Top 10 business risks and opportunities for mining and metals in 2022

EY
Building a better working world

Executive Summary

Opportunities will continue to outweigh risks in 2022, as ongoing social disruption became the clear driver of change in our industry. While there were fears that the COVID-19 pandemic may slow global progress on sustainability measures, the opposite has been true. It is clear from our survey results that purpose, long-term value and sustainability are no longer add-ons to business as usual – they are business as usual. External influences will keep driving risks and opportunities as stakeholder and capital market pressure continues to hold miners accountable.

It's not surprising then that the top three risks and opportunities this year for the mining and metals sector are: environment and social; decarbonization; and license to operate (LTO).

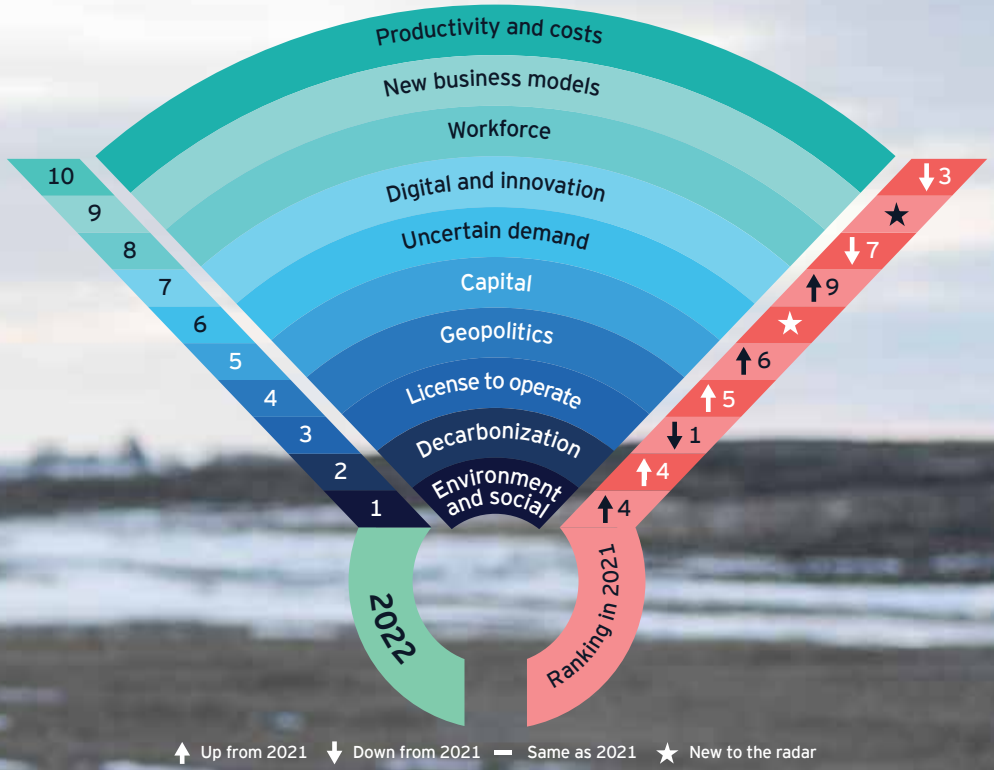
1 Environment and social

While many conversations in the market are currently focused around the energy transition and road to decarbonization, 25% of our survey respondents saw environmental and social issues as the number one risk. While this was initially surprising, we believe it is indicative of miners and stakeholders broadening their perspectives. Miners need to be able to demonstrate their contribution to a sustainable future if they are to access the rapidly growing pool of capital available for strong environmental, social and governance (ESG) performers.

2 Decarbonization

Decarbonization has become a major disrupter in the sector, dominating many discussions and presenting both risks and

Top 10 business risks and opportunities



About the survey

We surveyed global mining and metals executives, between June and September 2021with the majority of respondents being from the C-suite.

opportunities. Our survey respondents have elevated the risk to second place for 2022, up from fourth last year. Decarbonization needs to integrate into a company's overarching strategy, rather than be addressed as a separate or distinct path, delegated to a discrete team. Almost all mining and metals companies have set decarbonization targets but, without understanding how to reach them, are committing to potentially unrealistic goals. Companies that share their road map to net zero and their successes along the way can gain investor confidence and, potentially, competitive advantage.

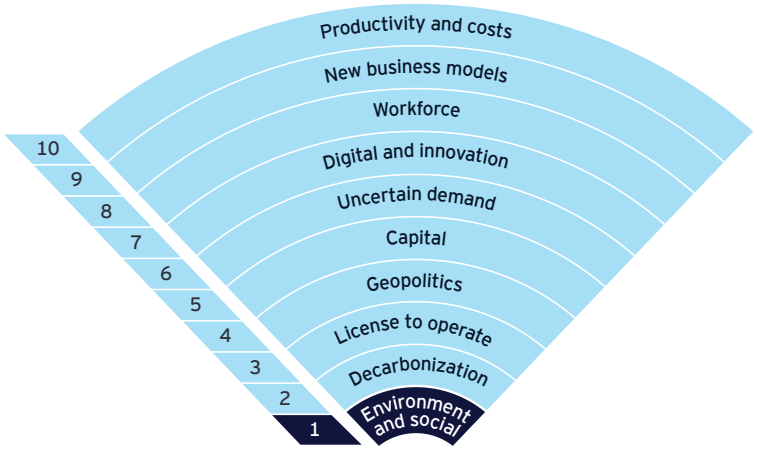
3 License to operate (LTO)

LTO has lost the top spot it has held for the past three years but is still seen as a top three risk. Miners that can demonstrate their societal value will strengthen relationships with stakeholders and be rewarded in the marketplace with lower costs of capital, better human capital engagement and, in the long run, improved market value.

Sector disruption has created a large number of opportunities for those that can capitalize on them. Companies that can demonstrate they are operating in the best interests of a broad group of stakeholders can gain a competitive edge in the fight for capital and new resources. Taking action now will enable a sustainable future for the sector.

In the face of generally positive future demand, both as a result of government stimulus and the energy transition, it is critical that mining and metal companies have the ability to compete effectively, particularly with new entrants into the sector as downstream players invest to secure supply. This means considering new business models, a strong focus on scenario planning and then optimizing portfolios that allow for flexibility in the face of increasing change.

Environment and social



(Up from 4 in 2021)

01

Miners that manage their impact on the environment and communities can build a positive legacy

Over the past year, mining and metals companies focused on decarbonizing operations as external pressures increased. For the next 12 months, we expect stakeholder expectations to broaden around issues such as biodiversity, social impact and water management. Miners are beginning to integrate ESG factors into corporate strategies, decision-making and stakeholder reporting, as the issue becomes a priority for shareholders and investors.[1] EY research has found that 91% of investors now view nonfinancial performance as "pivotal" in their investment decisions.[2]

For mining and metals companies, navigating ESG is increasingly challenging, given the breadth of issues the sector faces, as well as the myriad of reporting standards to which they need to adhere. Twenty-five percent of our survey respondents say both environmental and social issues are the number one key risk and opportunity, but our findings indicate that governance is not yet seen as an issue, but this will change as the focus on social issues increases.

Managing social impact and ensuring a "just" transition

The COVID-19 pandemic has focused attention on social inequalities, placing pressure on companies to go beyond their regulatory obligations and take responsibility for driving social equality in the regions in which they operate. Many mines are in remote, underdeveloped parts of the world with local communities that rely on mining for economic growth. Miners have a role to play in ensuring the long-term, sustainable economic growth and social progress of these regions by working with governments, nongovernment organizations and communities to leave a positive legacy both during and beyond life of mine.

This is an issue that will increasingly come to the fore as the energy transition accelerates, and miners move away from fossil fuels. Maintaining integrity and, ultimately, LTO will require companies to manage this change with care and limit negative impacts on coal-depending economies and communities, including women, young people and Indigenous groups.

Transparent supply chains can demonstrate human rights commitments

A knock-on effect of the COVID-19 pandemic has been a rise in the use of child labor and in violence against women. As more financial institutions adopt the Equator Principles (EP) risk management framework around social risk, miners will need to demonstrate their commitment to human rights. In particular, EP4 mandates human rights assessments be performed before project funding is awarded. We expect to see more mining companies adopt human rights best practice across their supply chain to meet expectations and retain LTO.

Progressive planning for closure should be adopted across life of mine

Many mining companies are missing rehabilitation performance measures and targets. Those that are leading the way have put a commitment to sustainability firmly on the CEO agenda and performance measures, which then cascades down through the business. This overarching vision is critical considering the complexity of the issue — miners must navigate different political, social requirements, as well as what's best for communities in terms of leaving a legacy beyond life of mine. Progressive rehabilitation plans will help miners to avoid the potential blowouts that we have seen across the industry in the past, but this needs to start with mine planning.

Biodiversity has yet to receive the same attention as other ESG topics, such as climate change or gender diversity. But momentum on the subject is building as more businesses realize that the benefits of protecting natural capital can outweigh the costs.

With future mines set to be carbon neutral and sustainable, the majority of the sector's environmental risk and liability will lie in closed legacy assets. Tailing dams and contamination are two significant risks requiring ongoing monitoring. Digital tools can help with this.

---

[1] "The role of water in mining's sustainability journey," Aquatech, 4 November 2020, via https://www.aquatechtrade.com/news/industrial-water/mining-giants-tackling-water-use-with-tech/.

[2] "ANZ to stop lending to Australia's biggest coal port over its exposure to fossil fuels," *The Guardian*, 9 February 2021, via https://www.theguardian.com/australia-news/2021/feb/09/anz-to-stop-lending-to-australias-biggest-coal-port-over-its-exposure-to-fossil-fuels

Managing the water-energy nexus

The water-energy nexus relates to how much water is used to generate energy and how much energy is used to collect, distribute and dispose of water. Water management is likely to be one of the ESG issues most scrutinized by investors in 2022, according to our survey respondents who ranked it the number two ESG issue on investors' minds.

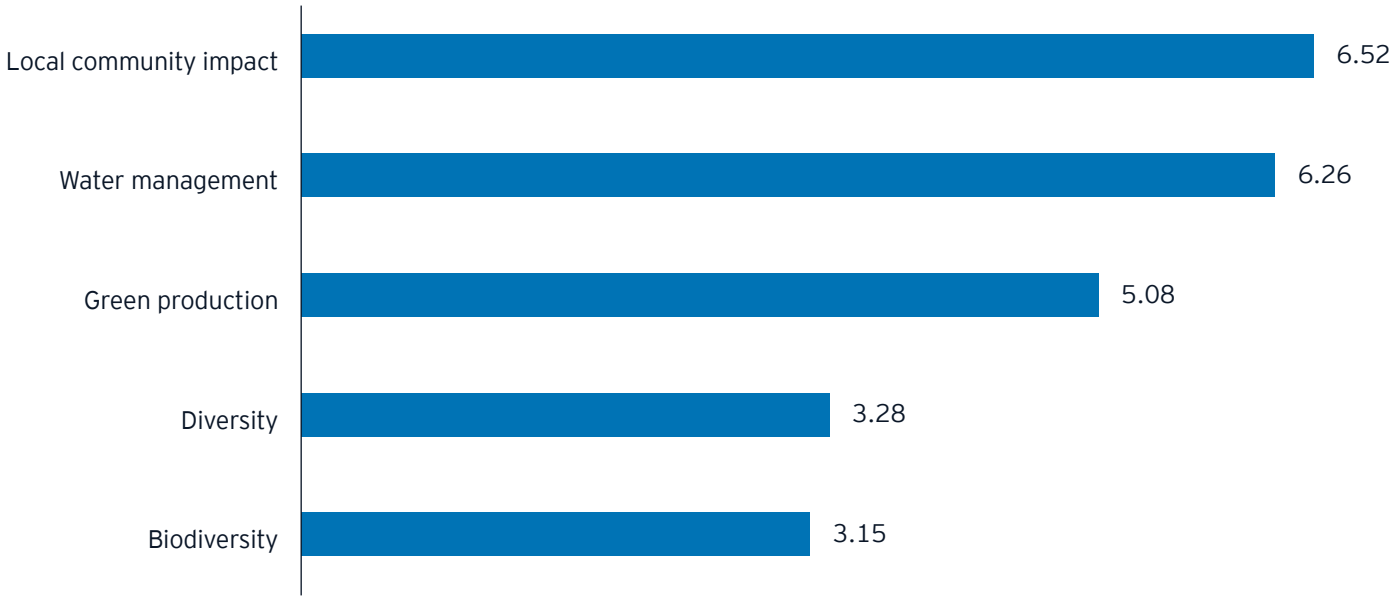
Currently, the sector tends toward setting blanket targets around water usage, but these often do not acknowledge the trade-offs, which will likely come to the fore as ESG measures and reporting standards improve. For example, some technologies that save water can also be energy intensive.

De-watering of tailings dams is essential to avoid the tailings failures that have been in the spotlight in recent years. New technology to recover coarse particles can improve both energy efficiencies and water savings by about 30%, and de-watering them eliminates the risk of wet tailings.[3]

Embracing the circular economy

In the circular economy, mining and metals companies face a number of risks, but can also capture the opportunity for recovery and recycling, through to product-as-a-service. Recycling rates currently vary for all minerals and geographies due to costs and technical issues, but as technology improves, opportunities to adopt circular economy practices to repurpose and regenerate will only increase. The capital markets are beginning to play a role in accelerating the shift to a circular economy. BlackRock, for example, has formed a partnership with the Ellen MacArthur Foundation to drive investment in companies contributing to, or benefiting from, circular economy activities. Companies

Which are the top environmental and social issues on which the mining and metals sector will face the most scrutiny from investors?



Source: *Top 10 business risks and opportunities in mining and metals for 2022* survey respondents.

[3] "EU proposes world's first carbon border tax for some imports," *Reuters,* 15 July 2021, via https://www.reuters.com/business/sustainable-business/eu-proposes-worlds-first-carbon-border-tax-some-imports-2021-07-14/

that hesitate to adopt new circular models may not only miss out on opportunities to create value but find their ability to operate their core business impacted.

Setting a direction on ESG reporting standards

There has long been concern about what became known as the "alphabet soup" of ESG measurement and reporting standards, which are multiple and sometimes duplicative to follow, making it hard for miners to quantify and demonstrate value from an ESG perspective.

The aggregation of standards is something that would benefit miners, as well as investors who are keen to have a level playing field upon which to assess how companies are performing versus their peers.

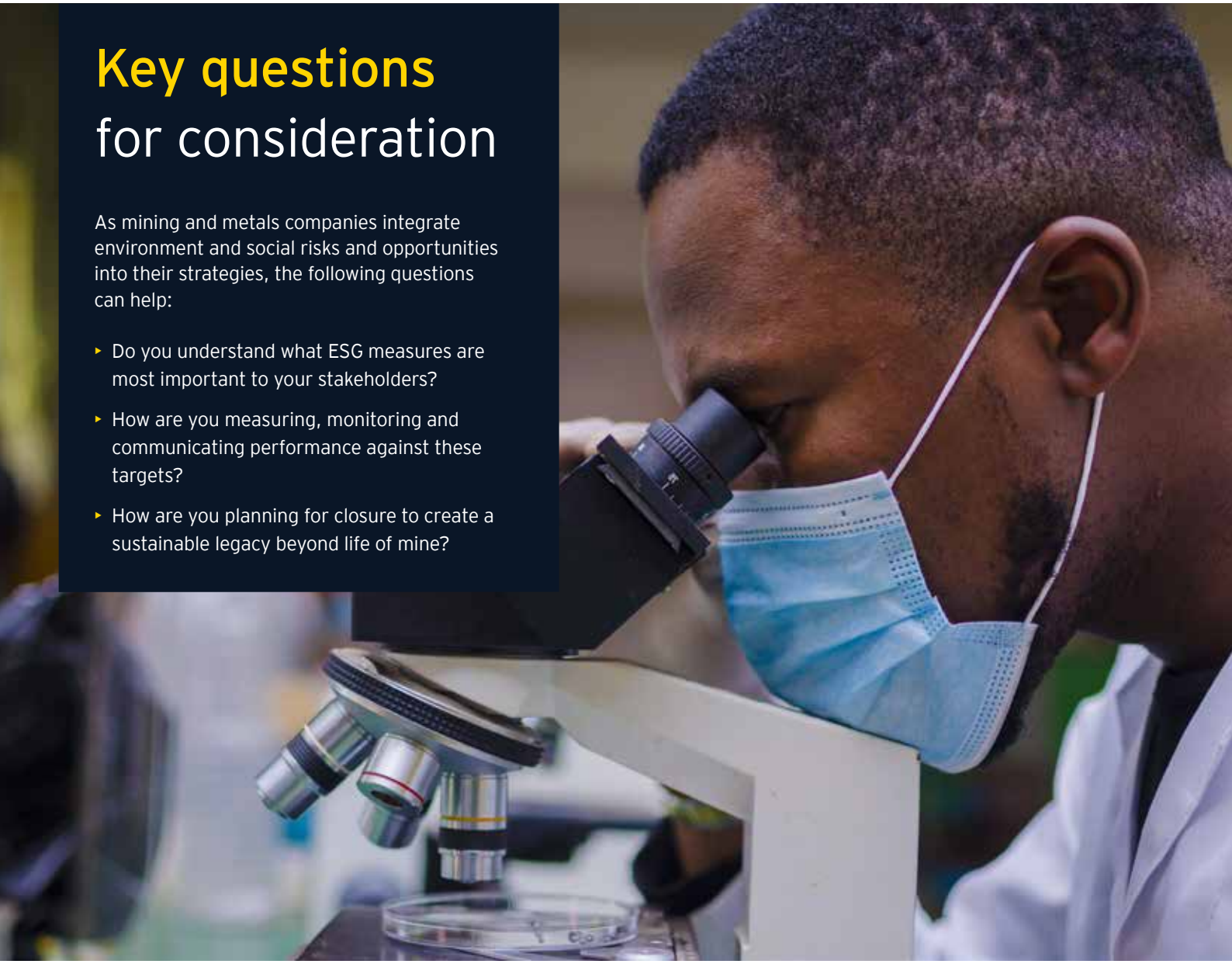
The IFRS Foundation[4] has added an increased urgency to the search for common standards, and there is a degree of optimism in the sector that a solution is in sight. We would anticipate that with the emergence of these common standards will come pressure from shareholders to link ESG performance to senior management pay, to hold leadership accountable for the company's actions.

[4] Carbon Prices now Apply to Over a Fifth of Global Greenhouse Gases (worldbank.org).

Key questions for consideration

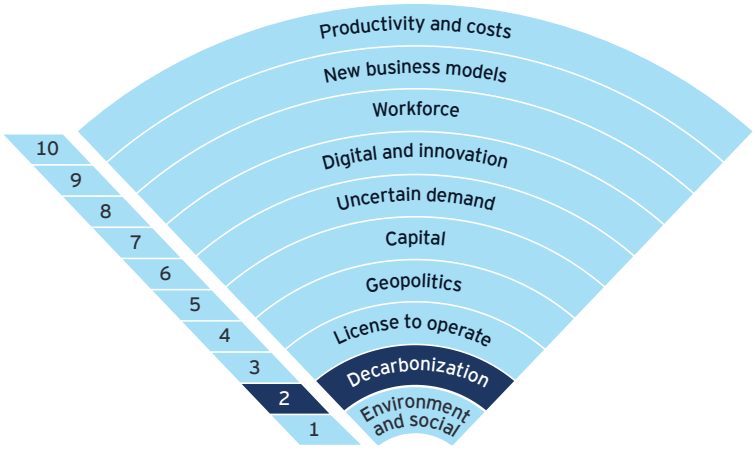
As mining and metals companies integrate environment and social risks and opportunities into their strategies, the following questions can help:

- Do you understand what ESG measures are most important to your stakeholders?
- How are you measuring, monitoring and communicating performance against these targets?
- How are you planning for closure to create a sustainable legacy beyond life of mine?



Decarbonization

02



(Up from 4 in 2021)

Practical, flexible abatement strategies can achieve net zero — and competitive advantage

The past year has seen miners and investors accelerate conversations and actions around decarbonization, which is now a major disrupter in the sector, presenting both risks and opportunities. It's not surprising then that decarbonization takes the number two spot of 2022's ranking, up from four last year.

Financial institutions, including banks, pension funds and insurance companies, have been declining to finance thermal coal-related investments since as early as 2013. But this trend has gained momentum and even broadened over the last 12 months, culminating in the G7 announcement to end all government funding of thermal coal by the end of 2021.

Carbon pricing set to increase

Investors' move away from coal comes as climate regulations and expectations increase. The EU recently proposed the world's first carbon border tax,[5] effectively taxing carbon emitted during steel and aluminium production in countries without a carbon tax, when the end product arrives in the EU. This will have a significant impact on the import of steel and aluminium, and is another example of countries coming together to act in concert, in turn influencing others to do the same.

Actions such as these, in tandem with other carbon reduction regulations, are likely to have a significant impact on net exporters, and may even push those countries where production takes place to react with their own price on carbon. And, with many of the world's governments trying to raise revenue after spending more than US$30t globally on COVID-19-related stimulus, we see a risk that similar taxes and policies will be rolled out more widely. Currently only one-fifth of the world's greenhouse gases are covered by carbon pricing instruments, but this is likely to increase.[6] Navigating these emerging regulations will be a challenge for miners, both in terms of managing decarbonization efforts and reporting against targets.

But even as miners face the challenges of decarbonization, and the majority have committed to net zero by 2050, few have made the necessary investment to achieve this. We suspect this is because many miners are still working through what net zero means for them, and will wait for answers before allocating capital.

Building a flexible decarbonization strategy with practical pathways

Decarbonization is a sector disrupter and, as such, needs to be treated like any other strategic risk — dealt with at a board and executive level, and managed as part of the overarching business strategy, rather than addressed as a separate climate strategy delegated to a discrete team.

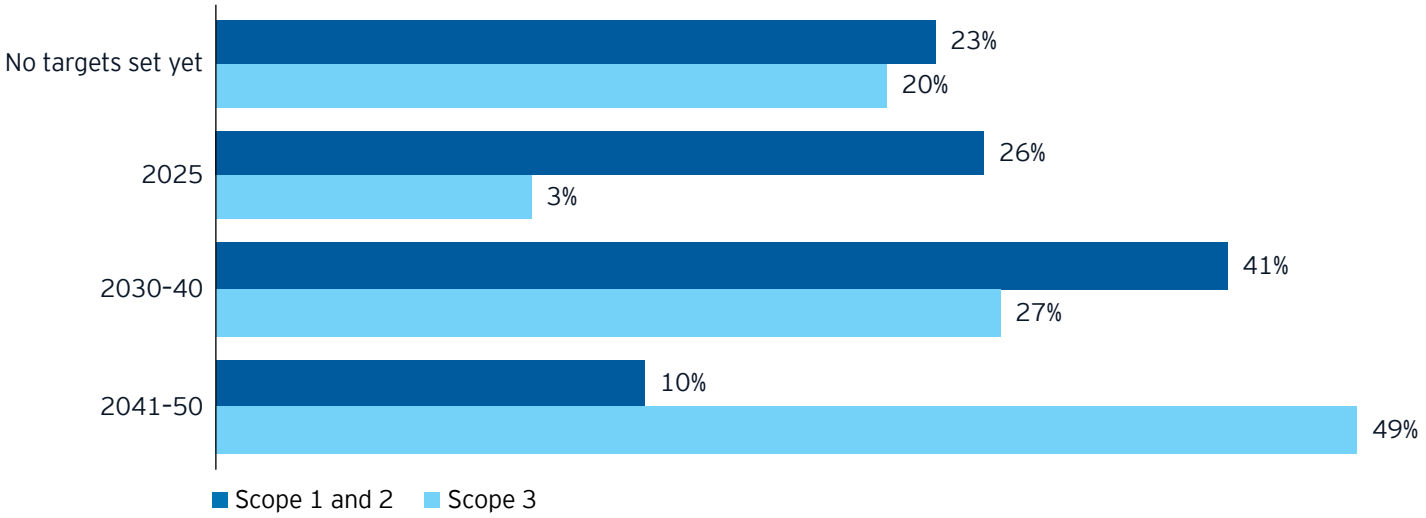
Doing this successfully requires miners to consider:

- Scenario planning the different pathways to net zero, to create a flexible, agile decarbonization strategy
- Aligning organization design and culture by incentivizing behavior that helps achieve targets
- Incorporating net-zero achievement into capital allocation methods
- Determining which tools, technology and innovation to invest in, and who to collaborate with
- Deciding when to sell exposed assets, or whether to transition to new energy economy metals
- Assessing other potential opportunities, including recycling, renewables and carbon-reduced products
- Reviewing funding and capital models, including funding sources, the role of government and internal allocation, and how to make best use of tax breaks and incentives
- Determining how offsets and other financial instruments can be used to help achieve net zero

[5] "Global investors engage top mining companies on Indigenous community rights & social licence," *Church of England*, 28 October 2020, via https://www.churchofengland.org/news-and-media/news-and-statements/global-investors-engage-top-mining-companies-indigenous

[6] "Ben Wyatt to join Rio Tinto Board," *Rio Tinto Media Release*, 4 June 2021, via https://www.riotinto.com/news/releases/2021/Ben-Wyatt-to-join-Rio-Tinto-Board

What are your targets (in terms of time) to reduce your carbon emissions and attain net zero?



Source: *Top 10 business risks and opportunities in mining and metals for 2022* survey respondents.

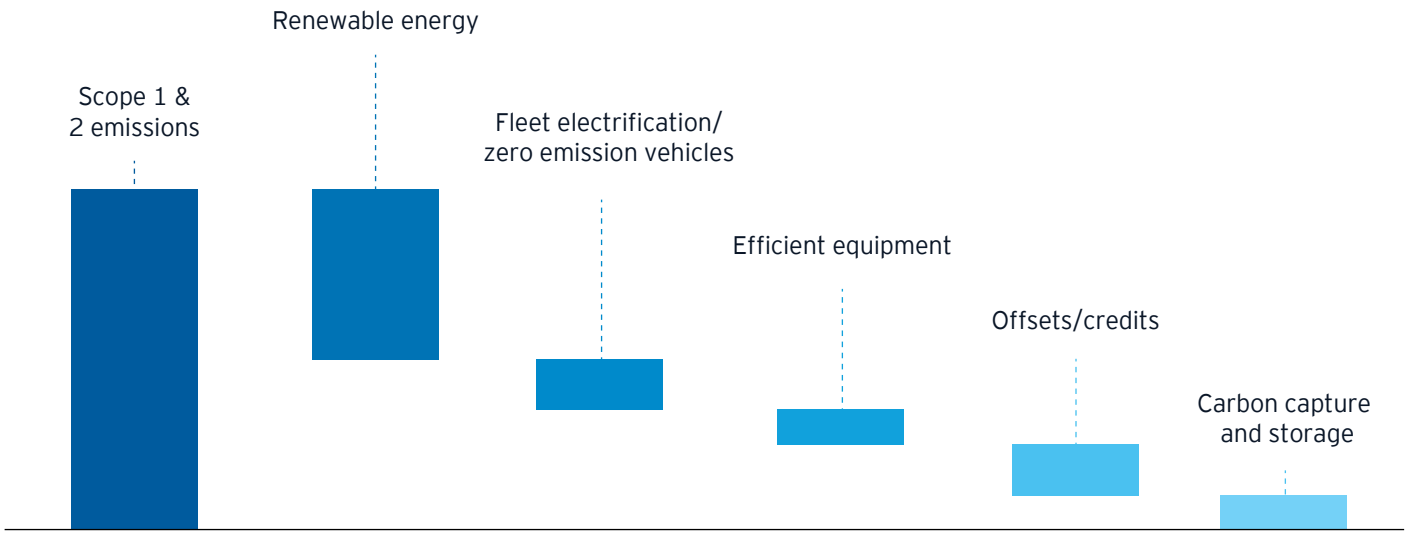
The low hanging fruit – scope 1 and 2 abatement

Abating scope 1 and 2 emissions should be high on the agenda for miners and, ideally, already in progress. It was surprising to see that more than 20% of our survey respondents still had no targets to achieve net-zero scope 1 and 2 emissions, even with capital market pressure on the sector. Miners need to act now, to avoid becoming less attractive to customers and capital markets than their peers.

We see several opportunities for miners to reduce emissions on-site:

As well as providing a reduction in a mine's carbon emissions, switching to renewables is a smart use of the land that surrounds the mine. Fleet electrification and replacing diesel with zero-carbon fuel options across the value chain offer opportunities to decrease on-site emissions. Renewable energy is the most cost-effective abatement initiative and can reduce emissions significantly depending on site conditions and location.

But these measures alone will not fully decarbonize a mine. Emissions from processing, ventilation, heating and cooling and backup power generation remain significant. Carbon capture and storage will be needed to achieve a net-zero target, potentially alongside other forms of carbon offsets.



Why switch to renewables?

Incentives or grants may be available to early movers, and, if carbon is taxed, financial benefits are on offer — if not, capital markets will still reward the move. The infrastructure that gets power to site enables mines to send it back to grid, and combining power generation with carbon capture and storage can reduce emissions further. When mines close, the early investment in renewables will generate revenue — beyond life of mine.

Capture the premium or someone else will — scope 3 abatement

Abating scope 3 will be the real game changer in miners' quest for long-term sustainability and performance. Our message to companies still hesitating over the issue is simple: unless you can control these emissions, you risk losing value and competitive advantage. But abating scope 3 emissions requires mining and metals companies to make big changes in how they operate, collaborate more with clients to decarbonize the whole value chain and articulate the value to stakeholders. This last mile of decarbonization is hard, and data collaboration poses potential limitations to the accuracy and completeness of data needed to support targets. For miners, the key challenge will be to encourage and empower parties across the value chain to be carbon neutral.

Communicating for transparency and value

Amid uncertainty around emerging carbon legislation, miners need to respond appropriately to shareholder pressure to meet climate targets, and avoid committing to potentially unrealistic goals. Sharing their road map to net zero and their successes along the way will be key to gaining investor confidence and, potentially, competitive advantage.

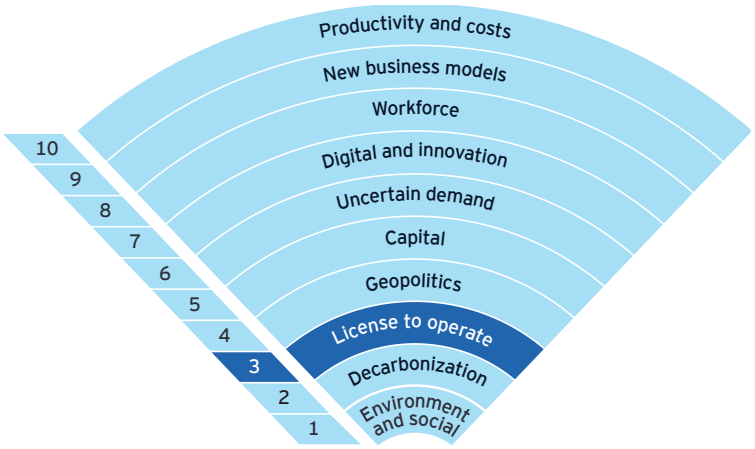
Key questions for consideration

As miners build a proactive plan to decarbonize, key questions can shape their long-term strategy:

- How do we deliver and operate generation assets?
- Are we making the best use of tax breaks, incentives and finance structures available?
- What are the funding and capital models available to us?
- Do we know which technology should be used to scale up and accelerate decarbonization?

License to operate

03



(Down from 1 in 2021)

Creating long-term value for all stakeholders can secure mining's future

LTO is an evolving and complex issue for mining and metals companies. Shareholder expectations are changing fast around myriad sector challenges, including mining's contribution to communities, economies, protection of heritage sites and engagement with Indigenous and First Nations people, as well as the industry's role in ethical supply chains and the climate crisis. Resource nationalism is also on the rise as discussed within our number four risk, geopolitics. Tailings dam safety is also a focus of investors, who are demanding miners do more to eliminate the failures that can devastate local communities and the environment. The Church of England Pensions Board (CEPB) Director of Ethics and Engagement, Adam Matthews said the issue of tailings dam safety "has exposed a systemic issue across the mining sector. On each occasion, the mining sector further erodes the trust in its social license to operate."[7]

Taking a proactive approach to managing these issues remains critical, as we see increasing links between a company's ability to access debt capital and their social and environmental impact. Miners that take the opportunity to better demonstrate their positive contribution to communities and build their brand can enhance their ability to access new resources, capital and debt.

Broader consultation with Traditional Owners can improve decision-making

Over 40% of our survey respondents say that community engagement will be the focus of investor scrutiny of mining and metals in 2022.

Much of the focus will be around miners' engagement with First Nations people and other stakeholders. In 2020, institutional investors with US$10.2t of funds under management wrote to the boards of global mining companies to seek assurances about how they gain social LTO with Indigenous communities. Expectations about what constitutes Traditional Owners' consent to mining are changing and translating into broader impacts on approvals and reputations. Miners need to continue to collaborate and effectively manage and communicate their impact on communities within a framework that considers Indigenous heritage protection needs, as well as economic and social requirements. Rio Tinto is the first ASX 200 company to appoint an Indigenous Australian, Ben Wyatt, to its board of directors to help build better relationships with the Traditional Owners groups.[8]

Taking a proactive approach to diversity and inclusion

The capital markets are placing a greater emphasis on ESG, and, as the focus on inclusion and diversity escalates, this should be a catalyst for change in the sector. Extensive third-party studies cite the benefits that diversity can provide in terms of retention, productivity and bottom-line improvements.

Attracting the next generation of talent with different skills and diverse backgrounds will not be easy. Creating an adaptive, flexible workforce that embraces hybrid working can help miners compete in a tight skills market, but miners will also need to work harder to showcase the long-term value of mining. A recent survey of US employees found that more than 70% of people say they are more likely to work for a company with a strong environmental agenda, and nearly 40% of Millennials chose a job because the company performed better on sustainability than the alternative.[9]

A focus on long-term value can enable sustainable LTO

This focus on long-term value will be critical if miners are to strengthen a sustainable LTO strategy. The days of focusing solely on the current quarterly results are over – the focus instead needs to be on stakeholder value in its broadest sense. Stakeholders evaluate companies by considering the value they bring to customers, people and society, in addition to their own bottom line. These are the pillars of the EY long-term value framework.[10]

---

[7] "Most millennials would take a pay cut to work at an environmentally responsible company," Fast Company, 14 February 2019, via https://www.fastcompany.com/90306556/most-millennials-would-take-a-pay-cut-to-work-at-a-sustainable-company.

[8] "Creating shared value: How to reinvent capitalism — and unleash a wave of innovation and growth,"/Michael E. Porter and Mark R. Kramer, *Harvard Business Review*, January to February 2011

[9] "Mining under Castillo: a threat or an opportunity?," *Mining-technology.com,* 9 September 2021, via https://www.mining-technology.com/features/pedro-castillo-election-mining/.

[10] "As US exits Afghanistan, China eyes US$1 trillion in minerals," *Aljazeera*, via https://www.aljazeera.com/news/2021/8/24/as-us-exits-afghanistan-china-eyes-1-trillion-in-minerals.

Harvard Business School's Professor Michael Porter defines shared value as "policies and operating practices that enhance the competitiveness of a company while simultaneously advancing the economic and social conditions in the communities in which it operates.[11]" Driving shared value should be a priority for miners, especially those operating in countries in the midst of a commodities price boom and where the gap between rich and poor is widening as an outcome of the COVID-19 pandemic.

Next steps

Miners that act now may have an unprecedented opportunity to incorporate the needs of a full range of stakeholders. The enterprise that defines its long-term value narrative and invests for the greater good will not only create benefits for all stakeholders, but also be rewarded in the marketplace with lower costs of capital, better human capital engagement and, in the long run, improved market value.

---

[11] "Impact of global minimum tax tricky to quantify," *S&P Global Market Intelligence*, *14 August 2021* via https://www.capitaliq.spglobal.com/web/client?auth=inherit#news/articleabstract?id=66065575.

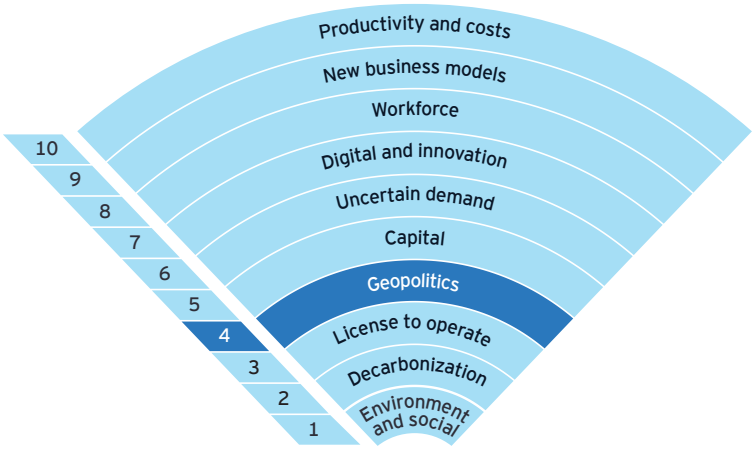
Key actions to take now include:

Identify where to focus: this involves determining which LTO issues have the most potential to drive — or destroy — value for the business to focus efforts.

Align around a wider, stakeholder-driven agenda: a move away from a narrow focus on shareholders enables miners to consider how to create longer-term value for communities, including First Nations people, and the workforce.

Measure with the right metrics: it used to be difficult to measure nonfinancial value consistently and credibly. Now, a trend toward the development of common ESG metrics is putting the measurement of nonfinancial performance firmly on the CEO's agenda.

Build the brand: strengthening brands through effectively measuring, articulating and reporting on the value delivered to stakeholders can help miners secure LTO and ultimately gain competitive advantage.



(Up from 5 in 2021)

Geopolitics

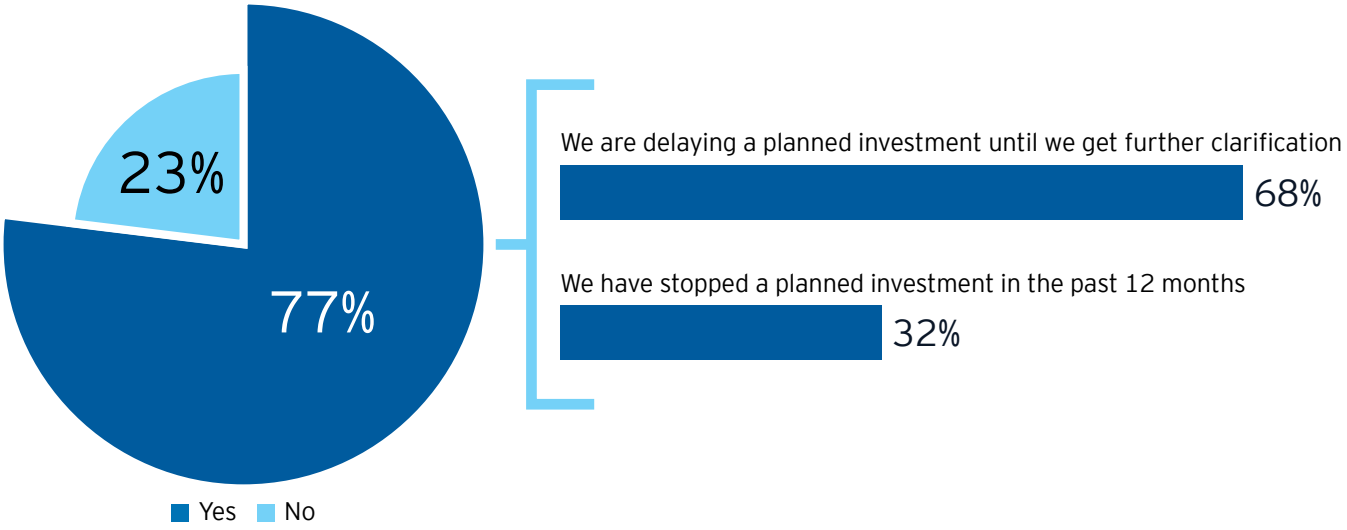
04

Miners will need to proactively navigate trade wars, new governments and resource nationalism

The past year has seen geopolitical risk increase significantly. Governments around the world have dramatically shifted policies and regulations in response to an increased impetus to tackle climate change and improve controls around data and digital commerce. And the geopolitics of the COVID-19 pandemic — including export controls and industrial policies to increase "self-sufficiency" in critical products, a global minimum tax on the largest global companies, vaccine nationalism and vaccine diplomacy — are creating new headwinds for globalization and exacerbating strains in the global rules-based order.

Amid such significant challenges, it is not surprising that 77% of mining and metals companies surveyed in EYs *Global Capital Confidence Barometer — 23rd edition* (CCB) said that geopolitics were forcing them to alter strategic investments.

Are geopolitical challenges forcing you to alter your strategic investment?



Source: CCB mining and metals respondents.

As miners consider strategic decisions, they should assess the implications of several geopolitical trends:

- **Changing governments and social upheaval:** in Peru, for example, a new government has come to power that is likely to focus on social profitability, which would mean higher taxes if it can convince opposition lawmakers in Congress to support it. Peru has noted that mines need not only to make money for private companies and generate tax revenue but also to support local communities through improved infrastructure, respect for Indigenous communities and strong environmental regulations. And in the lead up to the November elections in Chile, the Government has already proposed increased copper royalties.[12] In South Africa, the trial of ex-President Jacob Zuma led to social upheaval and logistical challenges for companies in the rest of Africa that use the country's ports. More recently, the cessation of conflict and the resumption of power by the Taliban in Afghanistan could see negotiations begin to exploit its huge reserves of copper, lithium and rare earths.[13]

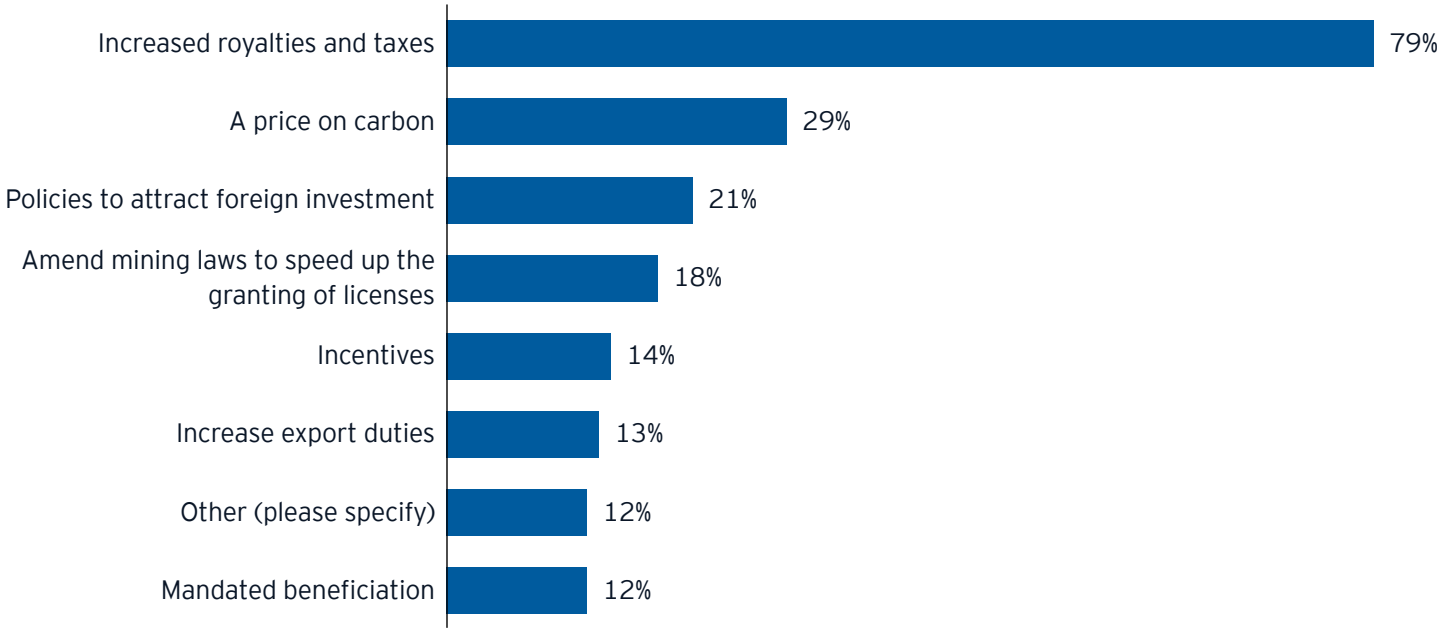
[12] "EU proposes world's first carbon border tax for some imports," *Reuters*, 15 July 2021, via https://www.reuters.com/business/sustainable-business/eu-proposes-worlds-first-carbon-border-tax-some-imports-2021-07-14/.

[13] "Carbon Prices now Apply to Over a Fifth of Global Greenhouse Gases," *World Bank*, 25 May 2021, via https://www.worldbank.org/en/news/press-release/2021/05/25/carbon-prices-now-apply-to-over-a-fifth-of-global-greenhouse-gases. eyes-1-trillion-in-minerals.

- **Trade policy changes:** the shift in the US-China relationship from one of cooperation to competition has increased global trade tensions, and not just between the two countries. We are also seeing fundamental changes in the trade flows of some commodity markets. For example, the Chinese ban on Australian coal has diverted flows of coal from Australia to India and Japan. Meanwhile, US coal imports to China have gained traction. We have also seen some tariffs ease as countries seek to ensure adequate supply of materials. For example, a significant surge in US domestic steel demand has resulted in the renegotiation of steel import tariffs.

What actions do you expect governments to take over the next 12 months?

Respondents could choose more than one answer



Source: *Top 10 business risks and opportunities in mining and metals for 2022* survey respondents.

- **Re-emergence of resource nationalism:** so far, global stimulus has focused on supporting individuals, incentivizing business and investing in infrastructure to ensure economic recovery. Eventually, however, as governments consider how to ensure equitable returns from mineral resources and repay debt, resource nationalism will re-emerge. We may see governments cashing in on the opportunities of green minerals — 79% of survey respondents expect this to occur predominantly through increased royalties.
- **Regional investment in critical minerals:** while the US has rejoined several world organizations and treaties, and the World Trade Organization notes that some trade policy restraint is preventing an acceleration of protectionism, bias toward regionalism remains. Countries are launching efforts to reshore manufacturing or diversify supply chains to boost self-reliance in strategic sectors. And many have started to consider how to capture more of the value chain for minerals, including critical minerals. We may see closed circular economic principles implemented to meet environmental targets, which could ultimately restrict foreign investment to secure more of the value chain for domestic mining and metals companies.
- **Competition for mining investment and skilled labor:** as countries seek to attract investment, we may see more incentives for mining and metals companies, including in carbon capture and decarbonized processes and products. Global competition for skilled labor is likely to increase further as countries develop new energy and infrastructure projects. Some countries are already rolling out measures to attract top talent, including Singapore, which has launched incentives and visas for engineers and other in-demand roles.

- **Global minimum tax:** the proposal for a global minimum tax, backed by the G20, will require multinational companies to pay at least 15% tax in the countries they sell goods to, even if headquartered elsewhere. While there are still many unknowns about the proposed tax, including whether resource-focused companies may ultimately be exempt, miners will need to stay abreast of developments.[14]

- **Cross-border carbon taxes:** the EU recently proposed the world's first carbon tax on import including steel and aluminium to be phased in from 2026. The tax aims to protect EU industries from overseas competitors not subject to the same measures.[15] These new measures, in tandem with other carbon reduction regulations, are likely to have a significant impact on net exporters, especially if more widely adopted. Currently only one-fifth of the world's greenhouse gases are covered by carbon pricing instruments.[16]

- **Government incentives:** mining and metals companies may be well positioned to take advantage of government incentives aimed at accelerating the energy transition. For example, R&D tax credits may be offered to help companies meet decarbonization goals.

- **Climate change:** the acceleration of efforts to deal with climate change will remain a key disrupter over the next decade — both in terms of policy and its impact on businesses. According to a recent report by IRENA, the rapid growth in renewable energy is likely to have a geopolitical impact, as most countries will be able to achieve energy independence and it has the potential to address many of the issues that are often among the root causes of geopolitical instability and conflict.[17]

Next steps

Mitigating geopolitical risk requires mining and metals companies to take a proactive, diversified approach. Now is the time to:

- Integrate political risk into broader strategic planning: consider the impact of geopolitical trends when making strategic decisions, and ensure there is clear ownership of political risk within the organization.

- Engage with stakeholders: companies should proactively seek opportunities for closer engagement with stakeholders, including governments, to demonstrate how mining creates long-term value for communities.

- Collaborate with trade and industry groups: working together with trade and industry groups can help miners better advocate around future taxation schemes.

- Influence taxes and policies: articulate the impact of changes on mining and metals companies, and make recommendations to help build better taxes and policies.

- Investigate government incentives: mining and metals companies that make the most of government incentives or co-investment opportunities can fast-track innovation and decarbonization, while reducing costs.

- Build supply chain resiliency: mapping supply chains and stress-testing under multiple scenarios can help companies understand and address the impact of ongoing and future disruptions, and see where major weaknesses lie. When supply chain structures are no longer fit for purpose, companies will need to act fast — first, to ensure continued inbound and outbound flows of products and, second, to build a more resilient supply chain for the future.

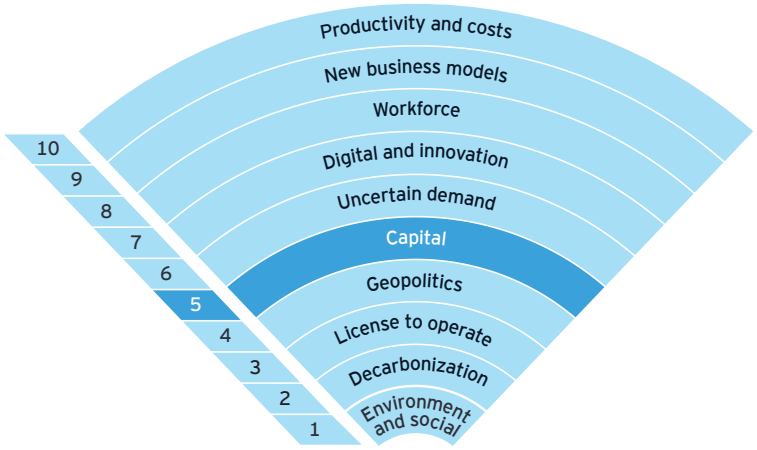
---

[14] 'A new world: the geopolitics of energy transformation," *International Renewable Energy Agency (IRENA), 2019.*

[15] "State of the Market," S&P Capital IQ Pro, March 2021.

[16] "Rio Tinto to deploy world's first fully autonomous water trucks at Gudai-Darri," *Rio Tinto Media Release*, 22 June 2021, https://www.riotinto.com/news/releases/2021/Rio-Tinto-to-deploy-worlds-first-fully-autonomous-water-trucks-at-Gudai-Darri.

[17] "BlackRock World Mining Trust plc, 2021 Outlook," BlackRock, 29 January 2021, via https://event.webcasts.com/starthere.jsp?ei=1420106&tp_key=ab8683d97a.



(Up from 6 in 2021)

Capital

05

Capital availability increasingly linked to ESG ratings

Access to capital remains challenging for mining and metals companies, with investors deterred by risks associated with ESG, LTO, community issues and volatility. Miners will need to work harder to demonstrate their achievement of both financial and nonfinancial considerations if they are to compete for capital at a reasonable price. Companies with higher ESG ratings can access a larger pool of attractively priced capital, including bonds or sustainability-linked loans with slightly lower interests. This form of capital allows mining companies to ringfence capital for sustainable projects or to decarbonize operations. Governments are also supporting the development of technologies to build supply chains of critical minerals.

For companies with high-carbon assets, traditional sources of funding are harder to access and more expensive, so some are exploring alternative sources of funding. For example, private equity has taken a larger role in funding US coal mines, while a pool of private investors in some Asian countries has shown willingness to invest in coal to ensure supply over the transition. We've also seen several US-based companies raise capital using tax-exempt bonds available through local economic development authorities.

Bold decisions can create opportunities

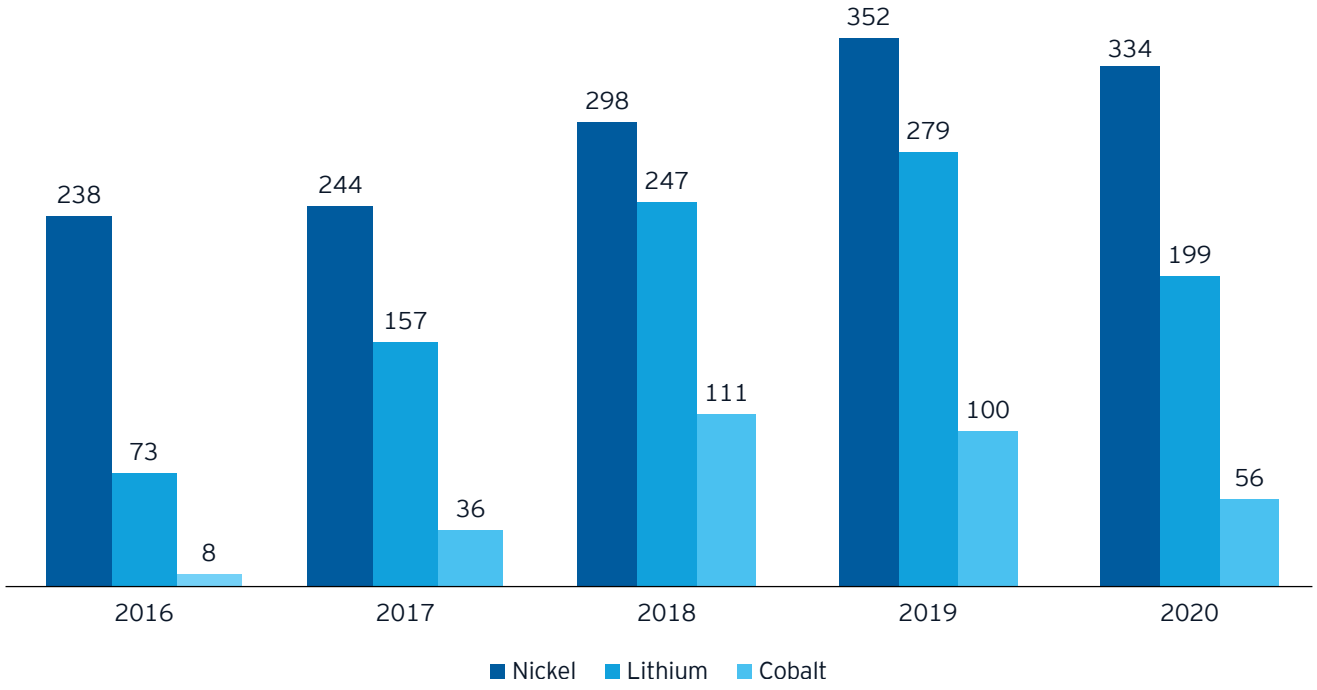
Mining and metals companies have maintained capital discipline during the pandemic. Companies focused on core operations and productivity while brownfield expansion or greenfield projects were delayed. Now, as demand and prices are rising, miners will be reassessing their capital allocation strategies. While risks are also on the increase, including around geopolitics, LTO and labor shortages, it seems that the opportunity of surging demand is one that miners should seize. Now is the time for bold decisions, to meet new demand, invest in innovation and align the business around a wider stakeholder-driven agenda.

Designing the optimal portfolio to cater to future demand

Building a portfolio fit for the future requires miners to consider a mix of strategies:

- **Building out reserves and replacing production:** exploration is increasing as mining companies seek to ensure long-term supply and equity markets provide support to explorers. Copper and gold still make up around 70% of exploration budgets, but investment in exploration for battery minerals

Exploration for battery minerals 2016-20 (US$m)



Source: *S&P Capital IQ Pro*, EY knowledge analysis.

is growing. Over the last five years, budgets have increased at a compound annual growth rate (CAGR) of 7% for nickel, 22% for lithium and 46% for cobalt.18 Megaprojects picked up pace over the last 18 months with projects worth US$25b announced. Most of these are based out of the Americas and Europe with a focus on copper, gold and battery minerals.

- **Investing in minerals with strong future demand prospects:** battery minerals M&A deal value more than doubled year on year in H1 2021 to US$2.1b while deal volume increased by 60% year on year. As battery mineral markets, such as lithium, nickel and cobalt, gained scale, there has been increased interest from larger mining and metals companies. Downstream players are also either acquiring the supply of critical minerals or entering agreements with mining companies to secure long-term supply by providing capital upfront.

- **Continued divestment of high-carbon or fossil fuel assets:** companies are continuing to divest thermal coal mines but are also now selling off high-carbon assets. These fossil fuel assets are generally being bought by private capital or buyers seeking to secure supply in certain markets – for example, Japan, India and South Korea — where coal will remain part of the energy mix for a while longer.

- **Considering the impact of supply chain regionalization:** as mining companies plan new projects, they should review government incentives aimed at encouraging investment in their country or region. Some governments may even be willing to co-invest in assets where it offers an opportunity for their region to own more of the value chain.

Investing in decarbonization and innovation

Miners face an increased imperative to invest in (and be seen to be investing in) decarbonization of their operations. This requires a significant amount of capital and collaboration both within the industry and with downstream players. Mining and metals companies are investing in renewable energy to reduce mine site emissions and entering alliances and partnerships to remove carbon from the value chain.

Mining companies are also setting up innovation funds to invest in companies that are developing low-carbon technology to produce greener products. We see more interest in hydrogen, both in terms of storage and its impact on future commodity demand – for example, the potential of platinum group metals (PGMs) in fuel cell electric vehicles (FCEVs).

Capital is also being allocated to accelerating technology, data analytical capabilities and operational transformation to improve productivity, keep on top of inflation and ensure competitiveness. For example, autonomous vehicles are being deployed to promote mine automation, enhance worker safety and improve productivity.[19]

Opportunities for further consolidation

M&A strategies are often aligned to the commodity market in which companies are operating. For example, consolidation in gold mining began in 2018; however, market players believe there are still opportunities to create large gold majors that will attract investment even when gold prices are lower. In the US, consolidation is occurring in steel, with steelmakers keen to capture more of the value chain, both upstream into scrap and downstream into steel products. We expect to see consolidation in the lithium sector as single-asset miners combine and use scale to fast-track new projects.

Balancing short-term shareholder returns with long-term value creation

Shareholders are reaping significant returns as miners take advantage of the current upcycle in commodity prices to pay out long-awaited dividends. BlackRock had called out the sector to provide higher dividend yield in 2021, after companies ended 2020 with strengthened balance sheets on higher commodity prices. According to the global investment firm, the sector is at the bottom of a new cycle, driven by economic

[18] "Will a lack of supply growth come back to bite the copper industry?" *Wood Mackenzie,* 23 March 2021, via https://www.woodmac.com/news/opinion/will-a-lack-of-supply-growth-come-back-to-bite-the-copper-industry/

[19] "EVs will drive a lithium supply crunch," *IEEE Spectrum*, 5 May 2021 via https://spectrum.ieee.org/evs-to-drive-a-lithium-supply-crunch

recovery and green infrastructure investment.[20] The position reflects the preference of mining investors for higher dividend payouts rather than keeping cash reserves for when times are tough. While we understand the desire for short-term rewards, we believe that that defining a long-term value narrative and investing for the broader benefit of all stakeholders will bring improved market value over the longer term.

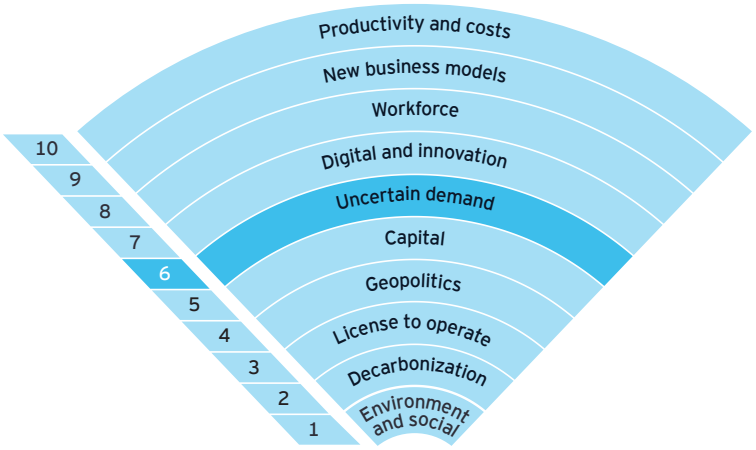
[20] "As a miner, what's my data really worth," *Paul Mitchell, EY Global Mining & Metals Leader,* via https://www.linkedin.com/pulse/miner-whats-my-data-really-worth-paul-mitchell/

Key questions for consideration:

As miners determine their capital strategy, the following questions can help:

- Do you feel alternative sources of green financing is available to you and if so, is it available on terms that are commercially attractive?
- Are investment decisions made on the basis of a full stakeholder risk analysis, incorporating financial, technical and social considerations?
- How frequently do you conduct portfolio reviews to ensure capital is allocated to maximise total shareholder returns?
- How important is balance sheet agility when considering optimum levels of gearing and dividend policy?
- Do you worry that your capital allocation strategy, sustainability strategy and/or shareholder return record leave you exposed to activist investors, and if so, do you have an engagement strategy for this scenario?
- Will capital markets continue to be the platform for large scale funding of mining projects, or will we continue to see a shift to private capital as a source of funding?

Uncertain demand



★ (New to the radar)

06

Building agility can help miners manage price volatility, substitution threats and changing customer demands

Volatility re-entered the top 10 ranking last year amid the uncertainty created by the COVID-19 pandemic and its impact on both supply and demand. We saw iron ore prices reach record highs after China's early post-pandemic recovery and stimulus program designed to ensure economic growth. Since then, broader global economic recovery and stimulus have caused a surge in demand in most commodity markets, and we have seen prices rise accordingly. Now, ongoing stimulus packages look set to further boost infrastructure spending and associated commodity demand.

Supplying the energy transition

The acceleration of the energy transition is pushing up demand for renewable energy, electric vehicles and energy storage systems, and the minerals required to manufacture them. EY research shows that many of the major commodities required in the energy transition — copper, nickel, cobalt and lithium — will be in deficit by 2025–26.

Mining and metals companies will need to bring on new supply to meet this rising demand, but significant supply-side challenges stand in their way. For example, it's estimated that investment of around US$100b is required to close the copper supply gap of 4.7Mt by 2030. Accessing capital depends on nonfinancial factors such as ESG, which may make the hurdles to finance project expansion even higher. At the same time, declining ore grades in copper deposits mean that the complexity of mining is increasing, and so too are the carbon emissions produced during the process.

Major miners are moving into technology and battery minerals, announcing large projects, acquisitions or long-term deals to supply lithium, cobalt or rare earth minerals. But bringing on this supply of new world commodities is challenging, and economic projects are harder to find due to increasing remoteness, complexity and rising royalties and taxes. Generally, reserves and production of these minerals are concentrated in only a few countries, increasing geopolitical risk. Projects have long lead times and are capital intensive — almost US$14b will be needed to finance new lithium production capacity out to 2025. These new projects face licensing challenges, particularly as the number of stakeholders with vested interests is increasing and LTO is becoming more complex. And price volatility is a major factor in these markets, as evidenced by the extreme movement in lithium prices over the last few years.

But we see miners taking innovative approaches to these problems, including developing new sustainable products and solutions to meet future demand. Mining and metals companies are also positioning themselves as participants in integrated supply chains, rather than in commodity markets. These supply chains, particularly in processing and battery manufacturing, are being established to counter China's dominance, with the US focusing on rare earths and the EU investing in the whole battery supply chain. Greater efforts to improve transparency around ESG-related metrics are designed to ensure capital investment in future supply.

Threat of substitution

The threat of substitution is very real. Mining and metals companies may invest in a market but, due to long project lead times, technology may move on or the energy transition stall or change direction in the interim. Battery technology is evolving as manufacturers find ways to reduce dependence on cobalt, which is in limited supply and dogged by ethical issues. A shift is already underway from conventional lithium nickel manganese cobalt oxide (NMC) batteries to lithium iron phosphate (LFP) batteries and some companies have even started to produce batteries without metal.

A structural shift in customer needs will also impact demand for commodities, particularly as innovation to solve sustainability and decarbonization challenges heats up. For example, the switch from basic oxygen furnaces (BOFs) to electric arc furnaces (EAFs) in steelmaking and the move from thermal coal toward gas or renewables will have major implications for coal and iron ore. These markets also face risks from recycling innovation (such as steel scrap replacing iron ore) as well as substitution of other materials (including swapping out steel for aluminium and using high-performance plastics in the automotive sector).

Next steps

Volatility will only increase, and the ability to compete effectively amid ongoing uncertainty is now critical for any mining and metals company. Instead of waiting for conditions to stabilize, organizations should instead:

Conduct scenario planning: miners must focus on being agile and prepared for future changes in demand. Scenario planning provides a solid, objective foundation to underpin medium- and long-term business plans, and map out and prepare for possible alternative futures. It also helps to determine if long-term decisions could be affected by future potential impacts on demand – for example, if technology progress slows or adoption of clean energy options, such as electric vehicles, is not as high as predicted.

Review and optimize portfolios: miners need to understand the interaction between the different parts of their portfolios to make decisions around investment, divestment and rationalization that enhance the value of the entire portfolio. Decisions regarding where to invest and allocate capital will need to be made long in advance.

Develop sustainable products: companies and industry organizations are developing and branding new sustainable products to secure a premium and competitive advantage. For example, the International Copper Association

has introduced its Copper Mark assurance system for responsibly mined copper, and Rio Tinto launched RenewAl, a low-carbon premium aluminium.

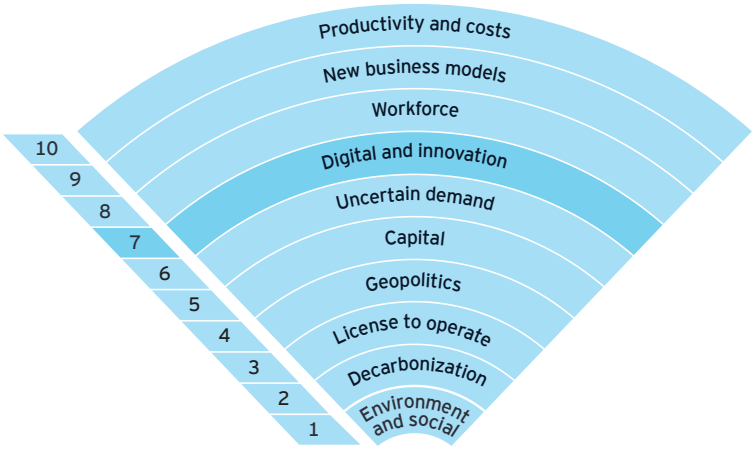
Increase collaboration: working more closely together with downstream (automotive and technology) players and governments can help ensure positive trade outcomes, as well as policy support. For example, companies can lend their expertise to help inform the development of policies around scrap collection or guide approval processes that facilitate projects in the battery manufacturing industry.

Ensure transparent and demand-driven supply chains: increasing the transparency of supply chains, including through blockchain, can meet ethical obligations while creating visibility of customers' demand for products across the value chain. A more transparent supply chain also helps miners capitalize on new opportunities.

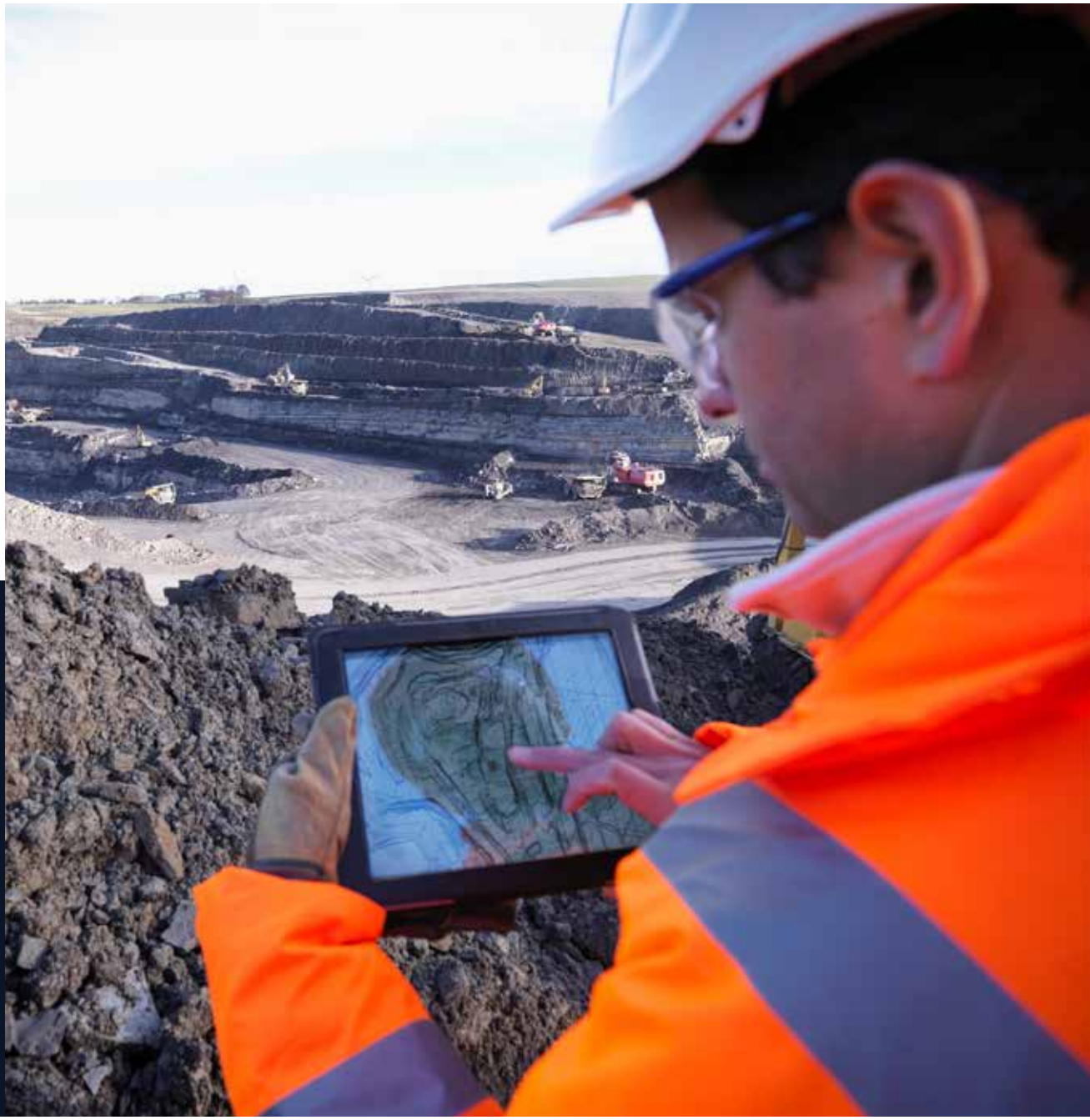
Secure offtake agreements with downstream players: these agreements can de-risk new projects and expanded production while also helping to reduce volatility in commodity prices. Miners will need to consider that these arrangements do limit the ability to capitalize on upcycles.

Digital and innovation

07



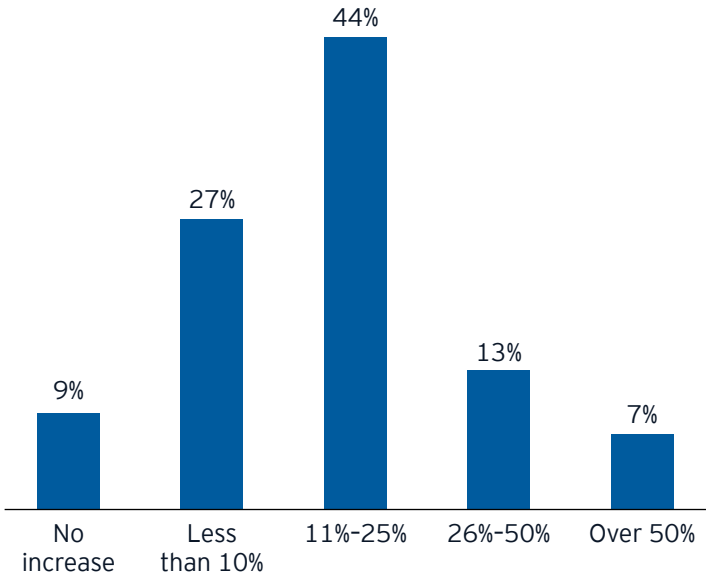
(Up from 9 in 2021)



Miners are accelerating investment in digital to better address ESG priorities and drive innovation

Digital has become an integral part of doing business in mining and metals, a fact we noted in last year's report where digital ranked just number nine in our list of risks and opportunities. But now we see a push to find, develop and deploy new technology for a broader purpose as miners respond to an accelerated focus on ESG from capital markets and the challenge to transition to net zero and develop "greener" products. Companies are planning to increase their investment in digital transformation, and are also beginning to realize the value of innovation to help them to diversify their focus and differentiate.

How much do you plan to increase your investment into digital transformation over the next 12 months?



Source: *Top 10 business risks and opportunities in mining and metals for 2022* survey respondents.

For many miners, driving value from existing technology investments and datasets remains a challenge. Market leaders are learning from their mis-steps and mistakes – assessing previously implemented point solutions to determine value from the initial investment, and using lessons to build a common set of practices around how to approach and design architecture for these programs. But many others are still in problem-solving mode with a narrow point solution focus. Without an integrated value chain approach to digital investment, these miners are unlikely to get the ROI they are seeking, as explained in in our report, *Digital mining: the next wave of business transformation*.[21] Again something that was missing from the radar of our survey respondents was cyber, despite the increased level of events during this year. Improving productivity and margins has been the focus of digital transformation over the past few years, and we expect miners to continue to leverage digital processes to enable more agile decision-making around cost. In an uncertain environment, we are also likely to see greater use of data science, scenario planning and data modeling to guide intelligent decisions. We also anticipate miners focusing their digital efforts around several key areas:

Supporting decarbonization

It was encouraging to see 36% of our survey respondents say their digital investment was focused on new products and platform development. As consumers demand greener products, miners that decarbonize their products first will gain a competitive advantage in the market, and digital technology will be a key enabler to this transformation.

Improving transparency of social and environmental impact

As the capital markets increase their focus on ESG, there is an urgent need to develop digital technologies to assist with real-time visibility of ESG data with dashboards to enable decision-making. In addition, miners are focused on real-time monitoring data – both to monitor legacy waste plants, but also to improve water and energy efficiencies.

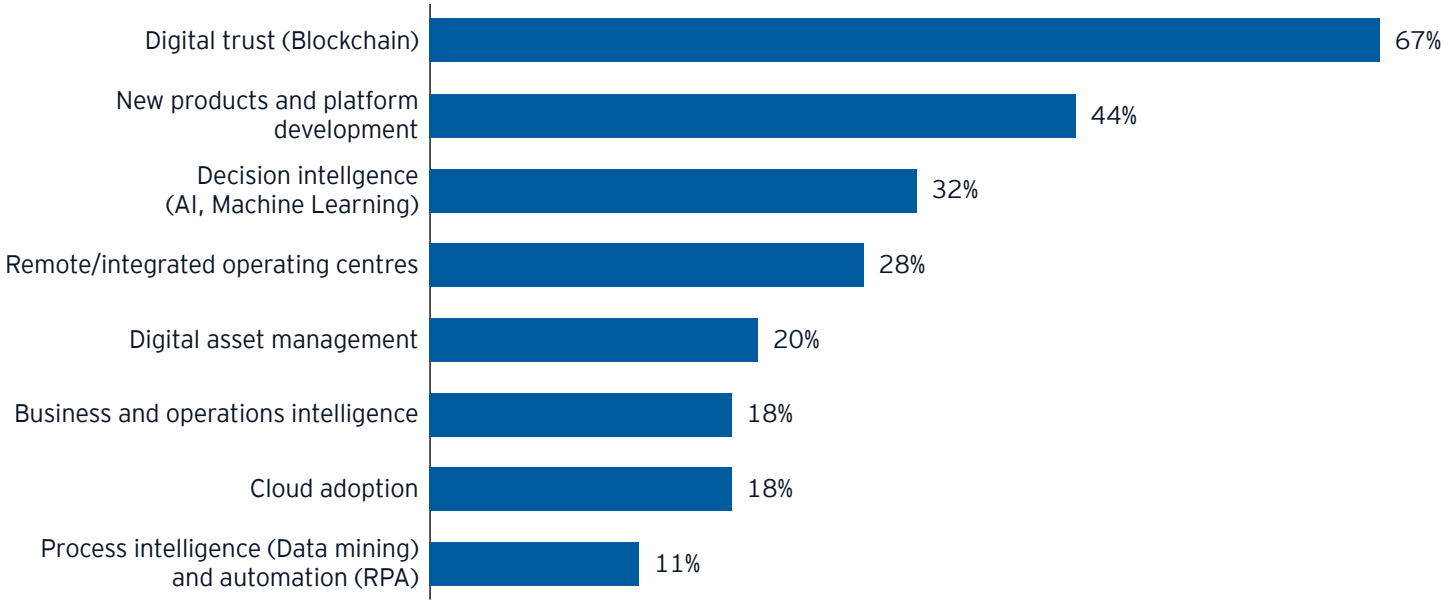
As discussed in our number one risk, environment and social, miners need to improve their transparency with regard to ethical supply chain in order to retain LTO and, ultimately, to maintain

[21] "Will a Shortage of Qualified Labor Derail the Brazilian Economy?," *Knowledge@Wharton, University of Pennsylvania,* 3 January 2012, via https://knowledge.wharton.upenn.edu/article/will-a-shortage-of-qualified-labor-derail-the-brazilian-economy/

their positive reputation with end consumers. Blockchain can assist with this, and so it was a little disappointing to see that 67% of respondents have no plans to focus on this in the next few years.

Data can also play a role in enhancing the mine closure process, including land rehabilitation and geospatial and vegetation management. As discussed in our LTO section, this is a critical time for miners, with its legacy lasting long beyond life of mine.

What are your digital priorities over the next five years? % of respondents who selected 'No Plan'



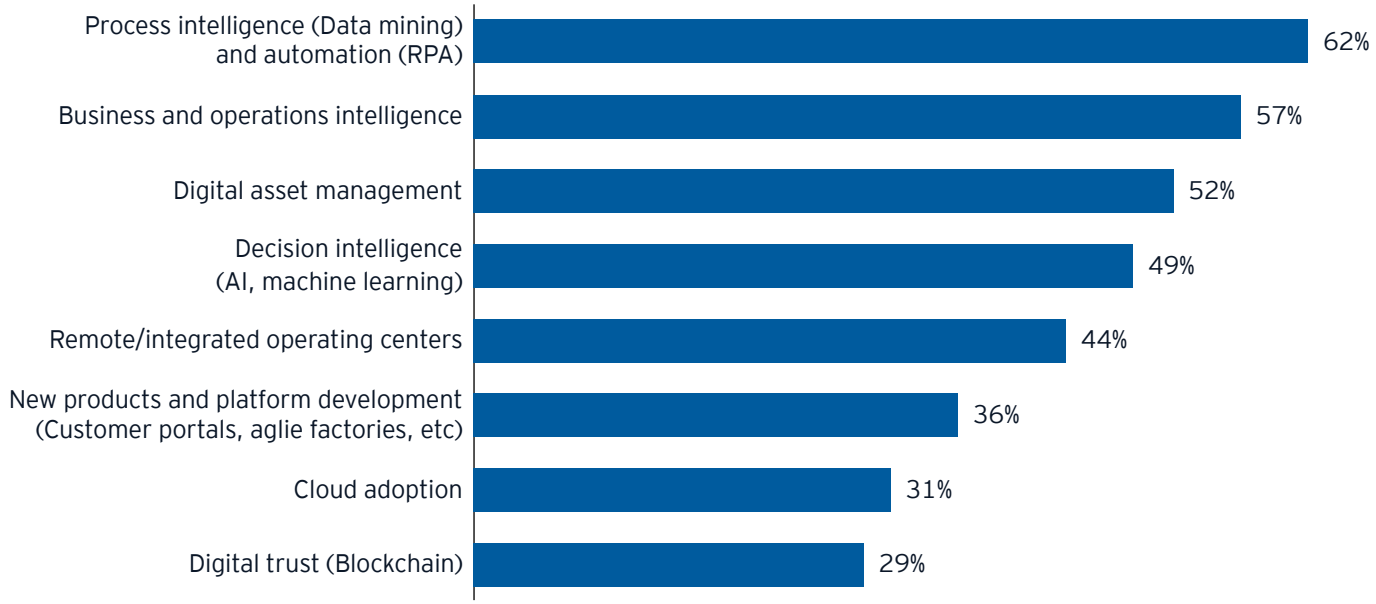
Reimagining health and safety

Data and digital tools can help improve on-site safety in multiple ways. For example, face recognition technology can identify fatigue in workers and real-time surveillance of tailings dams can enable early remediation. Electronic health and safety checklists can be used on-site to support operational productivity and allow for ongoing monitoring of potential failures.

Transforming work

The pandemic highlighted the benefits of on-site automation and remote operations centers (ROCs), with miners who had already adopted these innovations faring better than others. We are not surprised that 62% of miners are planning to increase automation within the next one to two years and 44% are seeking to build a ROC or integrated ROC.

Digital priorities over the next one to two years



Source: *Top 10 business risks and opportunities in mining and metals for 2022* survey respondents.

But miners must urgently build the digital skills needed for the mine of the future, as discussed in our workforce transformation section. Better technology training is required to support the change critical to the sector's successful digital transformation.

Continuing to make the right decisions about the workforce, as well as operations and supply chains, will depend upon collating and extracting value from data across the entire value chain. Process mining can be a key tool, connecting information systems and business processes together to help build a transparent, holistic view of the organization.[22]

Enhancing customer centricity

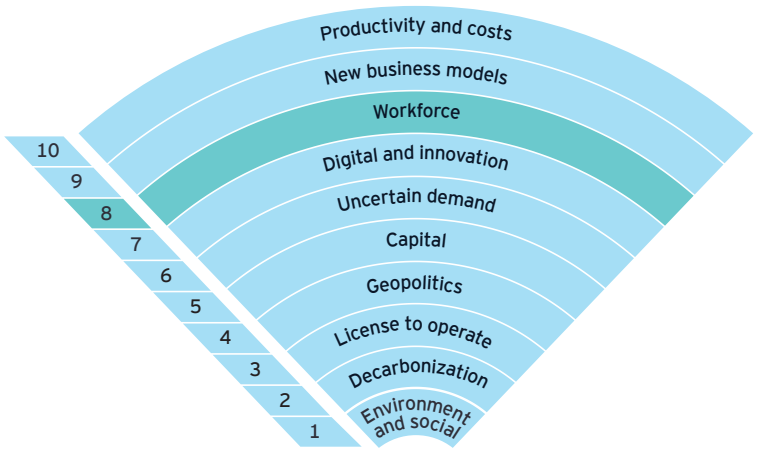
Miners need to deliver greater commercial value and insight through sales and marketing, and through being responsive to true market and customer agility.

Next steps

The momentum around digital transformation in mining and metals is growing. Miners need to start being digital rather than just doing digital. Organizations have an opportunity to capitalize on progress to drive further, rapid innovation by developing new solutions to the sector's most complex problems. We suggest that miners:

- **Take a structured approach:** the supply of innovative ideas is not the constraining factor for mining companies. Rather, the challenge is to ensure these innovations are focused on delivering the company's strategy and driving a competitive advantage. A structured approach to efficiently qualifying which ideas are worth pursuing and a consistent approach to testing and scaling these ideas will ensure innovation adds value to the business.
- **Collaborate and partner:** companies that haven't already should act now to form collaborations and alliances with technology and data management companies to develop and implement new digital solutions.
- **Extract more insights from data:** better decisions start with data. Miners that make smarter use of data and technology to improve scenario planning can build the agility needed to respond to ongoing volatility.

[22] W. Scott Dunbar et. Al, "Mining needs new business models," Elsevier, July 20, 2019.



(Up from 2 in 2021)

Workforce

08

Prioritizing digital skills and diversity, and creating career pathways, can build a future-ready workforce

The COVID-19 pandemic saw a tipping point in the disruption and adoption of technology within the mining industry. Value chain optimization became more than just process and performance, instead taking a new and accelerated approach to workforce management, including the introduction of more flexibility and evolving the use of rostering and fly-in fly-out (FIFO) workers.

The pandemic also highlighted the benefits of automation and ROCs. Miners that upskilled their workforce quickly or adopted new ways of working fared better than those that did not, quickly moving staff off-site or separating teams to reduce risk of transmission. Not surprisingly, 44% of survey participants plan to invest in ROCs over the next five years. Miners are also reviewing operating models to continue managing the workforce in a more agile way to balance capability and costs.

Attracting the next generation of talent

Border closures caused by the pandemic made accessing talent difficult, and now we see a skills shortage growing in critical markets. A lack of cross-border migrant workers and contractual workers is exacerbated by an exodus of aging workers, causing a net loss of industry knowledge. In addition, over the past year, turnover of frontline workers, including operators and maintenance workers, has increased.

Meanwhile, mining and metals has yet to successfully rebrand itself as an attractive sector for the next generation of workers. This limits its ability to compete for the few engineers coming through the pipeline, as well as for in-demand talent with more diverse skills and from different backgrounds. As discussed in the LTO section, building a new image for mining must be a priority. Across the industry, we see some interesting approaches to achieve this, including bringing teachers and families to mine sites to build their awareness of the diverse possibilities offered by a mining career, and hopefully help secure a future pipeline of critical skills.

A more detailed discussion of the changing skills needed for the mine of the future is included in our recent report The ***Future of Work: the Changing Skills Landscape for Miners (a report for the Minerals Council of Australia).***

Where should miners focus to be future ready?

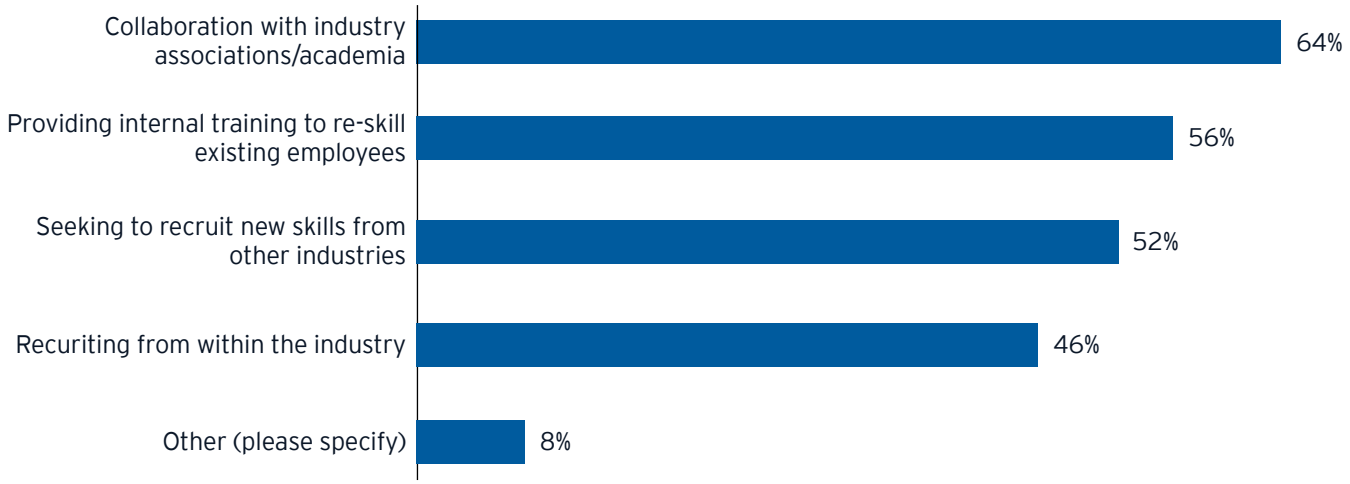
Develop future skills for digital transformation in the sector

While the pandemic reduced cost and increased efficiency, overall employee satisfaction decreased. As a result, empowering employees through purpose and development became critical. The COVID-19 pandemic has seen a shift in the use of new technology platforms to support collaboration and innovation.

Skeleton crews, cross-functional capabilities and changes in shift and workforce management has seen a pivot to distributed responsibility and leadership across almost all roles. Our survey respondents are pursuing various strategies to gain the skills they need for the mine of the future — and the pandemic has only accelerated this business requirement. Many mining companies are reviewing existing roles, determining what best looks like and identifying opportunities for standardization. An increased focus on finding pockets of excellence to share knowledge and skills across operations will substantially improve productivity. And miners that commit to bringing in different people and skills from other sectors can help disrupt traditional thinking and drive innovation.

As the skills required for the sector shift, and talent becomes difficult to find, miners must urgently focus on redesigning and reviewing critical skills, and proficiency needs for each role. Companies are working closely with universities and the education sector to analyze which skills are needed and determine the best way to upskill or reskill.

What are you doing to attain skills needed for the mine of the future? Respondents could choose more than one answer



Source: *Top 10 business risks and opportunities in mining and metals for 2022* survey respondents.

Build career pathways, learning journeys and competency maps

Miners have invested heavily in digital transformation, but many are yet to make the same commitment to training employees in how to use new systems and machinery. Closing this big digital literacy gap is an urgent priority and, amid ongoing COVID-19 restrictions, will depend on high-quality online learning. Digital apprenticeships, continuous training on digital platforms and the use of AI for new skill development can help insulate the industry from skill shortages.

We are also now seeing miners around the world collaborating with each other and with academic institutions to develop digital courses that can fast-track both inhouse learning and training for those new to the sector. Sixty-four percent of survey respondents stated this was a focus for them. Vale has gone a step further, **establishing its own corporate university.**

It's important too that those rolling out new technology work collaboratively with on-site teams to understand capability gaps and pain points. If employees do not trust new technology — or trust it too much — safety risks can arise. A renewed focus on purpose, distributed leadership and culture can support teams as they adapt to new ways of working.

A greater focus on the talent agenda and lateral pathway development will not only close the gap in critical skills but also improve retention. Some miners are moving to address this by building competency maps and associated career pathways to give workers much-needed transparency.

Improve safety and well-being

The pandemic saw greater adoption of digital equipment. The use of smart helmets for enhanced safety, communication, thermal imaging and fatigue monitoring is more commonplace than pre-COVID-19. ROCs that monitor digital equipment have led to a vast improvement in data quality and in-shift reporting. Digital equipment is not only improving safety and productivity but also reducing maintenance and downtime.

The challenge of managing workers' mental health and well-being came to the fore during the pandemic, as many

mining companies grappled with the impact of ongoing travel restrictions on their workforce and their families, particularly when workers could not get home during downtime. We are beginning to see both mining companies and mining associations work together to address this issue.

Sexual harassment and discrimination have long been an issue for a sector that remains male-dominated. In August 2021, the Minerals Council of Australia published a new industry code of conduct aimed at eliminating sexual harassment, following a Western Australian government inquiry that found one-fifth of women working in that sector's mines had been harassed.

The issue highlights an urgent need for miners to continually address and improve the complex workplace culture if they are to reduce the high attrition rates of female workers and create an attractive working environment for women and other under-represented groups. Cross-functional, networked teams working in new ways to innovate and sustain a connected and diverse culture is a part of the opportunity that exists for the industry. Better designed, safer on-site facilities and campsites, and proactive, diverse, human-centered problem solving, should be part of this change — a shift away from conventional mining culture, behavior and ways of working.

Accelerate workforce diversity and inclusion

Attracting the top talent for the future depends on creating a diverse, inclusive and continuous improvement culture. To compete in a tight skills market and reduce high rates of attrition, miners must build a trusting working environment that appeals to a new and more diverse generation of workers. Creating culturally safe workplaces, as discussed above, will be a step in the right direction, as will continuing to support the job sharing and hybrid working models that worked well, for both men and women, during the COVID-19 pandemic. As the investor community puts increasing emphasis on workforce diversity and inclusion (D&I), this will fast become an issue that companies can no longer ignore. A focus on accelerating D&I as a driver of growth, not compliance, is key — and must be a board-level directive.

New business models

09

★ (New to the radar)

Last year, as our respondents navigated the onset of the pandemic, they named high-impact risks and the need to plan for disruption as the second-biggest risk or opportunity facing the sector. Since then, the sector has seen several new disrupters, including an acceleration of decarbonization and the energy transition, and more accountability around ESG factors — factors that are increasingly linked to capital availability. At the same time, mining and metals companies are operating within a market where demand and prices are surging as governments pour stimulus into markets and economic activity returns to normal.

Amid such disruption, miners have a unique opportunity to analyze where optimal value can be found — and to redefine their business model to capture that value. Companies that do this successfully will futureproof their business model to better deal with disruption and changing commercial relationships, and ultimately win competitive advantage.

Traditional models may expose miners to more disruption risk

Traditionally, the business models of mining and metals companies were based around either exposure to a single commodity or a diversified portfolio of commodities. Both models expose miners to a range of geographies, except for some pure-play producers that may focus on just one country or region.

The largest miners are diversified conglomerates. The main benefit of diversification is that it reduces the impact of market volatility. A broader earnings base, through exposure to a range of commodities and geographies, means companies have a natural hedge and can smooth out returns. Historically, investment has been focused on tier 1, low-cost, long-life assets that provide these companies with lower risk profiles and stable debt ratings. Their large size also affords them greater scope to utilize and advance technology. However, there are costs to being a conglomerate, including those associated with managing a diverse portfolio. As these companies are not well insulated against commodity price cycles, investors cannot choose their preferred commodity exposure, and shareholders have limited say over acquisitions and divestments.

Pure-play miners have performed well, and several have achieved significant valuations. However, relying on one commodity, or deriving a significant proportion of revenue from one commodity, does increase a miner's risk in the case of future substitution of what they produce. Diversified miners with a heavy reliance on iron ore have been discussing broadening their earnings base, while other pure-play miners are considering other investments.

Six potential models may help miners capture value amid volatility

With disruption and uncertainty likely to be ongoing, it may be time for mining and metals companies to consider reshaping around a new business model:

- **Shared value model:**[23] a shared value business model can deliver greater returns directly to host communities and governments, increase community engagement and have a positive impact on mining companies' LTO.
- **Circular business model:** circular business models help companies create closed material loops to minimize waste, reduce carbon emissions and other pollutants, and keep materials and products in use. These models, and a move toward a more integrated circular economy, require companies to increase collaboration and become an integral part of value chains.
- **Vertical integration:** value chain analysis will reveal opportunities to capture more value. For example, with a huge portion of value often exported in raw ore or concentrates, it may make sense to acquire more of the downstream value chain, i.e., smelting, refining, logistics, trading or distribution centers. We are already seeing this happen in some countries or regions where domestic battery and critical mineral supply chains are being built. Miners may also explore options for further integration into downstream companies, e.g., manufacturing, automotive or construction enterprises. This allows miners to move closer to end consumers. While it is capital-intensive and time-consuming to build out these parts of the value chain, doing so can substantially reduce volatility.

[23] W. Scott Dunbar et. Al, "Mining needs new business models," Elsevier, July 20, 2019.

- **Horizontal market integration:** mining companies could also move into adjacent businesses, for example, by investing in digital or technology service providers to drive innovation or new products, or by operating renewable energy for both the mine and the community. Some companies are investing in sectors such as hydrogen, either through associated companies or within their own plans to decarbonize or innovate.

- **Joint ventures:** companies enter JV arrangements for a variety of reasons, including capital intensity, risk mitigation, access to resources and technology, supply chain optimization, market positioning, regulatory requirements or political sensitivities. When JVs are managed well, they have the potential to deliver substantial value to stakeholders, significantly enhancing the value of company portfolios and access to reserves and capabilities.

- **Offtake agreements:** these agreements can provide low-risk access to capital, while sharing production and operational risks across the value chain. Target companies can further develop or expand projects, providing greater returns for both their shareholders and the companies with royalties and streaming agreements on the projects. Offtake arrangements were once predominantly in precious metal companies, but we are seeing their use expand to critical metals such as nickel, copper, lithium, cobalt and manganese.

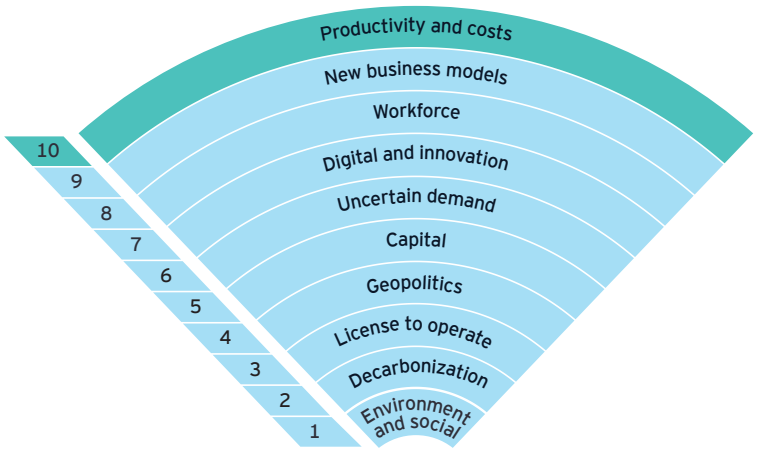
Is your business model fit for the future?

As mining and metals companies assess whether current business models are still fit for purpose, some questions can help:

- Have you identified where the value as well as risks and opportunities are in your current business model?
- Have you conducted in-depth scenario planning and future market assessments?
- What process will you undertake to implement a new business model?
- How much capital do you need to switch to a new market or model?

Rising costs and productivity

10



(Down from 3 in 2021)

Last year, productivity and rising costs jumped seven places in our ranking as the impact of COVID-19 fueled miners' fears around cost increases. Pandemic-related costs are ongoing, and miners also face higher input and shipping supply chain disruption and a growing need to decarbonize operations. Meanwhile, an escalating skills shortage is sending the cost of recruiting and retaining talent sky high.

Of course, demand is up too, driving high commodity prices that have increased the temptation for a "volume at any cost" approach, especially as current margins can bear it. But mining companies should heed the lessons from the last boom cycle – or risk being hit with structurally higher costs or operational silos that are hard to change when commodity prices decline.

Managing variability can boost productivity

Productivity in mining is determined by a mix of factors across four areas. Managing variability across all of these is key to unlocking genuine gains:

- **Geological uncertainty:** improved modeling and real-time sampling can help miners gain a better understanding of geology.
- **Asset reliability:** understanding the value and the productivity potential of each asset across the value chain can be a starting point, with analytics then able to provide real-time asset health as an input into mature, predictive maintenance strategies. These can be coupled with digital twins to optimize machinery and avoid breakdowns.
- **Operational discipline and management:** analyzing exactly where value comes from and defining the operating model that will enable it is the essential starting point for productivity transformation in mining. Productivity can only be improved if there is a strong case for change that clearly demonstrates the benefit and value that creates buy-in across the organization. The next step is to define the operational behavioral change that will underpin productivity shifts, examining the operation's executional coordination and discipline to determine what needs to be done differently to deliver consistent results. That's when miners should consider new business models and practices.
- **Closing the integration gap:** integrated operating models (enabled by centers), scenario planning and management have allowed better integration and alignment with markets and the ability to respond rapidly to market opportunities or threats.

Considering each of these variables can help companies better understand the problem or pain points they are seeking to solve, whether that is to improve processes to drive efficiency, transforming the business or managing the disruption caused by change. In all cases, it's important to take a value-chain approach to ensure pain points are not simply moved to another part of the business. The key to success is a systemic approach: people working with technology to manage these elements effectively.

Keeping people at the center of change

Productivity improvements will only succeed when they are people-centered. Miners that design an integrated operating model with humans at the heart will enable, encourage and lock in sustainable productivity improvements. Only then should technology be selected, to ensure it aligns with all elements of the value chain and broader business aims. In an uncertain environment, flexibility is critical. Both technology and operating models should be ready to gear up or down quickly, and maintain a stable cost base amid revenue-stream volatility.

Change management will be integral to boosting productivity. There is no point buying a fleet of automated haulage trucks if workers are resistant or uncertain about using them. Getting buy-in from employees and encouraging behavioral change will require not only the best people using the appropriate tools to solve productivity challenges but also a new approach to working together. Communication and collaboration across the business, a commitment to breaking down silos and improving workforce diversity are critical to helping miners unlock innovation. Finally, there is a need for wisdom — miners need to ensure mistakes of the past are not repeated, factoring in learning to create continuous improvement in the future.

Maintain cost cutting – but make sure it's sustainable

Reducing costs will always be part of any productivity improvement strategy, but it needs to be done with an eye on long-term value, as well as short-term gains. Miners should ensure cost-reduction measures are sustainable and do not have a negative impact on LTO. Possibilities include:

- Switching to lower-cost renewable sources of energy
- Encouraging innovation and partnerships that will reduce costs in the longer term
- Reviewing capital tied up in high levels of pre-stripping, advance development and stockpiles
- Considering the use of contract mining versus sale or leaseback
- Reviewing supplier and service contracts
- Creating strategic joint ventures to optimize economies of scale
- Reducing back-office costs through automation or outsourcing

Next steps

Improving productivity will depend upon a combination of data, information, knowledge and wisdom that is centered around people and powered by technology. We suggest miners:

- **Design a strategy to implement an end-to-end productivity solution:** a systematic approach centered around people and powered by technology can help miners identify and tackle pain points across the value chain.
- **Define the operational behavior changes that will underpin productivity:** deploying change management programs can encourage collaboration and eliminate silos.
- **Enhance diversity of thought and skills:** building more diverse teams is proven to boost the innovation that will uncover new solutions to old problems.
- **Focus on sustainable cost reduction programs:** miners need to maintain their focus on building a long-term sustainable cost base, ensuring new measures add, rather than erode, value.


GROUP B
GROUP A

How EY's Global Mining & Metals team can help you

The transition to a low-carbon future demands that mining and metals companies reshape their role in what will be a new energy world. Bolder strategies that embrace digital innovation can help overcome productivity and cost pressures, create long-term value and secure a stronger LTO. EY's Global Mining & Metals team brings together the breadth of experience and talent needed to approach the entire transformation process. By considering four key pillars of change – structure and culture, customers, technology, and skills and capabilities – we can help you adapt for today and reap the opportunities of tomorrow. And together we can build a better working world.

Area contacts

EY Global Mining & Metals Leader
Paul Mitchell
paul.mitchell@au.ey.com

Africa
Wickus Botha
wickus.botha@za.ey.com

Americas and Canada
Theo Yameogo
theo.yameogo@ca.ey.com

Brazil
Afonso Sartorio
afonso.sartorio@br.ey.com

Chile
Eduardo Valente
eduardo.valente@cl.ey.com

China and Mongolia
Libby Zhong
libby.zhong@cn.ey.com

CIS
Mikhail S Khachaturian
misha.khachaturian@ru.ey.com

France, Luxembourg, Maghreb, MENA, Francophone Sub-Saharian Africa
Christian Mion
christian.mion@fr.ey.com

Japan
Andrew Cowell
andrew.cowell@jp.ey.com

India
Vikram Mehta
vikram.mehta@srb.in

Nordics
Lasse Laurio
lasse.laurio@fi.ey.com

Oceania
Michael Rundus
michael.rundus@au.ey.com

United Kingdom & Ireland
Lee Downham
ldownham@uk.ey.com

United States
Bob Stall
robert.stall@ey.com

EY | Building a better working world

EY exists to build a better working world, helping to create long-term value for clients, people and society and build trust in the capital markets.

Enabled by data and technology, diverse EY teams in over 150 countries provide trust through assurance and help clients grow, transform and operate.

Working across assurance, consulting, law, strategy, tax and transactions, EY teams ask better questions to find new answers for the complex issues facing our world today.

EYG no. 008490-21Gbl

BMC Agency
GA 161757601

ED None

In line with EY's commitment to minimize its impact on the environment, this document has been printed on paper with a high recycled content.

ey.com/miningmetals