have failed to realise the benefits.

The reason is that often too much focus is placed on the technology and not enough on how the organisation will interface with that technology and use it to drive effective integrated decision-making that optimises the system versus an individual function.

The next steps in unlocking value are to use data-based insights to change how decisions are made at every level. Clarifying roles and responsibilities and reviewing incentives can also help. Actions that benefit the organisation as a whole, rather than specific departments or functions, will help companies become nimbler in response to changes in operational and business environments, and create greater value.

Trend 9: Closing the IT-OT cybersecurity gap

The acceleration of information technology (IT) and operational technology (OT) convergence and value chain integration in mining has produced new levels of efficiency in recent years. However, for many companies, rather than security efforts keeping pace with their digital growth, the gap between risks and controls has widened. The result is that, today, some of the industry's biggest cyber vulnerabilities are around OT, industrial control systems (ICS), and Industrial Internet of Things (IIoT). The ubiquity of digital technologies and work practices mean that businesses now need to factor security threats and solutions into every decision they make.

The adoption of remote and hybrid operating models as 'the new normal' also means that now is a good time to review cybersecurity measures around interconnected or segmented networks, and ensure they are robust enough to sustain current practices and support future business growth.

Trend 10: Preparing mining operations for changing climate

While decarbonisation has been the primary focus of miner's climate change-related efforts thus far, organisations also need to be thinking ahead and building climate resilience across their operations.

Physical risks resulting from climate change can carry significant financial implications for organisations, including direct damage to assets and indirect impacts from supply chain disruption.

By using United Nations climate models and digital risk management tools, it is now possible to quantify physical risks at new and existing mine sites, as well as map supply chains to identify and address pockets of enhanced risk.

The level of transparency and integration seen in mining supply chains today mean that organisations have the chance to not only prepare their own operations, but also help their suppliers and customers ready themselves for whatever operational impacts a changing climate might bring.

The time for change is now

In conclusion, these 10 trends are all closely interwoven. Mining companies should consider them holistically to create competitive and truly sustainable organisations fit to enable a cleaner, greener future. GMR

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