

An aerial photograph of a vast open-pit mine. The landscape is characterized by deep, terraced pits and winding dirt roads. Several large yellow mining trucks are visible on the roads, and a yellow excavator is positioned on the right side. The terrain is dark and rocky, with some areas of lighter-colored soil or rock. The overall scene depicts a large-scale industrial mining operation.

2023: THE NEAR FUTURE OF MINING

INTRODUCTION



SHERIF ANDRAWES

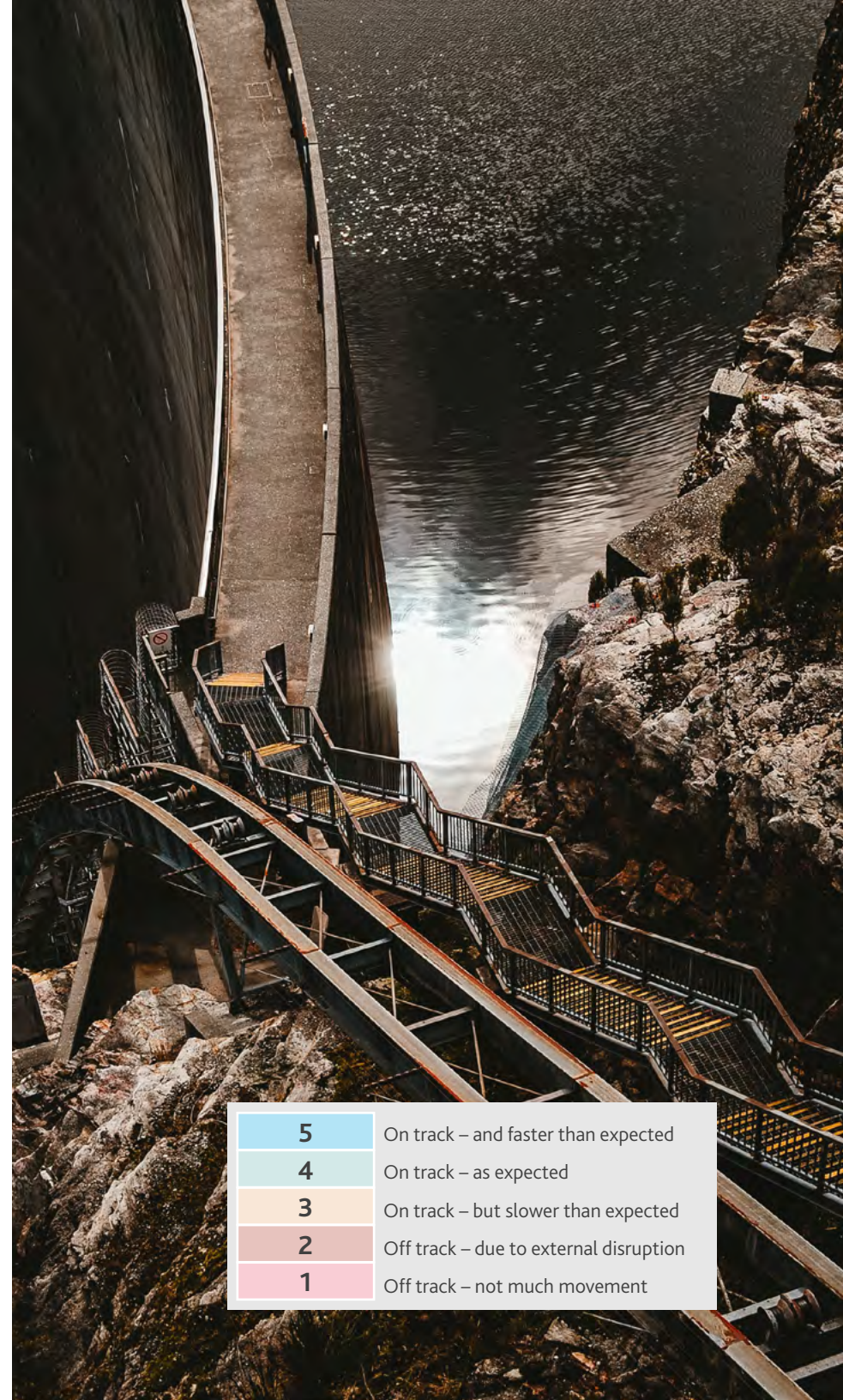
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In [*2020: The Near Future of Mining*](#), our Natural Resources practice leaders in the U.S., as well as Australia, Canada, South Africa and the UK, offered their predictions for the mining industry domestically and around the world. We predicted that by 2020, robots, renewables and the Internet of Things (IoT) would be the main drivers of change—necessitating a greater focus on cybersecurity and leading to greater demand for supply chain transparency.

Since we released our predictions in December 2017, a storm of external pressures has been hitting mining organizations. These include a period of mostly low commodity prices, growing calls from external stakeholders for mining companies to have good environmental, social and governance (ESG) programs, and increased geopolitical tensions that have created uncertainty around demand for raw materials. Mining companies are also undergoing unprecedented levels of innovation around IoT technologies and are up against greater cybersecurity threats.

As a result, most of our 2020 predictions are trending in the right direction, albeit at differing levels of progression. Using a heatmap, our global leaders have codified how our 2020 predictions have fared so far around the world. Higher values indicate predictions that have progressed more quickly. As we reflect on how the mining industry has evolved since we made our initial predictions, we also offer our take on how the mining industry will evolve by 2023.

Read on for *2023: The Near Future of Mining*.



5	On track – and faster than expected
4	On track – as expected
3	On track – but slower than expected
2	Off track – due to external disruption
1	Off track – not much movement

GLOBAL

2020 PREDICTION EVALUATIONS

MINING 2020 PREDICTION	STATUS	VALUE	INTERPRETATION
Supply chain transparency will take the compliance spotlight for 2020 as companies gear up for the European Union's Conflict Minerals Rule, effective in 2021.	On track – as expected	4	Though it may not have had the lead spotlight, the EU's Conflict Minerals Rule certainly highlighted the increased pressure mining companies are facing from external stakeholders who are more focused on ESG entities.
By 2020, robots will replace more than 50 percent of miners, and mining accidents will be cut by 75 percent. Half of the miners will themselves be retrained to run the technology controlling the robots.	On track – but slower than expected	3	All new mines are being designed to incorporate automation with some being fully automated. It is harder to retrofit existing mines. Mining accidents continue to fall thanks to technology improvements, such as automated vehicles and tracking devices, which monitor the relative positions of workers and hazardous equipment.
By 2020, activist hackers will launch at least five cyberattacks on mines around the world in permanent denial of service (PDoS) attacks aimed at eliminating the environmental and social threats they pose. They'll use workers' connected devices to launch the attacks.	On track – but slower than expected	3	We have seen numerous cyberattacks in the industry but not as many as expected, which is a positive sign. More than anything, this reflects the awareness of the issue in the industry and the steps companies have taken to mitigate risk. Companies must remain vigilant, though, as hackers grow more sophisticated and this risk evolves.
Global mining companies leveraging internet-connected sensors and automated drillers in mines will decrease their per ton digging costs by more than 30 percent.	On track – but slower than expected	3	We are seeing per-ton digging costs decline substantially, but this has not been the case across all companies.
By 2020, renewables will account for one-quarter of the world's electricity generation as dependence on coal wanes.	Off track – has not moved much since we predicted	1	According to a renewable energy report from BP, renewable electricity generation accounted for about 9 percent of global electricity generation in 2018. Denmark (69 percent), Germany (32 percent) and the UK (32 percent) were some of the global leaders, but growth has been slower than our ambitious prediction in 2017.

GLOBAL TOP MINING PREDICTIONS BY 2023

Gone are the days when miners could simply explore for minerals. Looking ahead, successful miners will be those that also mine for innovation.

Mining for innovation means organizations must develop new products and processes internally to maximize financial and talent resources. They must also consider acquiring new resources from outside their organization if that gives them a more sustainable path forward. Both types of 'innovation mining' will at the same time require new processes and protocols to manage the cyber risk that comes along with new, digitally enabled discoveries.

By 2023, here's how we predict organizations around the world will mine for innovation:

1. The arms race around [rare earths](#) will quicken, as growing geopolitical tensions impact global trade and countries battle to lead manufacturing and technology innovation.
2. Secondary raising will be a concept of the past. The rise of alternative financing solutions, which reduce the burden on mining companies' balance sheets, will grow in popularity, hitting stock exchanges hard.
3. Miners will become an open book because of the pressure from investors to demonstrate their social license to operate. Miners will use blockchain technology to validate their operations.
4. Artificial intelligence will be commonplace in mining operations, as miners use it to interpret data from smart sensors and machine interconnection, and to improve operational safety and efficiency through unmanned, AI-enabled technologies. This will transform mining into one of the safest occupations of its kind.



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MINING AROUND THE WORLD

CLICK ON THE + BELOW TO READ COUNTRY-SPECIFIC EVALUATIONS & OUR TOP 2023 PREDICTIONS FOR EACH MARKET



UNITED STATES

PREDICTION EVALUATIONS

MINING 2020 PREDICTION	STATUS	VALUE	INTERPRETATION
Most mining companies will grow to spend 10 percent of revenue on information technology (IT) by 2020, compared to just 1 percent in 2015. As a result, many U.S. mining entities will continue to expand efforts to integrate autonomous technology by 2020.	On track – as expected	4	Many mining companies are adopting predictive maintenance and mine management software that allow for automation.
By 2020, more than 1 in 5 mining companies in the U.S. will be the victims of a distributed denial of service (DDoS) attack.	On track – but slower than expected	3	Several mining companies across the globe fell victim to cyberattacks, although phishing remained the most common style of attack.
Deep-sea mining expeditions will become common by 2020 in the U.S. industry, and there will be a U.S. law established to regulate the practice and its environmental impacts.	Off track – not much movement	1	Studies are still underway to determine the environmental impacts from the International Seabed Authority (ISA)'s proposed mining code—set in 2018 to be finalized by 2020.
More than 10 percent of U.S. national infrastructure projects funded through 2020 will be projects in the mining sector.	Off track – not much movement	1	Although there has been a concerted focus on 'critical metals,' further infrastructure spending has not manifested at the federal level.
Driven by innovation in the sector, a currently unknown mineral will become an integral part of the U.S.' energy mix by 2020.	Off track – not much movement	1	New minerals have not taken the focus away from critical or traditional metals in the industry.



UNITED STATES

TOP MINING PREDICTIONS BY 2023

1. The U.S. will break into the [top five producers](#) of battery metals, as new technology unlocks American resources and national policy around critical metals spurs investment and development of these projects. Demand for copper in electric vehicles will also support the U.S. mining industry further.
2. The importance of a digital workforce will become more vital as automated mines prove to be 20 percent more profitable than their manually operated counterparts. It will be easier to bring new talent into the pipeline but continue to be difficult to retain them in the face of differing generational and cultural attitudes towards digital transformation across organizations.
3. Technology that reduces the environmental footprint of mines will become the new norm, as miners reduce costs using renewable energy and minimize their impact on water resources. This will come to pass through the continued proliferation of legislation regulating the use of water for industrial purposes and improved metal and industrial water recycling methods.



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CANADA

PREDICTION EVALUATIONS

MINING 2020 PREDICTION	STATUS	VALUE	INTERPRETATION
By 2020, "digital" will no longer be a buzz term, and blockchain will become a necessity.	On track – and faster than expected	5	As mining companies learn from the trailblazers in blockchain and concerns around the sourcing of raw materials grow, blockchain will be essential by 2020.
By 2020, the debate over bitcoin versus gold will only intensify as financial regulators look to control this new medium of exchange and avoid another dotcom bust.	On track – as expected	4	The debate over bitcoin vs. gold is alive and well—especially as increased worldwide debt levels are driving central banks to buy gold and ultimately drive commodity prices higher. Bitcoin enthusiasts refer to the cryptocurrency as a "safe haven" asset, though analyst takes suggest otherwise.
By 2020, new and recent immigrants, aboriginals and women will continue to make up the personnel shortfall in Canada's growing mining sector.	On track – as expected	4	According to a March 2019 interview with Canadian Prime Minister Justin Trudeau by <i>Northern Miner</i> , the mining sector employs 16,000 Indigenous people, making it one of the top employers of Indigenous Canadians in the country.
By 2020, 30 percent of mining industry leaders will have defined and implemented platform cleantech strategies.	On track – as expected	4	On Jan. 29 , the federal government announced its plan to invest \$4.2 million in two renewable projects in the north of Canada, and we expect the push to renewables to continue, especially as emphasis on ESG programs grows.
Cybersecurity spending across IT and operations in the mining industry will increase 20 percent year-over-year by 2020.	On track – as expected	4	Cybersecurity spending will continue to increase, as foreign hackers up their attacks against the industry. The cybercrime group FIN10, for example, has focused specifically on Canada's mining sector since 2013, launching several intrusion operations to steal valuable data.

CANADA

TOP MINING PREDICTIONS BY 2023

1. **Seventy-five percent** of miners will choose software as a service (SaaS) options versus on-site financial, maintenance, health and safety, and reporting platforms, as they look to conserve cash and reallocate investment elsewhere.
2. More mining companies will move to alternative energy in a bid to trim costs, especially as the cost of wind and solar declines. Those that do will realize up to **30 percent** in energy savings.
3. Attracting digital talent will be a growing challenge for the mining sector, especially as companies race to adopt new technologies ahead of their competitors.



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SOUTH AFRICA

PREDICTION EVALUATIONS

MINING 2020 PREDICTION	STATUS	VALUE	INTERPRETATION
By 2020, deep-level mining challenges will accelerate the drive to develop cost-effective alternatives to the traditional mining process.	On track – and faster than expected	5	This push is largely on track, though unemployment could be the 'X factor' in the near-term by potentially hampering the transition to cost-effective alternatives.
By 2020, communities around mining sites will have a greater impact on company operations than national legislation.	On track – and faster than expected	5	We see this continuing to be a priority.
Increased governmental regulations will lead to increased unpredictability of life-of-mine plans by 2020.	On track – as expected	4	The government again pushed the implementation of the National Environmental Management (NEMA) out for another year, but we still expect it to come to fruition by 2020 and anticipate broader increased governmental regulation in the sector.

SOUTH AFRICA

TOP MINING PREDICTIONS BY 2023

1. To solve for the challenge of achieving uninterrupted electricity supply, mining companies will continue developing their own independent electricity generation facilities. These could challenge the status quo for energy production in South Africa, possibly even adding surplus electricity to the network. It will also continue reducing demand for centrally produced electricity.
2. The South Africa Revenue Service (SARS) will take a more advanced audit approach, with significant changes to the mining tax regime expected. We predict greater transparency from the extractive industry by SARS, putting taxpayers in a position to enter into cooperative compliance arrangements.
3. Renewables will make up at least one third of power production, as the country continues its energy transition under increased environmental and energy security pressures.



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AUSTRALIA

PREDICTION EVALUATIONS

MINING 2020 PREDICTION	STATUS	VALUE	INTERPRETATION
By 2020, tech companies will become the miners of the future.	On track – as expected	4	The continued digitalization and electrification of our world will see larger global companies like Apple, Tesla, Volkswagen and Samsung vertically integrate to secure the resources they need to scale up and compete.
By 2020, artificial intelligence (AI) will change the way we negotiate and price contracts, and humans will no longer control deals in markets.	Off track – not much movement	1	AI has not been adopted yet in price negotiations, largely because of the human element and challenges around the adoption of new technologies, which cannot be underestimated. We now see AI's use in other areas of the mining process as more likely.
The path to growth is changing. Crowd-sourced equity funding, a new method of financing created under legislation passed in 2017 which went live in 2018, will transform the growth path of small-to-medium mining companies.	Off track – not much movement	1	We still believe this will happen, but regulatory delays have meant that crowd-sourced equity funding platforms have been slow to come to market. Fundraising is difficult at present at the small end of the exploration market, and any alternative sources of capital will be welcome.

AUSTRALIA

TOP MINING PREDICTIONS BY 2023

1. Diesel machinery will not be used in new underground mines in Australia, and existing underground mines will have begun to phase them out. This push will come from the financiers of new mines and potentially from government bodies too. Common acceptance of the health dangers that nano diesel particles present will take hold, and miners will have made strides towards the electrification of underground mines, leading to the country's first all-electric underground mine.
2. More companies will propose in-country beneficiation plants, which have always been an aspiration for Australia. There has been limited success to date, but Australia is now becoming increasingly better positioned because of geopolitical uncertainties, abundance of energy sources (including renewables), remoteness of sites making it less feasible to transport over long distances and other factors.
3. At least 10 Australian mining companies will have used competitive crowdsourcing (like hackathons) to fast track at least one of their exploration projects. Crowdsourcing ideas and analysis of data—often for a prize—will be a quick and cost-effective way for mining companies to progress exploration projects that may be noncore, tricky or unusual.



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UNITED KINGDOM

PREDICTION EVALUATIONS

MINING 2020 PREDICTION	STATUS	VALUE	INTERPRETATION
By 2020, we will see the demise of offshore holding companies in zero tax jurisdictions.	On track – as expected	4	New legislation requiring companies to demonstrate substance in many offshore territories came into force this year. There has been a noticeable increase in groups starting to review their structures and plan for operational and structural changes. It is anticipated that these changes will become more visible towards the middle of 2020 before the first returns reporting on substance must be filed.
Blockchain technology will be used to verify the provenance of high-value minerals by 2020.	On track – but slower than expected	3	It's not a question of if — but when — blockchain will be implemented more broadly in the mining sector. The sector has already seen some adoption of blockchain, with BMW's partnership with a London-based blockchain startup to trace the source of its electric vehicle batteries as just one example. Given the relatively new nature of the technology, though, companies are still determining how to navigate challenges around implementation, organizational adoption and risk mitigation.
More licenses will be lost due to regulatory and community intervention by 2020.	Off track – not much movement	1	Despite a few high-profile examples in recent years of license refusals or cancellations for failures to meet regulatory requirements, domestic mining to date continues to be relatively stable. Mining assets are long tail in nature, and therefore, if established, are an accepted part of the community.
Non-miners will make significant investments in the sector by 2020.	Off track – not much movement	1	There's a growing requirement for electrical storage and battery power in all aspects of our lives, requiring the discovery of new resources and opening of new mines. But while there's been a lot of new supply ramping up, there hasn't been as much as initially anticipated, in part because of challenges around the need for manufacturers to source their specific requirements in terms of chemical composition for their battery, with Lithium as one example.
London mining IPOs will increase fourfold by 2020.	Off track – not much movement	1	In 2017, when the bulk of the research for <i>2020: The Near Future of Mining</i> was being done, there were seven IPOs that listed on the London Stock Exchange . Since then, though there have been some more recent IPOs from mining companies, the sector has been cooler than others. For example, in 2018, the industry saw just five IPOs. In 2019, several mining companies listed on the exchange, but none have been reported as IPOs.



UNITED KINGDOM

TOP MINING PREDICTIONS BY 2023

1. Whatever the final Brexit outcome, the UK will continue to be an attractive fundraising market for global mining companies.
2. The UK capital markets will see the start of other industries taking strategic investments in mining companies to secure valuable and needed commodity supply.
3. Potash will be the mineral of choice for the UK mining industry as significant projects are anticipated to come online in the early 2020s.



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