

Global mining and
metals top 10
business risks and
opportunities – 2021



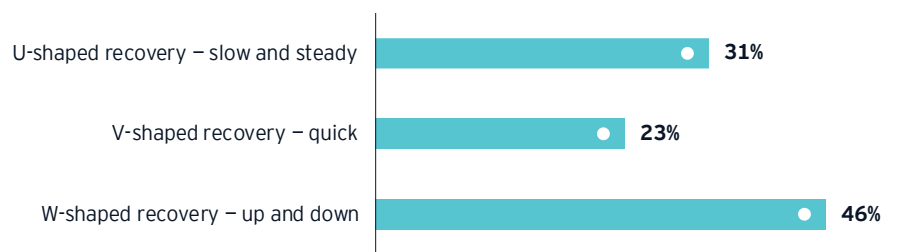
Executive summary

When last year's report raised the prospect of high-impact risks – those that are rare but potentially catastrophic – who could have predicted what would follow in 2020? At that point, we anticipated that disruption would soon hit the sector but didn't expect it to come from a global pandemic that has now accelerated other disruptive factors.

COVID-19 is clearly the dominant issue of 2020 and is going to impact all industries into 2021, and mining and metals is no exception. At the time of writing, some markets are beginning some semblance of an economic recovery, but others, particularly many significant mining geographies, remain heavily impacted by the virus. In our 2021 report, we focus on the effects of COVID-19 on the sector, highlighting how the pandemic has heightened many risks but also created new opportunities. While the outbreak has been a truly disruptive event, the mining and metals sector has dealt with its impact extremely well, leading an effective response due to:

- ▶ The safety-first culture that prioritized people's health and well-being
- ▶ Excellent governance that enabled agile change management with the right checks and balances in place
- ▶ Collaboration with governments, the sector, health experts and communities to ensure leading practices were followed
- ▶ Changes made on expert advice that were embedded across operations to ensure a consistent, effective response to the pandemic

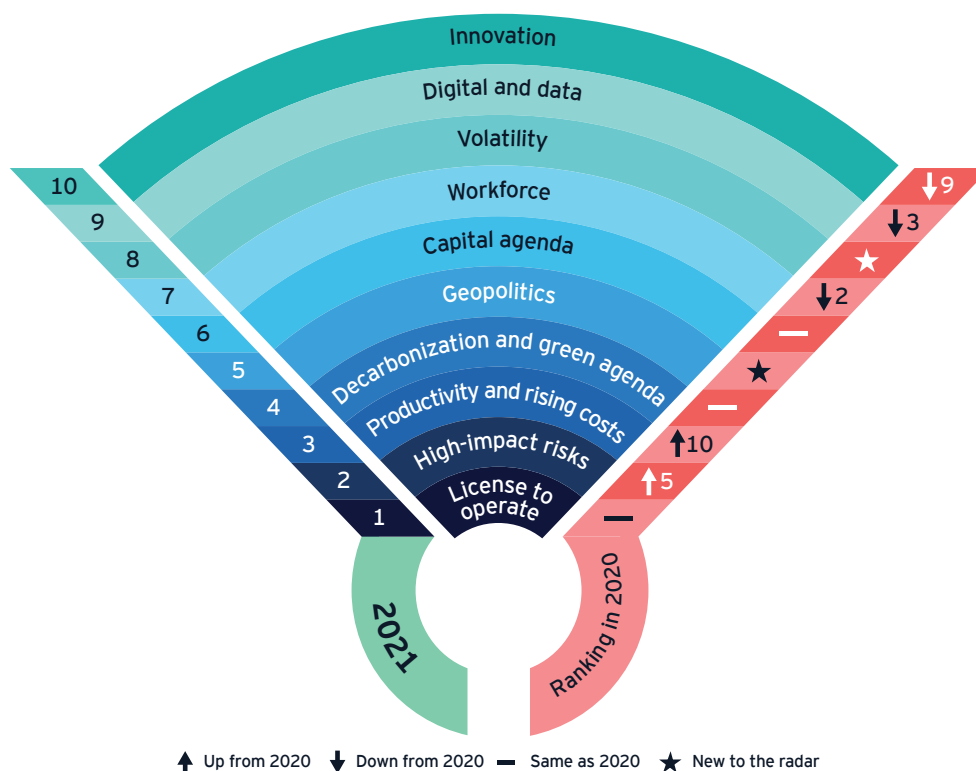
What do you think the recovery for the mining and metals sector will look like?



ABOUT THE SURVEY

We surveyed more than 250 global mining and metals executives. The majority of respondents were C-Suite executives. The survey was conducted between 29 June and 31 August 2020.

Top 10 business risks and opportunities



As a result, many mines have remained operational and productive during the pandemic, despite having less people on-site. Business continuity has come at a cost, however, due to the added expenses of new processes, procedures, protocols, health testing equipment and support for the workforce.

Of course, the overall impact of the pandemic varies across the sector. Each commodity has been affected differently depending on current and future demand, stockpiles and the virus's impact on supply. Given this, it was not surprising that our survey respondents have different perspectives on how recovery will unfold, with almost half predicting a W-shaped recovery (up and down). At EY, we expect a saw-toothed recovery – a Nike swoosh with a very bumpy bottom. This saw-shaped, choppy return to growth demands that organizations be far better at dealing with unpredictable shifts in the business environment. It will demand flexibility, resilience and fast reflexes.

Adversity has created opportunities for positive change

It is apparent that the disruption of 2020 has created plentiful opportunities, this is reflected in the report with opportunities outnumbering risks. Disruption has reshuffled rankings, with license to operate (LTO) and environmental, social and

governance (ESG) all becoming more prominent as social responsibility and broader stakeholder demands intensify as we emerge from the pandemic. We believe that COVID-19 has created the opportunity for change and that we will see major structural changes and acceleration of transformational projects take place across the sector.

1 License to operate (1): Remains the number one issue for miners, with 63% of our survey respondents flagging it as a top three risk. We expect the issue to become even more important as stakeholders broaden and develop a stronger voice. As effective engagement becomes even more critical, we believe miners should consider three tiers of community:

- ▶ Local communities will have greater expectations around how miners respect Indigenous rights and native title.
- ▶ National communities may push for a return to resource nationalism, with increased debate around who miners sell to and for what purpose.
- ▶ Broader community commitment will come into focus as socioeconomic issues are highlighted post-COVID-19. We may see pressure build to provide ownership of assets to communities.

Miners will need to work with governments and sector associations to help shape the messaging of the societal contribution and value derived from the mining sector. There is a real need to rebrand, and with investors looking to understand value beyond the financials, this is key to obtain capital and other sources of funding.

2 High-impact risks (5): In last year's report, we noted that company-destroying risks tend to be rare and, as a result, may not be examined but rather will stay on the risk register in much the same format year on year. But, in 2020, the COVID-19 pandemic has clearly demonstrated the importance of understanding and reviewing these high-impact risks, particularly as there is a significant link between a company's ability to manage them well and its LTO. The experience of the pandemic has heightened stakeholder expectations around how enterprises prepare for, manage and monitor all high-impact risk exposures.

3 Productivity and rising costs (10): Rising costs and productivity remain on the radar as the complexity of mining increases and commodity prices come under pressure due to disrupted supply and the impact of ongoing economic uncertainty on demand. The impact of COVID-19 has been mixed, with some restrictions imposing new, unforeseen costs and other measures removing silos that hindered productivity. Over the longer term, we believe that tackling this issue effectively requires a true end-to-end focus on costs and productivity across the value chain.

Workforce, and digital and data, our second and third biggest risks in 2020, still appear in the top 10, now sitting at 7 and

9, respectively. We believe their lower ranking indicates that miners believe these issues are now better managed and, for some, business as usual.

Two new risks have emerged on the sector's radar this year: geopolitics (5) and volatility (8).

- ▶ **Geopolitics:** The top geopolitical issues that miners expect will impact their sector are the changing role of the US in the international system, European Union (EU) stability and US-China relations. This shifting geopolitical landscape is changing many dynamics, particularly demand, for mining and metals companies. A trend toward economic protectionism to favor domestic producers and ensure host countries receive their fair share of resource wealth will emerge in many jurisdictions.
- ▶ **Volatility:** COVID-19 is creating significant near-term disruption to supply and uncertainty around demand. While China's swift economic rebound has kept up demand for iron ore, and gold and silver retain their status as safe havens, any future disruption could see this change fast. Miners need to be able to make sustainable, long-term decisions as they deal with the return of severe commodity price volatility, the threat of substitution and changing customer demand.

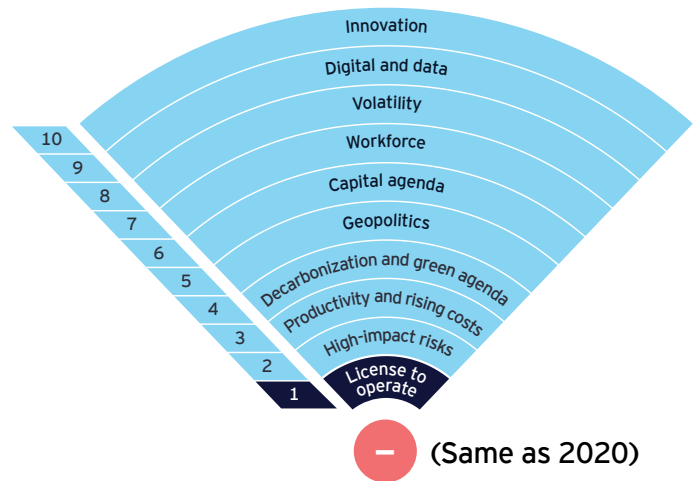
COVID-19 created a critical need for the mining and metals sector to develop a fast, cohesive response to the crisis. In doing so, it broke many long-standing organizational barriers, in particular those silos inherent on mine sites. Now, many companies are seizing the opportunity to do more – to remove complexity, overcome historical obstacles to change and accelerate a transformation agenda that focuses on long-term resilience.



01

License to operate

Strengthening LTO in a changing world



This year, LTO retains its rank as the mining and metals sector's top risk and opportunity, with 63% of our survey respondents flagging it as a top three risk. This is not surprising, particularly when every one of the sector's stakeholders that contribute to their LTO has been affected by COVID-19. The impacts of the pandemic, and how they are managed in the longer term, will fundamentally alter the sector's value proposition to communities, customers, suppliers and governments.

In many jurisdictions, mining was declared an essential service during the COVID-19 pandemic, and miners extended their existing laser focus on the environment, health and safety to include local communities, suppliers and partners; indeed, many collaborated with government and sector associations to limit the impact of COVID-19 on these stakeholders. Initiatives included supplying sanitation materials, funding access to medical assistance and providing basic amenities, such as cleaning and sanitation items, clean water and medical equipment. These efforts have had a clear positive impact on LTO within the sector.

Investor scrutiny regarding communities on the rise

Seventy-three percent of our survey respondents said that their companies' impact on the local community is the issue facing most scrutiny from investors. In a recent EY survey

of institutional investors,¹ 23% of respondents told us that ESG performance is an area where mining and metals companies lagged other sectors. With this in mind, it's clear that addressing investor concerns through improved ESG performance is critical. We believe there are three tiers of community to consider.

Local community

Even when miners operate in accordance with the law and their formal license, issues can arise, and executives will be held accountable. The importance of regular formal and informal reviews and ongoing discussions of LTO with local communities and traditional landowners is critical.

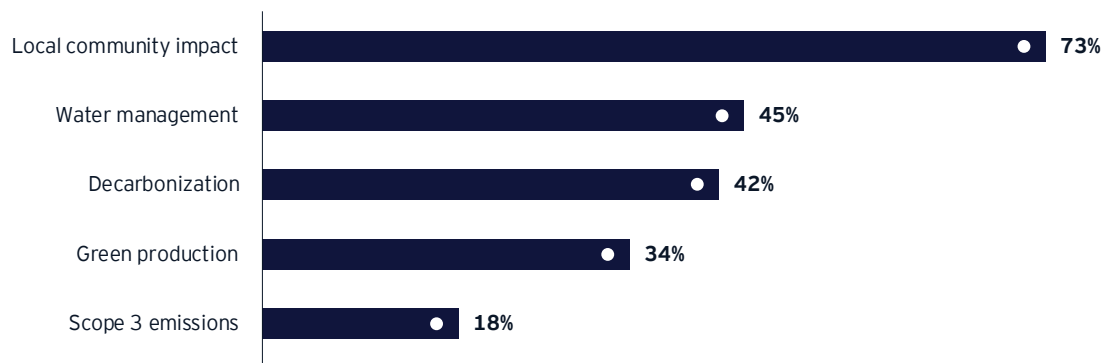
National community

As discussed in our commentary around geopolitical risk, we anticipate a rise in resource nationalism, which will increase the debate around who miners sell to and for what purpose. In many markets, sentiment is growing that a nation's citizens "own the assets in the ground." Is this another disruptor that could see the emergence of more national mining companies?

Broader community

We anticipate that the economic downturn resulting from the impact of COVID-19 will give rise to an uptick in discussion

What area of mining and metals will face the most scrutiny from investors relating to ESG issues?*



*Respondents were allowed to choose more than one option.

¹ "How will ESG performance shape your future?", EY website, www.ey.com/en_gl/assurance/how-will-esg-performance-shape-your-future, accessed 5 August 2020.



around socioeconomic issues, with a renewed level of contention around financial inclusion. Will we see a move toward providing ownership of assets to communities? We suspect activism in this area may increase.

With 98% of investors considering ESG performance when they make investment decisions and increasing levels of debt capital tied to social and environmental outcomes, miners must do more to demonstrate their positive impact on communities. With debt markets tight and capital markets open, ensuring access to capital will be critical, particularly as we believe internal and external growth opportunities are likely to arise. Companies that fail to make their ESG case may struggle to access the capital they need to seize these opportunities and

will miss out on the potential to diversify their investor base and access debt at lower cost. As Tom Butler from the International Council on Mining and Metals (ICMM) stated: "Those companies that have invested in building and maintaining community relationships will be those that come out of this crisis, and any future crisis, in a better position than those that don't."

Tailings dam standard raises the bar for the sector

A report published by the Church of England² earlier this year noted that a third of the world's tailings dams were at high risk of collapse. With the majority of these dams in Australia, Brazil, the US and Southern Africa, a concerted focus from mining companies to address this issue is key.

² "Investor mining and tailings safety initiative," *The Church of England website*, <https://www.churchofengland.org/investor-mining-tailings-safety-initiative>, accessed 31 July 2020

Recent failures of tailings dams prompted an independent committee (comprising the United Nations Environment Programme, Principles for Responsible Investment and ICMM) to issue a new international standard, the Global Industry Standard on Tailings Management, which aims to help companies manage dams to achieve zero harm to employees, communities and the environment.

Can insights gleaned from the COVID-19 pandemic help miners prepare for the future?

The mining and metals sector did very well in managing the health and business impacts of COVID-19, with many enhancing their LTO through safeguarding employees and communities, acting on expert advice and having the right

governance in place to make changes swiftly. The sector's "zero-harm" approach to safety has served it well, but now miners should consider how to apply lessons learned here to other issues critical to LTO, including modern slavery and engagement with Indigenous communities.

But processes and policies are not enough if they are not embedded at all levels of the business, including operations. As discussed in last year's report, the shifting societal expectations of the sector require mining and metals companies to develop a clear brand strategy around LTO. There can no longer be a gap between what a company says and what it does – one such event can cause significant damage to an individual company, as well as to the reputation of the entire sector.

Call to action

As miners move to bolster their LTO, key areas warrant renewed attention:

Deepen the company's understanding of specific community issues and concerns that impact stakeholders: Any small misstep could cause loss of LTO. Taking a holistic approach to community considerations will help allocate time and capital to projects that deliver meaningful shared value for companies and stakeholders alike.

Constantly review processes and policies and engage with Indigenous communities: Recent events have highlighted a real need to review and reset processes and policies around third-party rights.

Shape a stronger message around mining's value to society and the economy: In a market where capital is scarce and investors seek evidence of value beyond the financials, miners must rebrand. As discussed in our section on geopolitics, companies should consider how they can work more closely with governments and sector associations to more clearly demonstrate how they are creating long-term value. It is important for miners to help key stakeholders understand the economic footprint of mining in relation to the contribution to economic output and employment, both directly and indirectly. A key element of this contribution comes in the form of taxation, both direct and indirect, and other government and community contributions. Related to this is the potential increase in activity from sector reforms that result in

further investment. This increase in investment is the mechanism by which society benefits from its resources, with government playing a key role in the rate at which these benefits are realized.

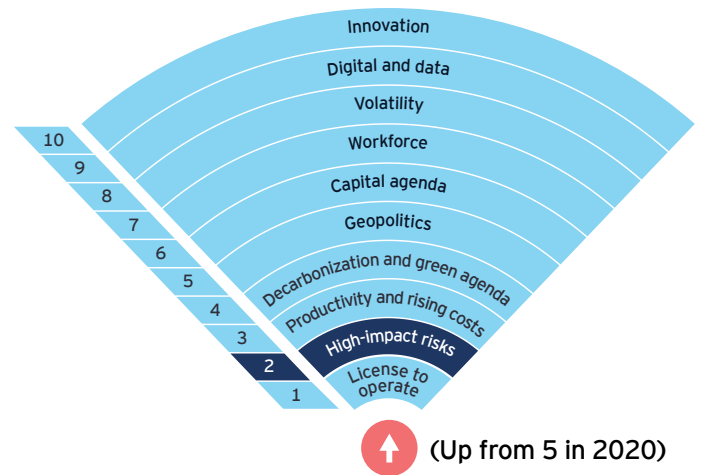
Increase engagement with governments to encourage investment: More proactive engagement can guide governments on actions to drive greater investment in the sector, including the removal of red tape around project approvals. The rise in resource nationalism also highlights a need for mining companies to work more closely with governments.

Proactively manage the company's human rights and modern slavery risks and impacts: Governments around the world are increasingly regulating business transparency in relation to modern slavery and human rights risk management. Leading organizations are using this as an opportunity to enhance the proactive management of human rights risks and impacts across their organizations and supply chains. Mining companies should examine their operations and supply chains to understand areas of human rights and modern slavery risks and develop robust controls, including due diligence, to ensure that gaps are addressed and risks and impacts are minimized.

02

High-impact risks

Is the biggest future risk the way companies approach risk now?



In last year's report, we noted that company-destroying risks tend to be rare events that we are unprepared for and, as a result, may not be examined but rather will stay on the risk register in much the same format year on year. But, in 2020, the COVID-19 pandemic has clearly demonstrated the importance of addressing these high-impact risks, particularly as there is a significant link between a company's ability to manage them well and its LTO. The experience of the pandemic has heightened stakeholder expectations around how enterprises prepare for, manage and monitor all high-impact risk exposures.

Now: recognize that the immediate response will significantly define the company and its brand

- ▶ **Activate a dedicated crisis management team** that includes senior leadership and diverse skills that are appropriate to the crisis.
- ▶ **Protect people and assets.** In times of crisis, organizations have the responsibility to act in the best interests of their people, their customers and other stakeholders. Protecting their people requires companies to identify alternative working arrangements and reimagine business as usual, while also complying with local labor laws in a way that puts first the health and safety of employees.
- ▶ **Maximize liquidity** and maintain a strong balance sheet. Evaluate liquidity and capital demands to ensure operations can continue and short- and medium-term obligations can be met. Forecast scenarios to enable planning.
- ▶ **Establish lines of communication** and ensure the company understands its key stakeholders. As any high-impact risk will create uncertainty and fear, it is important that companies put people first and engage in purposeful conversations. Those that do will propel through recovery and renaissance faster and stronger.
- ▶ **Understand the level of disruption** to the core business and respond accordingly. Collate and extract value from data across the entire value chain to ensure that the right decisions are made about the workforce, operations and supply chains.
- ▶ **Act quickly and decisively** to make the necessary changes to maintain operations.

79%

of board members say their organizations are not very well-prepared to deal with a crisis event.

Source: EY Global Risk Survey 2020

How does a company develop an approach for a crisis where predefined responses are not adequate?

In the event of a crisis, immediate action is required to protect people, assets and value. Enabling this immediate action requires organizations to have a professional crisis management plan ready – one that addresses employee well-being, continuity of operations, brand reputation, finance management, the supply chain and legal issues that the crisis might trigger. It is crucial to have a map for navigating uncertainty and complexity. We suggest an adaptive response across three time horizons: now, next and beyond.

Next: return to the new normal and pivot

Once the immediate impacts of the crisis have been managed, it is important that businesses prepare to return to a new normal as soon as possible. We recommend that miners:

- ▶ **Conduct scenario planning.** Miners must focus on being agile and prepared for ongoing impacts. In times of high

uncertainty, it's vital to assess the economic effects of disruptive events and corresponding shifts in business trajectories. Scenario planning provides a solid foundation to underpin medium- and long-term business plans objectively and to map out and prepare for possible alternative futures.

- ▶ **Understand possible external disruptions along the value chain.** Unforeseen crises can present unexpected business and legal challenges. Companies will have to conduct contract risk assessments and identify preventive actions, manage customer-supplier contract disputes due to economic impacts or supply disruptions, and even be prepared to invoke “force majeure” clauses when required. When communicating with relevant stakeholders, consult with legal teams for advice on potential liabilities. Also, consult with business units regarding how to manage communication around ongoing breaches and collection of proofs, if required.
- ▶ **Establish a transition and transformation center** separate from the crisis management team to lead the return to normal. As explained in a [recent article by EY Global Mining & Metals Leader Paul Mitchell](#), this center should take a longer-term perspective to guide the transition back to full capacity and drive transformation initiatives.

Beyond: reframe the future

It is clear that stripping away some of the overcomplicated governance, additional layers and silos has had a positive effect on miners, including an improved ability to make the right decisions in less time. Now companies have the opportunity to reflect upon changes made during the pandemic and determine which should stay and which should be reversed. When making these decisions, a focus on retaining the capabilities that enable agility and preparedness for future events can help. For example, during the COVID-19 pandemic, we've seen agile governance enable the rapid decision-making that has driven positive outcomes, such as continued production and the protection of workers' health and safety.

Post-COVID-19, stakeholders will expect more from organizations. So far, mining and metals companies have managed the pandemic well, but it only takes one high-profile event to cause whole-of-sector reputational damage. Miners will need to think about how they can reframe their focus on this in the future. Conducting a full risk review now is critical to ensure risks are reprioritized accordingly. The unprecedented impact of COVID-19 has also challenged previously held assumptions around plausibility and severity.

Call to action

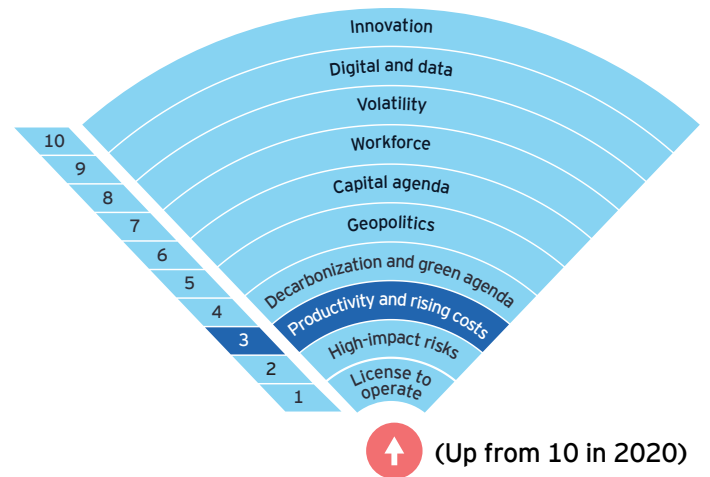
As businesses adapt operations and build resilience, they will need an enhanced approach to risk that encompasses:

- ▶ **Agility:** Miners must be able to act immediately and urgently when risks escalate and also continue to interpret and detect rapidly emerging risks in a fast-changing landscape. Digital readiness will help ensure operational agility, which is vital for companies to respond to these risks faster. Effective enterprise planning will allow agile operators to understand, position and react better than their competitors.
- ▶ **Data-driven approaches:** Leaders will need to shift from relying on subjective judgment toward adopting data-driven approaches – as multiple factors will need to be taken into account – ones that link internal and external data to feed smart decision-making that aligns to company strategy and risk appetite.
- ▶ **Rethinking the risk function:** The speed at which COVID-19 hit drove a shift in risk functions, from facilitating traditional risk management activities, to leading decision-making, primarily through the role of risk in the response and recovery teams. With traditional risk management structures no longer fit for purpose, it may be time to consider what a truly integrated risk management function should look like. We believe that it is one that is embedded across all functions of the business, with a simplified approach to governance that allows agile decisions while confirming all safety protocols are maintained.

03

Productivity and rising costs

Volatility creates productivity and cost challenges



Productivity and rising costs have always been high on the radar for operations and that importance always increases in times of volatility. Declining ore grades, increasing complexity across the value chain and pressures on commodity prices due to disrupted supply and uncertain demand are affecting all miners.

The impact of the crisis has been mixed. Process changes and restrictions have imposed new, unforeseen costs, but some measures taken in response to the virus have removed silos that previously hindered productivity. Over the longer term, we believe that tackling this issue effectively requires a true end-to-end focus on costs and productivity across the value chain.

The pandemic has increased costs but created opportunities for innovation

Many mines have remained operational and productive during the pandemic, despite having restrictions. This business continuity has come at a cost, however, due to:

- ▶ **Added expenses** of new procedures, protocols, health testing equipment and support for the workforce
- ▶ **The expense of changing processes**
- ▶ **The potential longer-term cost of deferring nonessential maintenance**, particularly sustaining capital
- ▶ **Increased supply chain costs** due to delays – to mitigate against the risk of future disruption, some miners may decide to choose a diverse group of suppliers, rather than those that offer the lowest cost

But while costs have increased, miners have also developed innovative solutions to entrenched issues, which will have a positive ongoing impact on productivity. For example, realigning rosters, which improved labor productivity, was achieved in just days, rather than after months (or years) of stakeholder management. Some measures implemented during COVID-19, including remote working for corporate staff, greater use of local resources and reduced fly-in, fly-out (FIFO) workers, have been so successful in lifting productivity that they are likely to stay in place.

Besides COVID-19-related costs, metal producers have also flagged rising energy costs, a major factor in the metals cost structure. As pointed out by Mark Cutifani, CEO of Anglo American, the amount of energy required to produce 40kg (88lb) of copper has risen by a factor of 16 since 1900.³ The high cost of energy, as well as a challenging demand outlook, is driving the continued closing of aluminum smelters, including Rio Tinto's New Zealand smelter.⁴

The mining sector is also dealing with increased expectations and regulations around ESG issues and LTO. In some cases, these expectations are leading to revenue losses and rising compliance costs. For example, new regulation in Brazil requires mining companies to introduce automated monitoring systems for tailings dams at risk of collapse.

³ "Mining Indaba 2020: Keynote address by Mark Cutifani, Chief Executive of Anglo American," *Anglo American website*, www.angloamerican.com/~media/Files/A/Anglo-American-Group/PLC/media/presentations/2020pres/mark-cutifanis-speech-at-mining-indaba-2020.pdf, accessed 31 August 2020.

⁴ "Smelter push for power savings," *Otago Daily Times*, 12 June 2020, via Factiva.



Call to action

- ▶ **Ramp up productivity initiatives:** Mining companies have already introduced a broad range of innovative solutions to maximize productivity, reduce costs and improve safety, including automation, artificial intelligence (AI), mixed reality and the internet of things. We expect this digital transformation to accelerate, with almost a quarter of our survey respondents saying their investment in digital will increase by 26% to 50%. However, despite pockets of digital innovation across the sector, we have not seen many companies implement the end-to-end initiatives that will drive true transformation.⁵
- ▶ **Eliminate silos:** Miners can use this time of crisis and the current safety lens as an opportunity to break down silos and implement change conducive to improving productivity,⁶ including new behaviors and operating paradigms.
- ▶ **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. It's important too that companies carefully manage stakeholder perceptions of cost cutting to ensure it doesn't impact LTO. Some possibilities for sustainable cost reduction include:
 - ▶ Switching to lower-cost renewable sources of energy; for example, ArcelorMittal South Africa is inviting proposals from independent power producers to build two utility-scale solar projects to reduce its energy costs
 - ▶ Encouraging innovation and partnerships to help with longer-term reduction of costs
 - ▶ Reviewing capital tied up in high levels of pre-stripping, advance development and stockpiles
 - ▶ Considering the use of contract mining vs. 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

⁵ "Four steps for transforming mining and metals companies," *EY website*, www.ey.com/en_gl/mining-metals/wave-approach-transform-digital-effectiveness, accessed 31 August 2020.

⁶ "How do you prepare for tomorrow's mine today?" *EY website*, www.ey.com/en_gl/mining-metals/how-do-you-prepare-for-tomorrow-s-mine-today, accessed 27 August 2020.

04

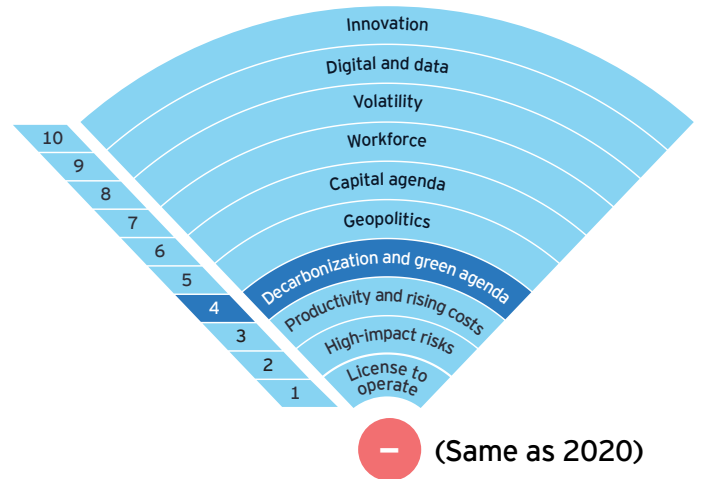
Decarbonization and green agenda

How a greater focus on the environment and climate can create new opportunities

In 2020, the pressure to reduce greenhouse gas (GHG) emissions remains the biggest environmental issue for mining and metals companies, although the amount of GHG contributed does vary across commodities. Together, the sector accounts for up to 7% of the world's GHG emissions each year, with far more significant emissions occurring downstream in energy generation, metal manufacturing and chemical processing.

As stakeholder pressure grows, mining companies are taking a deeper look at the transitional and physical implications of climate change, through legal, regulatory, technology and environmental lenses. Leading companies are setting out their approaches to decarbonize their direct emissions, including through electrification, use of alternate fuels and increased investment in renewables. However, many miners' current emission reduction targets do not align with the Paris Agreement. Even more of a concern is that companies have yet to comprehend the true environmental impact of their entire value chain or to understand the full implications of moving toward a net-zero carbon economy. Miners that better understand and communicate their plans to optimize business models in a changing world will be well-placed to navigate this significant global economic transformation.

This is especially important due to the impacts of COVID-19. Awareness of environmental issues has increased, as have expectations around corporate responsibility. We anticipate additional focus and scrutiny on mining companies as we come out of the pandemic – inaction is no longer an option.



Investors favor companies that measure and manage climate impact

In a recent EY investor survey,⁷ a staggering 67% of respondents told us that insights from a company's taskforce on climate-related financial disclosures (TCFD) would play a significant or very significant role in their allocation of capital. The renewed interest in a company's TCFD is due to the fact that, for the first time, companies need to consider and model a range of climate scenarios, determining how these will impact their risk management, strategies, metrics and targets, and governance. Unfortunately for miners, the EY Global Climate Risk Disclosure Barometer reveals that, with the exception of the largest companies, the sector performs poorly in this area.



Firms with the best ESG rankings financially outperform peers by 40%+.⁸

Nordea Equity Research

Renewed focus on renewables

Mining companies are accelerating their investment in renewables for their mining operations, driven in part by declining direct costs and a realization of the indirect

⁷ "How will ESG performance shape your future?," EY website, www.ey.com/en_gl/assurance/how-will-esg-performance-shape-your-future, accessed 5 August 2020.

⁸ "Cracking the ESG code," Nordea Markets website, https://nordeamarkets.com/wp-content/uploads/2017/09/Strategy-and-quant_executive-summary_050917.pdf, accessed 31 August 2020.



cost of carbon. According to the International Renewable Energy Agency (IRENA), the cost of solar and wind power has decreased significantly over the last decade (2010 through 2019), with solar photovoltaics (PV) declining by 82% and onshore wind by 39%. While hydropower costs have increased over the same period, nine-tenths of all capacity commissioned in 2019 is producing power for less than the cheapest new fossil fuel-fired project. In fact, IRENA estimates that 56% of all newly commissioned, utility-scale, renewable power generation capacity achieved lower costs in 2019 than that of the cheapest fossil fuel-fired option.⁹ Battery prices have also declined over the last decade, down 87% to 156/kWh in 2019.¹⁰

We are seeing many miners pledging to use only renewable sources to power their mining operations. BHP has entered into renewable energy supply contracts in Chile and has announced an intent to source 50% of power for the Queensland coal assets from renewables.¹¹

Hydrogen as a fuel alternative

Hydrogen is fast emerging as an energy option for fixed plant and mobile fleet energy. It produces zero emissions, providing an appealing opportunity to decarbonize mine sites and reduce diesel consumption.

In one example, Anglo American is developing a hydrogen-powered ultra-class electric mining haul truck as a part of its sustainable mining approach.¹² While some challenges remain, we anticipate that the appetite for hydrogen and technological advances will make its use on mine sites a reality within the next few years.

Preparing for impacts on productivity and operations

The impacts of climate change have intensified the physical challenges to mining operations. Seventy percent of mining projects from the six largest mining companies operate in water-stressed regions, and this is set to increase.¹³ For example, by 2030, Chile's copper production will be facing extreme water stress vs. high stress today,¹⁴ which will likely increase existing tensions between the miners, government and local communities.

Participants in our survey felt that water issues will soon become a key area of investor scrutiny. Miners should increase their focus on understanding the impact of water on their mines' ability to operate. In some areas, this will mean identifying pain points at a local level and considering innovations to support a move to waterless mines. In other key mining geographies, such as parts of Australia, South America and Southern Africa, miners should consider how to prepare for increased flooding due to climate change.

⁹ "Renewable Power Generation Costs in 2019," *IRENA website*, www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Jun/IRENA_Costs_2019_EN.pdf, accessed 17 August 2020.

¹⁰ "Battery Pack Prices Fall As Market Ramps Up With Market Average At \$156/kWh In 2019," *BloombergNEF website*, www.about.bnef.com/blog/battery-pack-prices-fall-as-market-ramps-up-with-market-average-at-156-kwh-in-2019/, accessed 31 August 2020.

¹¹ "BHP's Queensland mines to reduce emissions from electricity use by 50 per cent," *BHP press release*, <https://www.bhp.com/media-and-insights/news-releases/2020/09/bhps-queensland-mines-to-reduce-emissions-from-electricity-use-by-50-per-cent/>, accessed 10 September 2020.

¹² "Anglo American to test world's largest hydrogen powered truck," *Australian Mining website*, www.australianmining.com.au/news/anglo-american-to-test-worlds-largest-hydrogen-powered-truck/, accessed 27 August 2020.

¹³ "Shared Water, Shared Responsibility, Shared Approach: Water in the Mining Sector," *ICMM website*, www.icmm.com/website/publications/pdfs/water/170321_icmm-ifc_shared-water-shared-responsibility.pdf, accessed 21 August 2020.

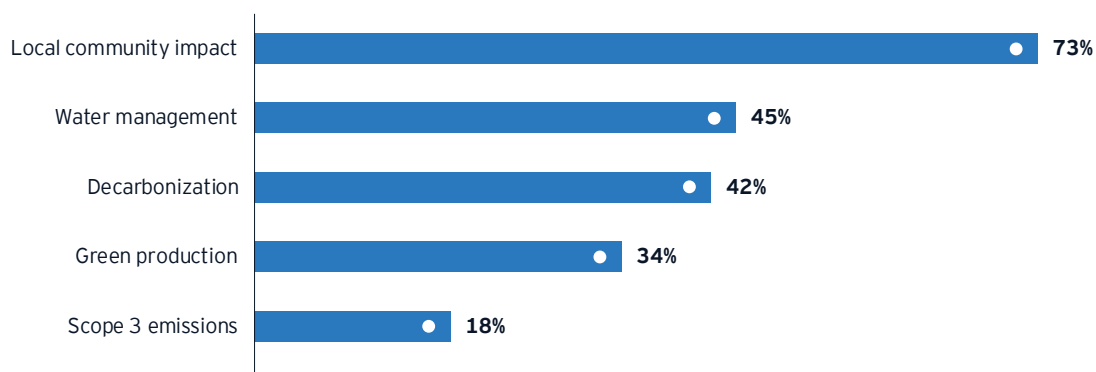
¹⁴ "Water Risk Atlas," *Aqueduct*, <https://www.wri.org/applications/aqueduct/water-risk-atlas>, accessed 4 September 2020.

Increasing temperatures are also a growing concern. Even a rise of just a few degrees can have a big impact on productivity and create serious occupational health and safety challenges. In a recent International Labour Organization report,¹⁵ heat stress through global warming is set to affect 2.2% of total working hours worldwide in 2030.

Biodiversity is declining at rates unprecedented in human history, and everyone has a part to play in slowing the

decline. ICMM recently announced that its members believe governments should establish and enforce minimum requirements that reflect best practice, which means that less progressive companies cannot exploit resources without consideration of biodiversity impacts, thus preventing a “race to the bottom.” Considering biodiversity as part of mine closure planning can leave a positive legacy for biodiversity conservation and, hence, enhance LTO.¹⁶

What area of mining and metals will face the most scrutiny from investors relating to ESG issues?*



*Respondents were allowed to choose more than one option.

Further scope 3 transparency

With the scope 3 emissions from companies that extract resources around 10 times as great as their scope 1 emissions, we were surprised that only 18% of our survey participants rated this as an issue that will face stakeholder scrutiny. Tracking scope 3 emissions remains difficult, but many miners are developing innovative ways to do so and pledging large-scale reductions. For example, Glencore has committed to reduce absolute scope 3 emissions by 30% by 2035, from 2016 levels.¹⁷ BHP has committed to take a product stewardship role for all emissions across its value chain for which it will work with shippers, processors and end users to reduce its scope 3 emissions.¹⁸

Downstream pressure for carbon-free materials

Other industries are also under pressure from consumers to reduce their carbon footprints and are seeking carbon-neutral parts to support their initiatives. For example, with automakers seeking cleaner aluminum, Norsk Hydro has developed new aluminum products produced from recycled post-consumer scrap or primary metal from hydropower smelters.¹⁹ We are also seeing significant strides toward the decarbonization of steel production through the use of hydrogen instead of coal.

¹⁵ “Increase in heat stress predicted to bring productivity loss equivalent to 80 million jobs,” *International Labour Organization website*, https://www.ilo.org/global/about-the-ilo/newsroom/news/WCMS_711917/lang-en/index.htm, accessed 4 September 2020.

¹⁶ “Rethinking how we work together to tackle the biodiversity crisis,” *ICMM press release*, www.icmm.com/en-gb/news/2019/protecting-biodiversity-by-mining-responsibly, accessed 24 August 2020.

¹⁷ “Glencore’s commitment to the transition to a low-carbon economy,” *Glencore press release*, www.glencore.com/media-and-insights/news/glencores-commitment-to-the-transition-to-a-low-carbon-economy, accessed 24 August 2020.

¹⁸ “BHP To Set Goals for Scope 3 Emissions,” *Energy and Mines website*, www.energyandmines.com/2019/09/bhp-to-set-goals-for-scope-3-emissions/, accessed 24 August 2020.

¹⁹ “Recycled aluminium the new sought-after material in low-carbon construction,” *Norsk Hydro press release*, www.hydro.com/en/media/news/2020/recycled-aluminium-the-new-sought-after-material-in-low-carbon-construction/, accessed 12 August 2020.

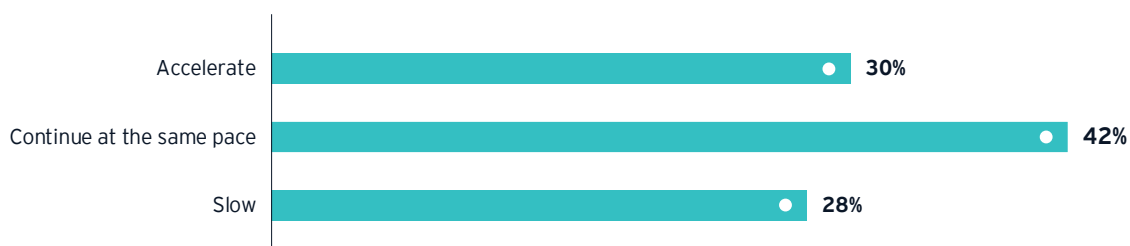


Call to action

The COVID-19 pandemic has offered miners an opportunity to reset operations. A greater focus on ESG issues can present a similar opportunity to transform the sector for the better. Those companies that can demonstrate that they are operating with a green, sustainable focus can gain a competitive edge in the fight for capital and secure a stronger LTO. But doing so successfully will require taking action across key areas:

- ▶ **Building and communicating the decarbonization strategy.** Be transparent about plans, set targets, and track and communicate progress toward them.
- ▶ **Increasing ESG reporting and transparency** around these initiatives. For example, efforts to mitigate risks at tailings dams may be an area of focus.
- ▶ **Conducting scenario planning for climate events** and water projections at key operations to determine which assets are most at risk.
- ▶ **Reducing and reporting on scope 3 emissions** by working more closely with customers.
- ▶ **Focusing on opportunities.** The transition to a net-zero carbon economy will see the growth of new sectors, underpinned by the resources sector.

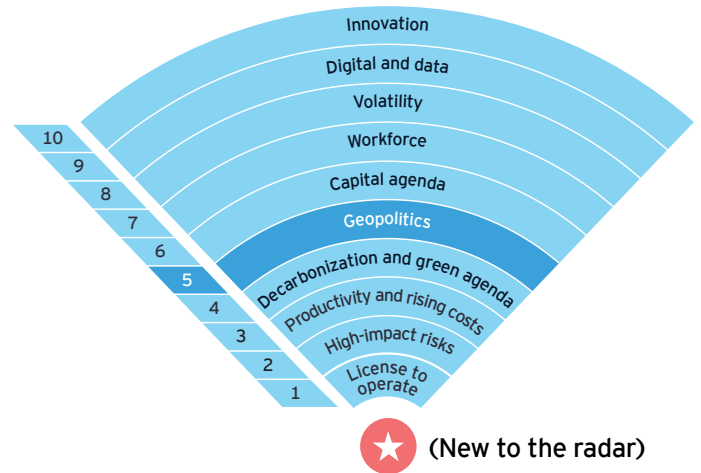
Pre-COVID-19, we were seeing a great deal of climate and green activism around the world, much aimed at the mining sector. Post-COVID-19, do you think the pressure will:



05

Geopolitics

Navigating geopolitical risk and economic protectionism



Geopolitical issues are a major risk on the minds of mining and metals leadership, ranking number five in this year's report. Our survey of global executives for the EY geostrategy report²⁰ found that the geopolitical issues that leaders expect will have the biggest impact on their companies are the changing role of the US in the international system, EU stability and US-China relations.

This assessment reflects the shifting balance of power among the world's largest economies. The US is repositioning itself from a leadership perspective, China is playing a bigger role in geopolitics and Europe is seeking a more cohesive projection of its own power. As the emerging blocs consolidate their power, relations between them could become volatile. We may also see increasing political risks in Africa and South America, which are home to the world's next generation of resources.

COVID-19 is intensifying protectionist actions

This shifting geopolitical landscape is changing the dynamics for mining and metals companies. An apparent trend toward economic protectionism to favor domestic producers and ensure host countries receive their fair share of resource wealth is manifested in government action:

- ▶ **Tariffs:** Several countries have imposed steel and aluminum tariffs to protect domestic producers from an influx of imports from oversupplied global markets.
- ▶ **Increasing royalties and taxation:** An example is Chile's plan to introduce a 3% mining royalty on copper and lithium extraction.²¹
- ▶ **Protection of strategic minerals:** Countries are acting to protect those minerals deemed critical to their regions. For example, the Democratic Republic of the Congo (DRC) Government has declared cobalt a strategic substance and

has given a new subsidiary of state-owned mining company Gécamines a five-year renewable monopoly on purchases of all artisanal-mined cobalt and other "strategic substances produced in-country."²²

- ▶ **Changed licensing arrangements.** Investors not using mining exploitation claims are losing them. In August, the Zimbabwe Government repossessed 16 mining concessions as it started implementing the use it or lose it policy.²³
- ▶ **Export bans or reserving production for domestic use:** Previously the world's biggest exporter of nickel, Indonesia banned export sales of nickel ore as part of plans to expand its domestic smelting industry. But lower demand, rising production and falling nickel prices are putting significant pressure on the country's nickel miners, and the Indonesian Nickel Miners Association has appealed to end the ban.²⁴

The global nature of the COVID-19 pandemic will only serve to increase tensions and raise the stakes of political risk, potentially exacerbating protectionist tendencies as governments seek to protect local economies.

Debt pressures may drive tax or royalty increases

Rising debt burden incurred during the pandemic is putting pressure on governments to raise revenue. As they seek new avenues to do this, mining is likely to come into focus. The sector has been declared an essential service in many economies and is expected to remain more profitable than others as commodity prices rise on the back of rebounding Chinese economic activity, stimulus spending shifting from consumers to infrastructure and, for gold, its safe haven status. Fifty-eight percent of our survey respondents expect governments to increase taxes and royalties. We could also see unilateral policy decisions that increase tax or royalties if mining

²⁰ "Geostrategy in Practice 2020: An EY survey of global executives reveals how to improve political risk management – an urgent imperative amid the COVID-19 crisis," EY website, https://assets.ey.com/content/dam/ey-sites/ey-com/en_gl/topics/geostrategy/geostrategy-pdf/ey-geostrategy-in-practice-2020-v1.pdf, accessed 12 August 2020.

²¹ "Mining royalty bill likely to advance in Chilean Congress, but challenge at constitutional court likely if approved," IHS Global Insight Daily Analysis, 28 January 2020, via Factiva.

²² "DRC state-owned monopoly of artisanal cobalt likely to pose legal and reputational risks to supply chains," IHS Global Insight Daily Analysis, 6 February 2020, via Factiva.

²³ "Zimbabwe's retraction of unused mining concessions unlikely to result in contract cancellations for large operators," IHS Global Insight Daily Analysis, 3 July 2020, via Factiva; "Govt repossesses 16 mining concessions," The New Times, 28 August 2020, via Factiva.

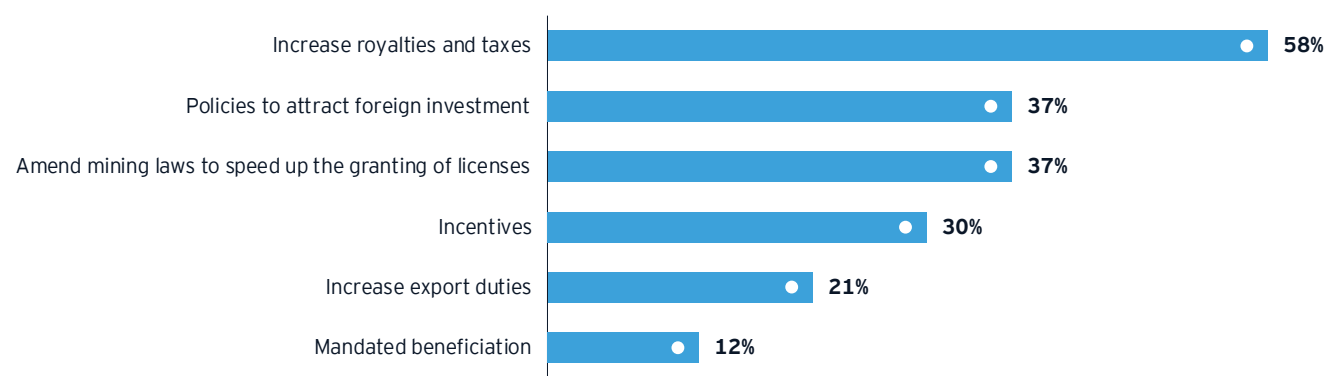
²⁴ "COVID-19 Turns Indonesian Ore Export Ban Into Curse For Nickel Market," S&P Global Market Intelligence website, <https://www.spglobal.com/marketintelligence/en/news-insights/research/covid19-turns-indonesian-ore-export-ban-into-curse-for-nickel-market>, accessed 29 July 2020.

companies reduce staff, either due to job cuts or new ways of doing things. And we may also see governments use other means to boost revenues, such as export duties, tax rates linked to profitability (a resource rent tax) or restrictions on foreign ownership to ensure domestic companies secure more of the value chain (e.g., production-sharing arrangements or export limits). Governments may consider nationalizing or taking part ownership in mining resources to derive more benefit.

However, many of our respondents also believe that moves to increase taxes are likely to be balanced with actions to increase investment, including attracting foreign investment,

speeding up the granting of licenses and increasing incentives. Some countries, such as Zambia,²⁵ have already temporarily suspended export and import duties to lift the pressure on businesses or eased the process of approvals. Another example is that while the Mongolia Government is likely to intensify exploration and research projects of rare minerals and begin extracting existing deposits, it is likely that it will stay heavily involved in the sector to balance investment with stakeholder demands, including “responsible mining.”²⁶ But with mining revenue unable to resolve the pandemic debt burden by itself, it’s important for governments to retain a focus on increasing business investment and employment across the board.

Post-COVID-19, what actions do you expect governments to take?*



*Respondents were allowed to choose more than one option.

Call to action

Mitigating geopolitical risk in a post-pandemic world will require mining and metals companies to take a proactive, diversified approach:

- ▶ **Consider new ways to more proactively engage with governments** to demonstrate the value of mining to the community.
- ▶ **Work together with trade and sector groups** to influence future taxation schemes.
- ▶ **Seek value-recovering trade-offs**, such as improvements in the time frame for project approvals.
- ▶ **Make recommendations to governments** that demonstrate the impact of tax and policy changes on mining and metals companies.
- ▶ **Conduct comprehensive scenario analysis** to preempt or plan for possible changes in geopolitical disruption or regulatory changes.
- ▶ **Ensure there is clear ownership for geopolitical risks within the business.** Thirty percent of those energy and resources companies surveyed in the EY geostrategy survey²⁷ say they currently lack this.
- ▶ **Better understand geopolitical analysis.** Some companies have added a government relationship team to their executive council, appointed a board director with policy expertise or even established a specific committee focused on geopolitical risk.
- ▶ **Consider how to diversify suppliers and customers** to reduce the risk of reliance on a particular country or region. The EY geostrategy survey found that more than one-third of energy and resources executives say supply chains are highly affected by political risk, and the sector is more likely than other sectors to feel the negative impact from protectionist trade measures.

²⁵ “Zambia suspends mineral export and import duties, likely pushing DRC to enact similar mining tax reductions,” *IHS Global Insight Daily Analysis*, 2 April 2020, via Factiva.

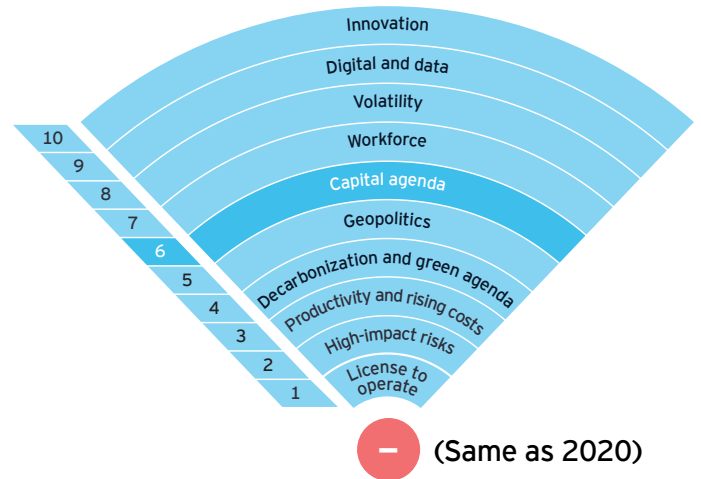
²⁶ “Mongolian ruling party election victory likely to accelerate state participation and regulatory oversight in mining,” *IHS Global Insight Daily Analysis*, 29 June 2020, via Factiva.

²⁷ “Geostrategy in Practice 2020: An EY survey of global executives reveals how to improve political risk management – an urgent imperative amid the COVID-19 crisis,” EY website, https://assets.ey.com/content/dam/ey-sites/ey-com/en_gl/topics/geostrategy/geostrategy-pdf/ey-geostrategy-in-practice-2020-v1.pdf, accessed 12 August 2020.

06

Capital agenda

Strengthening liquidity and maintaining capital discipline



Throughout the pandemic miners have acted fast to optimize liquidity by tightly managing cash, prioritizing the operation of core assets, and reducing or cutting nonessential or noncore capital expenditures. Some also took an initially cautious approach to capital spending, delaying investment decisions, reducing capex guidance and deferring dividend payouts. These actions, combined with several years of focused effort across the sector to strengthen balance sheets by reducing debt and instilling capital discipline, mean that mining and metals companies entered and navigated this crisis from a better position than in previous disruptive events. Those companies that have been able to continue operating will exit the current period of crisis with strength and significant opportunities.

This strength will serve companies well as we endure what it is expected to be a volatile commodity environment over the near term. However, as economic recovery initiatives get underway, and companies are encouraged to spend, this will likely drive an increase in capital investment. While stimulus in China is driving an initial wave of recovery for iron ore, steel and copper, the impact of country-specific stimulus packages on commodity demand has been limited to date. However, the switch to infrastructure spend in more countries will drive growth and increase commodity demand, particularly for iron ore and steel. At the same time, specific programs, such as those for green economic initiatives, will boost demand for copper and lithium.

Strong capital discipline is helping miners weather volatility, but making bolder investment decisions while increasing risk will enable greater returns in the medium and long term. Approaches to achieve this may be radically different

from those deployed in the past. Mining companies will need to evaluate their appetite for risk and approach to capital allocation to ensure they do not miss out on new opportunities.

As they consider how to transform sustainably, and gain real competitive advantage, mining companies should be open to considering all options: buy, build, return or invest.

Buy: rethinking portfolios to maximize returns

In a volatile market, frequent portfolio reviews will become a necessary tool to help companies increase value creation. Value creation can be achieved through enhancing existing businesses or divesting underperforming, nonstrategic businesses, freeing up the capital for new opportunities. As companies reorganize portfolios to maximize returns, they are likely to be driven by the outlook for commodities.

- ▶ **Gold M&A continues** as prices soar. For example, the merger of SSR Mining and Alacer Gold will increase and diversify the new combined company's asset base.²⁸ We also saw AngloGold Ashanti sell its remaining South African asset to Harmony Gold as part of the company's process of streamlining its portfolio.²⁹
- ▶ **Speciality minerals and rare earths will be a focus of governments**, as they seek to secure supplies of strategic rare earth minerals. We are likely to see more M&A or investment activity in this space. For example, Russia is planning to invest around US\$1.5b in rare earth minerals projects.³⁰ In the US, rare earth mining and processing company MP Materials has entered into a merger agreement with Fortress Value Acquisition Corporation to form a company with a combined equity value of about US\$1.5b.³¹

²⁸ "Shareholders Overwhelmingly Approve the Merger of SSR Mining and Alacer Gold," *SSR Mining press release*, <http://ir.ssrmining.com/investors/news/press-release-details/2020/Shareholders-Overwhelmingly-Approve-the-Merger-of-SSR-Mining-and-Alacer-Gold/default.aspx>, accessed 28 July 2020.

²⁹ "AngloGold must keep local listing to sell assets to Harmony Gold," *Mining Weekly website*, www.miningweekly.com/article/anglogold-must-keep-local-listing-to-sell-assets-to-harmony-gold-2020-08-21, accessed 28 August 2020.

³⁰ "Russia has \$1.5 billion plan to dent China's rare earth dominance," *Reuters website*, www.reuters.com/article/russia-rareearths/russia-has-15-billion-plan-to-dent-chinas-rare-earth-dominance-idUSL8N2F73F4, accessed 27 August 2020.

³¹ "MP Materials to list on NYSE through merger with blank check company," *SNL Metals & Mining Daily*, 16 July 2020, via Factiva.

- ▶ **The energy transition will drive investment in critical minerals.** A rising focus on decarbonization and green stimulus funding will drive more investment in the medium term in minerals that are critical to renewable energy, electric vehicles and batteries, including cobalt, lithium, nickel and copper.
- ▶ **Decarbonization will encourage divestment of coal assets.** Companies will also look to divest assets with high carbon footprints, such as thermal coal. However, potential buyers may find it difficult to gain access to capital as investors increasingly evaluate companies on nonfinancial factors, such as ESG, LTO and long-term value. For example, BHP intends to concentrate its coal portfolio on higher-quality coking coals and is considering options to exit BMC, New South Wales Energy Coal and Cerrejón. The company will also seek to divest oil and gas assets that are mature or are likely to realize greater value under different ownership.³²

Regular portfolio reviews will also help companies identify and divest assets that are at risk of disruption. Divestitures not only help companies focus on their growth areas but also provide additional capital to fuel even further expansion to increase shareholder returns and should be an integral part of an active portfolio strategy. Frequent portfolio reviews and strategic divestitures help ensure that companies are executing on their strategies to maximize shareholder returns. This “always-on” strategic mindset reinforces the agility and flexibility that will be key to drive growth through inevitable volatile commodity cycles.

Miners should also seize the opportunity to rethink supply and value chains in the wake of COVID-19. Companies may pursue deals to diversify their sources of raw materials, sell off infrastructure assets or shift to share costs through a collaborative approach of multiuser open access.

Build: pipeline and greenfield projects to accelerate

Beyond COVID-19, we will likely see an acceleration of first pipeline and then greenfield projects. Growth is likely to be driven by incentives provided by some jurisdictions. For example, the Government of Western Australia has announced that it will allocate AU\$8.2m (around US\$5.8m) for resource exploration as part of the state’s COVID-19 recovery plan.³³ Economic stimulus packages at a region or country level may also boost demand.

The impact of COVID-19 on “build” decisions will vary by commodity and region. While some companies are delaying their capital investment, others are progressing high-growth or core projects. For example, Indonesia expects US\$3.7b of investment in smelting projects to be delayed to 2021,³⁴ while Rio Tinto is progressing its Jadar lithium-borate project in Serbia.³⁵

The last few years have seen a number of miners focus on expansion or brownfield projects as these generally involve less capital and less risk. This approach is likely to continue in the current environment. In one example, Vale plans to expand its S11D iron ore mine capacity by 20 million tonnes a year.³⁶

But greenfield projects are expected to increase, particularly in copper and gold. Producers are partnering with junior explorers to gain fast access to growth assets. For example, Kirkland Lake Gold has entered into a joint venture with Newmont Canada to explore and develop opportunities around the company’s Holt Complex and Newmont’s properties in Timmins, Ontario.³⁷ Rio Tinto has also flagged the possibility of focusing more on smaller mine development projects to generate quick cash flows and faster returns to communities, governments and shareholders.³⁸

³² “BHP Results for the Year Ended 30 June 2020, *BHP press release*, www.bhp.com/-/media/documents/media/reports-and-presentations/2020/200818_bhpresultsfortheyearended30june2020.pdf?la=en, accessed 28 August 2020.

³³ “How are governments supporting miners in the post-coronavirus world?” *Mining Technology*, <https://www.mining-technology.com/features/mining-coronavirus-recovery/>, accessed 27 August 2020.

³⁴ “Indonesia expects delay to 2021 for \$3.7 bln smelter investments,” *Reuters website*, www.reuters.com/article/indonesia-metals/indonesia-expects-delay-to-2021-for-37-bl-smelter-investments-idUSL4N2E025U, accessed 31 August 2020.

³⁵ “Rio Tinto progresses the Jadar lithium project to feasibility study stage,” *Rio Tinto press release*, www.riotinto.com/news/releases/2020/Rio-Tinto-progresses-the-Jadar-lithium-project-to-feasibility-study-stage, accessed 15 August 2020.

³⁶ “Vale informs on Serra Sul 120 Project and increase of operational flexibility,” *Vale press release*, www.vale.com/EN/investors/information-market/Press-Releases/ReleaseDocuments/0813_Serra_Sul_120_FR_i.pdf, accessed 18 August 2020.

³⁷ “Kirkland Lake Gold Announces Strategic Alliance With Newmont Canada For Exploration Opportunities Around Holt Complex And Newmont’s Timmins Properties,” *Kirkland Lake Gold press release*, www.klgold.com/news-and-media/press-release-details/2020/Kirkland-Lake-Gold-Announces-Strategic-Alliance-With-Newmont-Canada-For-Exploration-Opportunities-Around-Holt-Complex-And-Newmonts-Timmins-Properties/default.aspx, accessed 21 August 2020.

³⁸ “Rio Tinto eyes M&A opportunities amid COVID-19 uncertainties,” *Australian Mining website*, www.australianmining.com.au/news/rio-tinto-eyes-ma-opportunities-amid-covid-19-uncertainties/, accessed 21 August 2020.



Return: balance dividends with funding growth

Mining companies have focused on shareholder returns for the past two years; however, a balanced approach is important. It's now time to allocate free cash flow to growth, M&A and shareholder returns. Miners need to be more mindful that there isn't necessarily a trade-off between returns and growth: companies can have a sensible and flexible dividend policy and still focus on growth agendas. While the pandemic has caused disruption, stronger balance sheets over the past few years have prompted some miners to retain their dividend policies. BHP announced a final dividend of US\$0.55/share, bringing shareholder returns to US\$6.1b for 2020, driven by robust free cash flow and a strong balance sheet. However, other miners, such as Glencore, determined that no 2020 distribution would be made amid the economic uncertainty resulting from COVID-19.³⁹

Invest: innovative technologies will create a competitive edge

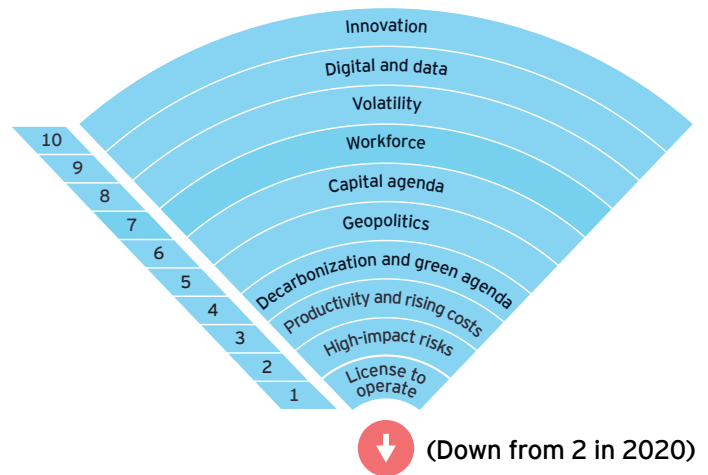
According to the EY *Global Capital Confidence Barometer*, 66% of mining and metals companies were already in the midst of significant business and technology transformation when COVID-19 hit. The impact of the pandemic on the workforce, supply chains and operations has underlined the case for innovative technologies, such as automation and AI. Companies that are more advanced in their digital transformations are faring better during this crisis and will continue to enjoy a significant competitive edge going forward. We expect more miners to accelerate their digital programs and to keep investing in technologies, especially those that focus on improving productivity and worker safety. Companies should invest in technology, data analytical capabilities and operational transformation to increase their competitiveness. Collaboration or investing in mining services companies may be a smart way to fast-track access to advanced technology.

³⁹ "2020 distribution information," *Glencore website*, <https://www.glencore.com/investors/shareholder-centre/distribution-information>, accessed 10 September 2020.

07

Workforce

Accelerating the future of work



With workforce safety the top priority for the mining and metals sector, it was not surprising to see companies act fast during the COVID-19 outbreak to protect workers' health and reduce the risk of site exposure. These actions were highly successful in managing the risk of the pandemic on health and disruption, but they did come at some financial cost. Now companies are recognizing that the accelerating adoption of remote working and virtual teams has the potential to add value beyond the crisis by keeping teams safe, productive and engaged.

Seizing the opportunity for transformation

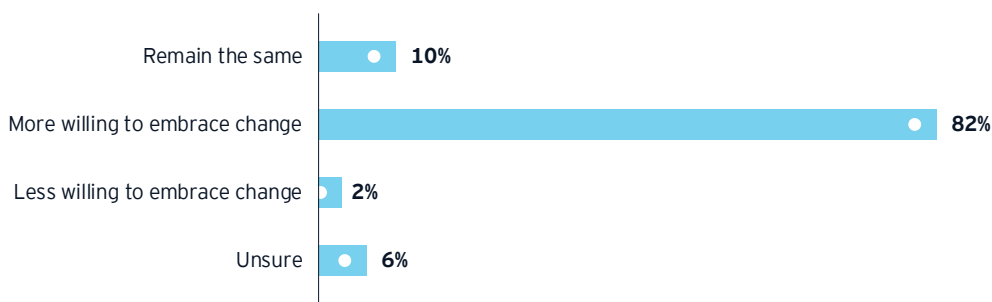
The pandemic has spurred a change in the corporate culture of mining and metals companies, creating a new opportunity for sustainable workforce transformation. Just over 80% of the mining and metals executives we surveyed said that they expect their organizations to become more open to change due to the impact of COVID-19. We have already seen how the need for a fast, cohesive response to the crisis broke down organizational barriers, in particular the silos inherent on mine

sites, with many companies now seizing the opportunity to remove complexity, cut through many of the historical barriers to change and accelerate a transformation agenda that focuses on long-term resilience.

Successful transformation will require miners to first identify the operating model shifts and strategic workforce they want to embed, evolve or eject. Defining and beginning the transformation journey includes three key steps:

- ▶ **Scenario planning** to anticipate and design the new normal. This includes defining a longer-term view of the organization's future of work and identifying what needs to stop, start and continue to achieve this vision.
- ▶ **Designing future operating models and environments** based on paradigms the company wants to break, while focusing on productivity, sustainability and safety.
- ▶ **Maintaining urgency around workforce transition and transformation** and guarding against falling back into pre-pandemic modes of operating.

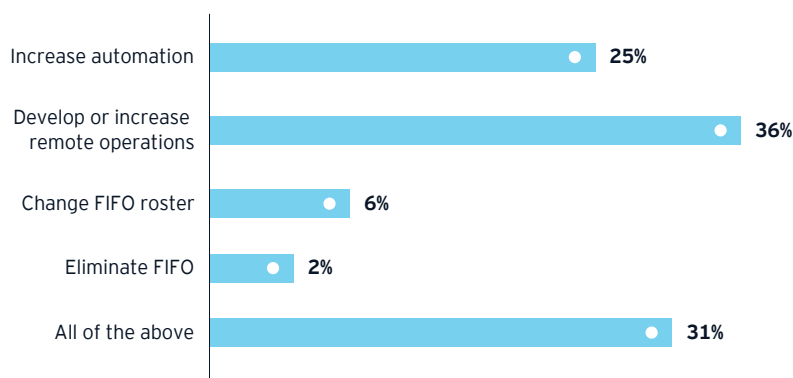
How do you think COVID-19 will impact your corporate culture?



In a recent EY mining and metals sector webinar, we asked more than 950 participants how the pandemic will affect future workforce decisions, with responses suggesting that most will accelerate digital transformation. This makes sense considering

that companies with advanced levels of automation remote or operations centers have fared better during COVID-19 than their competitors.

How will the pandemic affect your decisions on managing the future workforce?



Source: EY M&M webcast, 10 April 2020.

Finding the right skills for a changing market

Changes forced by the pandemic create a real opportunity for miners to transform operating models, including through changing rosters and adjusting the FIFO model. In turn, this transformation will shift the composition of the workforce and change capabilities and roles. Miners will need to rethink workforce planning, as COVID-19 accelerates a trend already in motion. According to an EY study, [The Future of Work: the Changing Skills Landscape for Miners](#), technology will enhance or redesign 77% of the sector's roles by 2030. In a post-pandemic world, the push for technological innovation will only increase demand for digital capabilities, including robotics and data literacy.

For those companies keen to enhance their workforce with these skills, opportunities abound to draw upon newly available talent from disrupted sectors. BHP was a fast mover, hiring 1,500 additional staff early in the pandemic to fill a variety of roles across Australia.⁴⁰ The miner was able to recruit quality staff to bolster the workforce, de-risk teams and strengthen its brand through demonstrating a commitment to the community.

But, while digital capabilities are in the spotlight, the immediate skills crunch may appear in niche areas related to construction and maintenance, particularly when anticipated infrastructure-led investment kicks off. We expect to see a reinterpretation of the future of work that allows miners to access the skills they

need with careful consideration around how to effectively and safely deploy capabilities, while also achieving organizational diversity.

This focus on diversity is increasing in the sector, with accelerated recruitment and upskilling of Indigenous and female workers. Companies can grow and drive a more significant Indigenous localized workforce by providing procurement and business development support to Indigenous-owned businesses. Companies realize that in a rapidly changing and disruptive market, they simply can't afford to ignore the [benefits of greater diversity](#), which is proven to improve problem-solving, innovation and the bottom line.

On-site safety remains a significant concern

The fast response of miners to the health and safety challenges of the pandemic included a laser focus on implementing processes to manage quarantines, prevent widespread transmission and provide access to both high-quality and scaled medical treatment if infection occurred within operations or remote communities. On the whole, these commitments to safety and well-being paid off for miners, with many able to continue operating through the pandemic.

Some companies went further, paying staff with potential health issues to stay home and providing food to Indigenous families so they didn't have to shop in nearby mining towns.

⁴⁰ "BHP to hire 1500 to support operations and the economy," *BHP press release*, www.bhp.com/media-and-insights/news-releases/2020/03/bhp-to-hire-1500-to-support-operations-and-the-economy/, accessed 27 March 2020.



However, keeping workers safe on-site remains a challenge, with the pressures of COVID-19 creating new challenges. Some miners are seeing more on-site incidents, primarily because existing health, safety and environment teams are focused on day-to-day COVID-19 management rather than injury prevention. And the longer roster cycles implemented as part of some miners' COVID-19 response increase the risk of physical fatigue, which needs to be carefully monitored and managed.

Managing psychosocial risk continues to be complex during this pandemic, and the impact of isolation, uncertainty, fear, and occupational violence and aggression poses issues across many industries, including mining and metals. Maintaining and enhancing the mental health and cognitive agility of workers will be critical to organizations' survival.

Call to action

Successful mining companies are proving to be agile in the current environment, focusing on what is critical to their mines, employees and communities now and eliminating the complexity to prepare for future challenges and opportunities. Responding to the immediate impact of the virus while continuing to build longer-term resilience has become critical to the success of mining companies across the globe.

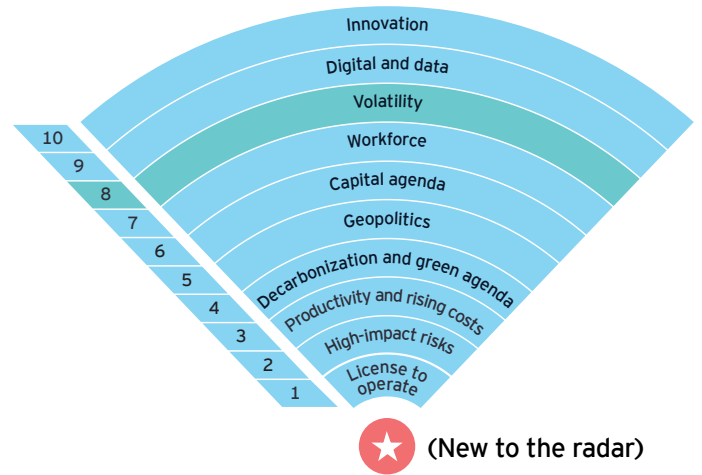
The impact of COVID-19 has created a unique opportunity to rethink the sector's workforce and operating model. Now is the time for miners to consider how to accelerate the transformation begun during this time, rather than attempting to return to business as usual. Key areas to consider should include:

- ▶ Building greater capacity for on-site health and hygiene
- ▶ Accelerating digital transformation, particularly automation and remote and integrated operating centers (IOCs)
- ▶ Building more agility into workforce reviews to balance capability and cost at speed
- ▶ Reviewing whether current capabilities meet changing business needs, recruiting new capabilities where required and extending new ways of working
- ▶ Accelerating diversity to reap the business benefits of a more balanced workforce that better reflects local communities
- ▶ Considering new approaches to workforce flexibility arrangements, rostering and FIFO

08

Volatility

Preparing today for tomorrow's commodity demand



The return of commodity price volatility, the threat of substitution and changing customer demand call on miners to make sustainable, long-term decisions. The impact of COVID-19 has created near-term disruption to supply and uncertainty around demand for many commodities. While China's swift economic rebound has kept up demand for iron ore, and gold and silver retain their status as safe havens, any future disruption could see this change fast.

Of course, the sector is used to managing price volatility. Miners regularly review and adjust business strategy and investment decisions in line with updates to the long-term economic outlook and associated long-range business forecasts (e.g., metal and energy prices, FX rates).

Precious and bulks – commodity price volatility 2000-20 q-o-q % change



Source: Oxford Economics.

Base metals commodity price volatility 2000-20 q-o-q % change



Source: Oxford Economics.

As we head into what is likely to be an unprecedented period of volatility, the ability to change at speed will require a renewed focus on scenario planning, as noted in our commentary around high-impact risks. It will be equally important to keep a keen eye on the changing macro environment and to assess the changing expectations of consumers, governments and regulatory bodies. These factors are likely to impact commodity demand, as seen after recent disruptive events: coal demand fell in the US due to cheap, plentiful natural gas; uranium demand crashed following the Fukushima accident; and, most recently, falling demand and geopolitical tensions saw oil prices crash.

We can already see that several short- and long-term trends are beginning to have an impact on commodity demand – mining companies should be ready to change or optimize their portfolios.

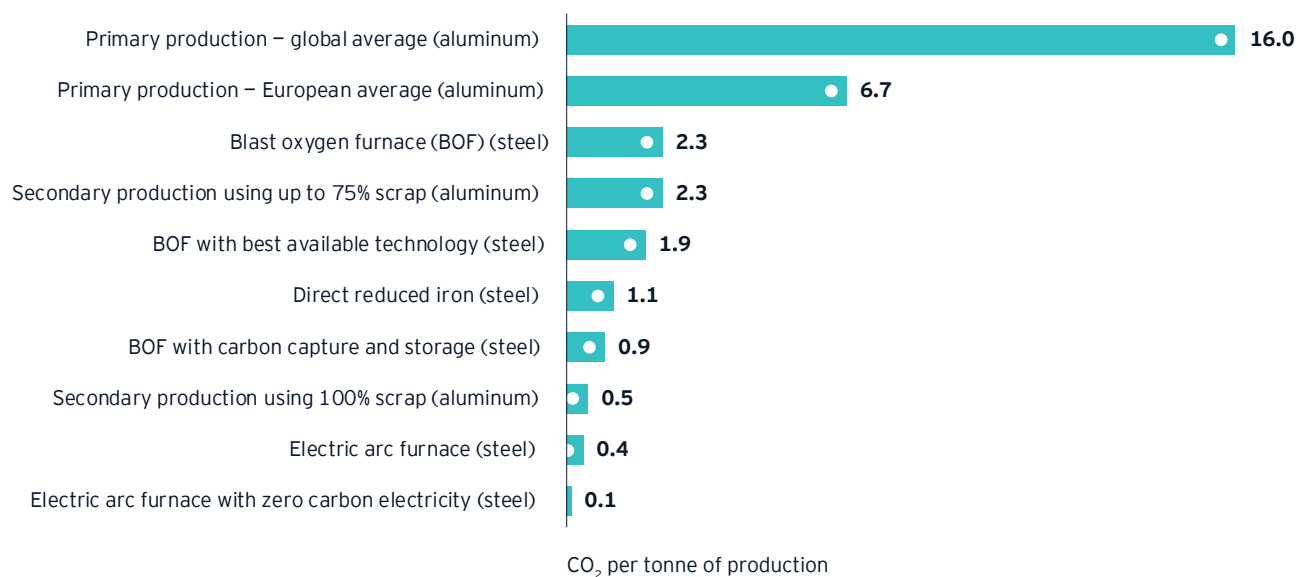
Short-term fallout from COVID-19: The immediate impact of COVID-19 on demand has been severe for companies in certain markets. For example, aluminum demand has fallen sharply due to shutdowns in the airline and automotive sectors. Recovery may be slow for some, particularly for highly leveraged companies, such as base metals suppliers to the aviation industry. Other markets could see a faster recovery as stimulus packages boost spending. For example, an expected influx of infrastructure investment will be a positive boost for iron ore and steel demand.

Long-term impact of changing consumer habits: The EY [Future Consumer Now Index](#), which tracks changing consumer preferences, found that a growing segment of consumers are willing to pay a premium for high-quality, ethically sourced sustainable goods and services and rate transparency of supply chains highly. This will drive a longer-term shift in commodity demand as consumer preferences dictate what is produced and with which materials. For example, customers buying new cars may want to know whether the copper in their vehicle was produced with coal-fired or renewable energy.

Increasing focus on eliminating carbon from the entire value chain: Downstream customers, such as technology and automotive companies, are renewing efforts to reduce their scope 3 emissions. This will put significant pressure on mining and metals producers and may also result in shifting commodity demand. For example, if aluminum producers are unable to innovate production to limit carbon emissions, in the future, automotive producers may opt for advanced high-strength steel made with hydrogen. However, this may be some way off.

Implications of moving to a circular economy: In recent years, the circular economy has gained increasing prominence as a concept among businesses, policymakers and consumers, as the urgency to act against climate change intensifies. The circular economy is an economic system aimed at eliminating

Comparison of CO₂ intensity of steel and aluminum production



Source: "Reaching zero carbon emissions from steel," Energy Transition Commission, https://thecoalhub.com/wp-content/uploads/2018/09/ETC_Consultation_Paper_-_Steel.pdf (2018); "Aluminum – Going green," Morgan Stanley, 14 June 2020, via ThomsonOne; EY analysis.

waste with the continual use of resources. At its heart, it embodies a fundamental shift in how we manage our use of products and materials. Rather than the current take-make-waste model, the aim is to keep resources and their value in the loop and to rethink future business models befitting a more sustainable society.

The rise of the circular economy model poses both risks and opportunities for the mining and metals sector. It is likely to have significant impacts on commodity demand, particularly as decarbonization efforts accelerate. For example, using more scrap in electric arc furnace steel production will lower the outlook for iron ore demand. As aluminum producers seek to reduce their carbon emissions, they will likely focus on increasing their secondary production using 100% post-consumer scrap.

The surge in adoption of electric vehicles (EVs) creates an opening for companies that can extract value through extending the useful life cycle of parts and batteries. In fact, with global EV sales forecast to hit 8.5 million by 2025,⁴¹ the question of how to deal with an increasing stockpile of EV batteries is set to become a very urgent one, from both

a commercial and environmental point of view. Up to 20% of the world's demand for cobalt in 2025 could be met through recycling EV batteries.

Increased demand for lithium, cobalt, copper, nickel and other minerals: While the current supply of these minerals is meeting demand, there are concerns that this may not be the case in the future as the energy transition gathers pace. Significant capital will need to be invested in lithium projects to meet projected demand; however, the current lithium price is not incentivizing this investment. Meeting future levels of demand may also be challenged by the geographical concentration of many of these minerals, which opens up potential for production disruption due to regulatory changes or tariffs. For example, China currently accounts for 50% to 70% of the world's lithium and cobalt refining. China also holds a dominant position along the entire rare earths value chain, processing 85% to 90% of mined rare earths.⁴²

These factors are driving governments to focus on securing supply of these strategic minerals. As discussed in our section on geopolitics, we expect to see a push to develop domestic capacities and localize supply chains, as well as efforts to

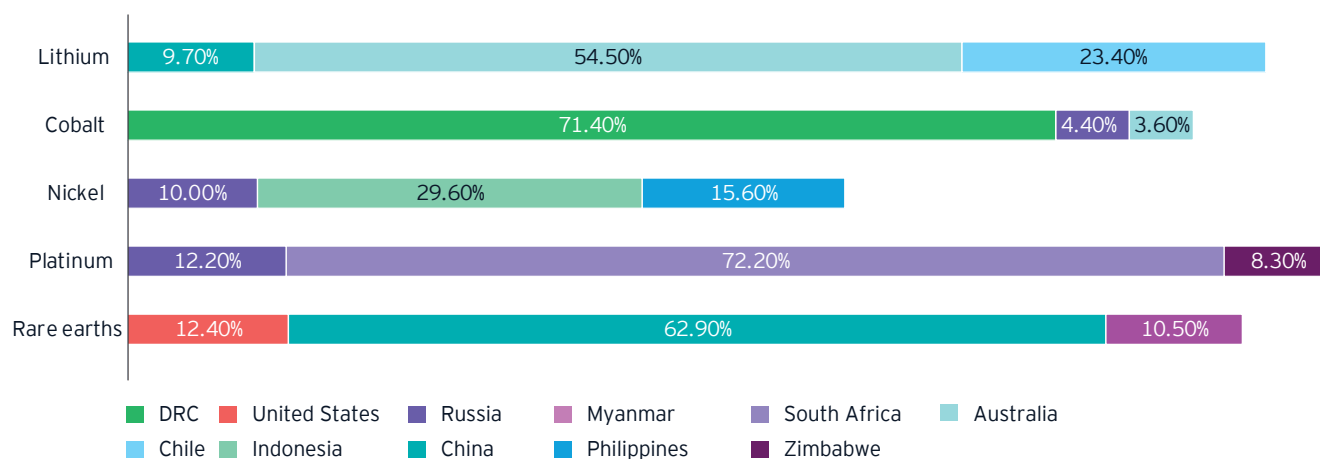
⁴¹"Electric vehicle outlook 2020," BloombergNEF website, <https://about.bnef.com/electric-vehicle-outlook/>, accessed 23 September 2020.

⁴²"Clean energy progress after the Covid-19 crisis will need reliable supplies of critical minerals," IEA website, www.iea.org/articles/clean-energy-progress-after-the-covid-19-crisis-will-need-reliable-supplies-of-critical-minerals, accessed 7 August 2020.

diversify supply by setting up processing facilities outside of China. For example, there are significant discussions in Australia about investing in battery processing facilities, and the US Government is investing in rare earths to ensure

supply.⁴³ This return to taking a nationalist view of minerals also raises the possibility of damaging long-term value in what is essentially a global business.

Top three countries in total production for selected minerals required in the energy transition, 2019



Source: IEA.

Call to action

Preparing today for the myriad forces reshaping commodity demand tomorrow will require miners to consider a range of actions:

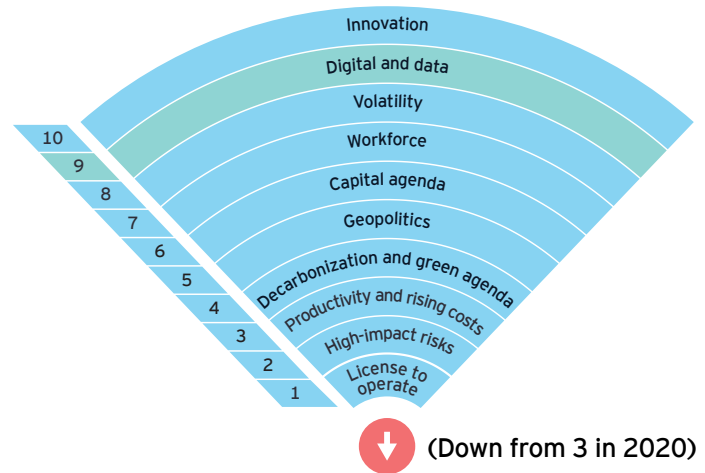
- ▶ **Conduct scenario planning.** Miners must focus on being agile and prepared for future changes in demand. Scenario planning provides a solid foundation to underpin medium- and long-term business plans objectively and to map out and prepare for possible alternative futures.
- ▶ **Review and optimize portfolios.** Miners need to understand the interaction among various parts of their portfolios to enable decisions on investment, divestment and rationalization to enhance the value of the entire portfolio. Decisions regarding where to invest and allocate capital will need to be taken long in advance.
- ▶ **Ensure transparent supply chains.** This is important from an ethical standpoint but also to ensure good visibility of customer demand for products across the value chain. More transparency may also provide the ability to capitalize on new opportunities (e.g., increasing recycling).
- ▶ **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.

⁴³"Lynas gets a boost from US Defence contract," *The Sydney Morning Herald website*, www.smh.com.au/business/companies/lynas-gets-a-boost-from-us-defence-contract-20200423-p54mle.html, accessed 18 August 2020.

09

Digital and data

Making data actionable and deriving value from it



In last year's report, digital transformation and identifying relevant and actionable data ranked third on our list of risks, its third time in the top three. This year, it has slipped to ninth place. We believe that this is not because it is viewed as a less important risk – or opportunity – but rather that many of the issues surrounding digital have become “business as usual” for the larger miners. Many are in the second or third year of their digital road map journey and, as their digital transformation becomes more complex, its value to the organization is clearer. Increasing investment in digital readiness, including through merging information and operational data layers (IT/OT convergence), is also helping leaders feel more confident in their ability to use digital and data to ensure operational agility.

Data remains a challenge that will only intensify

Still, the ability to manage and maximize data remains a challenge that is set to increase. Recent trends suggest that the amount of data created within the next three years will be greater than that created over the past 30 years. Productivity and embedded data is increasing the fastest, with a forecast of a 40.3% compound annual growth rate from 2019 through 2024.⁴⁴

But are companies making the most of this data? Recent IDC research found that while 67% of enterprises prioritize the creation of a data management capability to derive insights from internal data, 45% of organizations still had a low level of maturity for data excellence. Only 19% of organizations had reached the highest level. With digital effectiveness critical

to sustainable productivity and margin improvements, those organizations that can achieve this economy of intelligence will have a competitive advantage – just as those that had achieved economies of scale once had an enduring advantage over competitors.⁴⁵

As discussed in [an article by EY Global Mining & Metals Leader Paul Mitchell](#), process mining can help miners understand which data is important and how to extract value from it. And, during the COVID-19 pandemic, we have seen that those mining companies that focused on their data sets kept productivity outcomes stable or even improved them. This highlights the fact that there is sufficient value in existing information – if companies know where to find it. When disruptions occur, a good process mining toolkit can inform better decisions around how to respond and help strengthen areas of vulnerability for future resilience.

COVID-19 has highlighted both the benefits and risks of automation

The pandemic has forced even some of mining's late digital adopters to move to digitally enabled remote working, with many rolling out new technologies extremely quickly. Many also took the opportunity to rethink operating models and management systems, using technology and data to improve scenario planning and rapidly model new operating scenarios (e.g., change in plans due to disruption, shutdown planning). Unfortunately for many miners, the crisis also exposed serious gaps in their data sets that prevented them from making the most of data to mitigate the risks posed by the pandemic.

⁴⁴ “IDC's Global DataSphere Forecast Shows Continued Steady Growth in the Creation and Consumption of Data,” *IDC website*, <https://www.idc.com/getdoc.jsp?containerId=prUS46286020>, accessed 29 July 2020.

⁴⁵ “IDC FutureScape: Worldwide Data, Integration, and Analytics 2020 Predictions,” *IDC website*, <https://www.idc.com/getdoc.jsp?containerId=US44802519>, accessed 29 July 2020.

As supply chains were disrupted, there was a critical need for better visibility into the scale and frequency of disruption – reliable and timely data provided a competitive advantage. More digitally advanced miners used a digital twin to assist with this. A digital twin is a carbon copy of mining operations that simulates the behavior of business processes or equipment, enabling management to identify constraints, optimize operations and predict failures. Clearer visibility of supply chain pain points makes it easier to minimize vulnerabilities and to see the different ways in which knock-on effects might manifest themselves before they happen, all helping to improve operational excellence.

While automation and remote integrated operations have delivered significant benefits during the COVID-19 pandemic, we are concerned that some miners are overlooking the potential for increased cyber risk. The rise in remote working and “bring your own device” policies have increased the volume of phishing campaigns and the overall cyber risk profile for mining companies, but this was not reflected in our survey: only 15% of respondents cited it as a top three risk.

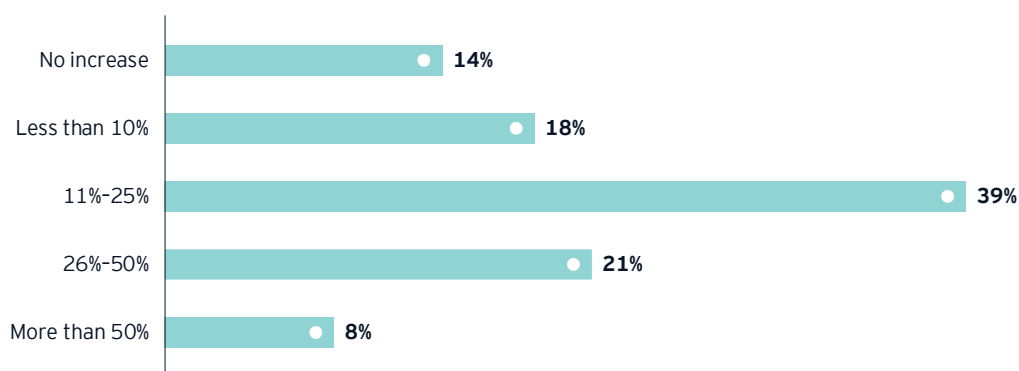
Digital transformation is set to accelerate, with a focus on safety and productivity

Our survey respondents suggest that digital transformation is an area of significant investment, with 21% saying that investment will increase between 26% and 50%. In the short term, the key focus will be those digital programs that improve safety or productivity or both, including:

- ▶ **Remote operations centers (ROCs)**, which can significantly improve mine safety. A recent World Economic Report⁴⁶ estimated that ROCs could save approximately 250 lives and avoid more than 12,000 injuries between 2016 and 2025.
- ▶ **Data and analytics**, which can drive huge productivity gains. For example, Rio Tinto’s Project Tempo,⁴⁷ developed in collaboration with EY, aims to maximize the reliability of its railway by pinpointing problems on rail tracks before they arise through the use of AI.

In the longer term, we expect that digital investment will focus more on delivering environmental benefits, such as reducing energy and water use, removing waste and decarbonizing operations.

Post-COVID-19, by how much do you plan to increase your investment in digital transformation?



⁴⁶ “Digital Transformation Initiative: Mining and Metals Industry,” World Economic Forum, January 2017, www.Reports.weforum.org/digital-transformation/wp-content/blogs.dir/94/mp/files/pages/files/wef-dti-mining-and-metals-white-paper.pdf, accessed 28 July 2020.

⁴⁷ “Rio Tinto’s Project Tempo maximises railway reliability,” *Mining Magazine website*, www.miningmagazine.com/transport/news/1376871/rio-tinto-s-project-tempo-maximises-railway-reliability, accessed 28 July 2020.



Call to action

COVID-19's impact has highlighted the benefits of various technologies, such as automation, AI and blockchain, to help ensure business continuity. Businesses that had already invested in advancing their digital journey are reaping the benefits now and will continue to have a competitive edge beyond the pandemic. We are at an important crossroads, where the willingness to change in the organization is at an all-time high and the silos that often slowed digital adoption have been removed, presenting an opportune time to capitalize on the current digital skills market, which is not as tight as previously anticipated.

For companies considering where to place their bets in digital transformation, these areas may offer the biggest benefits:

- ▶ **ROCs** enable companies to isolate and protect critical employees more quickly – remote and end-to-end integration is key.
- ▶ **The use of blockchain** across the broad value chain, including customers and suppliers, provides continuity and surety of the supply chain.
- ▶ **Cloud-based networked ecosystems and 3D and additive printing on-site** can bolster supply chain resilience. Providing visibility into second- and third-party supplier alerts notifies miners of vendor disruption, as well as improving knowledge of customers (in demand-driven supply chains), helping to ensure greater supply chain intelligence.
- ▶ **Process mining and digital twin** technologies should be in the toolkit of every mining company seeking to better understand and gain value from their data.
- ▶ **Economies of intelligence** can be achieved through maturing capabilities to collate and extract value from data. Continued focus on finding insights across the entire value chain can help ensure that the right

decisions are made about the workforce, operations and supply chains.

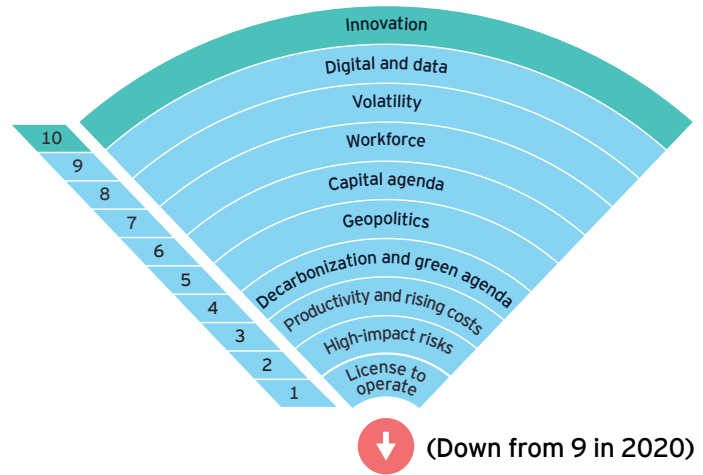
- ▶ **Flexible architectures** allow miners to scale, alter or consolidate the systems landscape to adapt to changing business demand, prevent lock-in to rigid solutions and drive cost efficiencies over the next three to five years.

As miners consider next steps, the key is to select the right technology and to make the best use of available data. We recommend reassessing the digital strategy to confirm that digital programs are mapped against the most critical areas of the mining value chain to effectively prioritize solutions and align for the maximum release of value over time. Our **wave approach** may help guide this thinking. It is important to avoid knee-jerk measures – changes should be sustainable and add, rather than erode, value. Resist the urge to connect every piece of equipment, as this will only add to the complexity of data management. During these times, it's critical to review cyber controls and accelerated cyber programs, particularly if the company is looking at IT/OT integration where the attack surface is increased exponentially.

10

Innovation

Bringing a step change to the mining sector

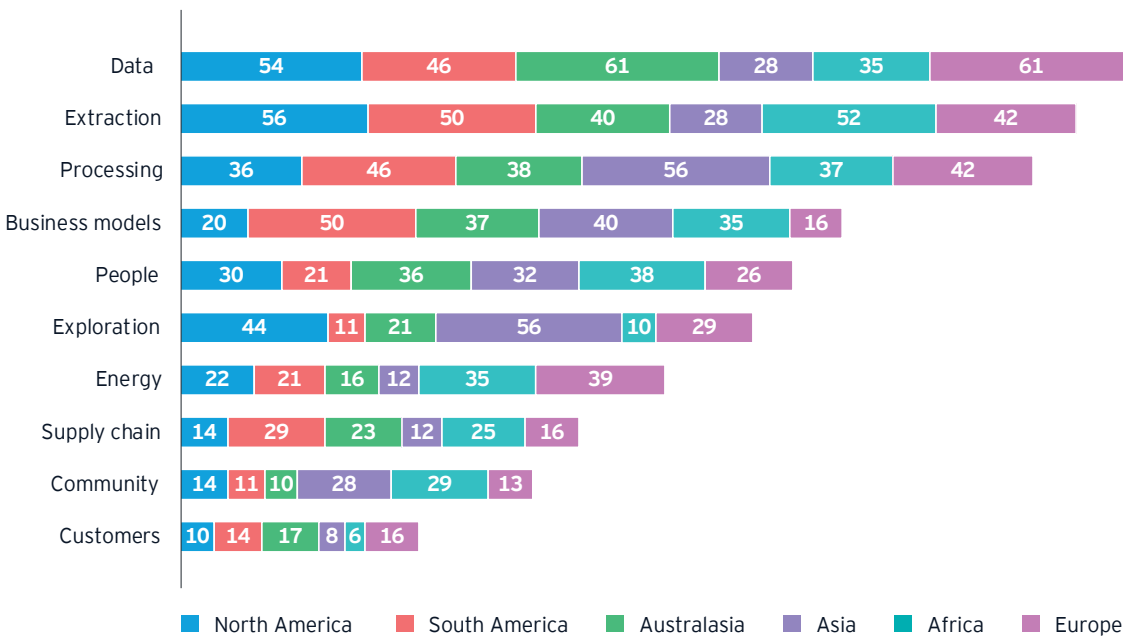


Within the mining and metals sector, innovation has long helped companies drive down costs; improve the economics of resources in the face of key structural challenges, including declining ore grades and remote locations; and enhance the efficiency of processing and ore sorting. In recent years, we have also seen many companies apply innovative

new approaches to health and safety issues, sourcing and managing the cost of energy, particularly in remote areas, and building stronger engagement with local communities. However, while we see many areas of innovation within the sector, these are often isolated or implemented in silos, limiting their potential to make a real impact on miners.

Where in the value chain are your innovation efforts primarily focused today?

By % of respondents given three options



Source: VCI State of Play Ecosystems Report, 2019.



Interview

Steve McIntosh

Group Executive,
Growth & Innovation at Rio Tinto

After more than 30 years at Rio Tinto, Steve McIntosh is retiring from his role leading, among other things, the mining giant's innovation arm. We asked Steve to reflect on the key factors to drive successful innovation within a mining business.

What do you need to make innovation stick?

Innovation must be connected to strategy to win support. And, since innovation programs have to be executed by the business, it's important the business has the bandwidth to do this. Innovation that is seen to help the assets – rather than something imposed upon them – is more likely to stick.

What are the innovation gaps in mining?

The sector has been doing some great things, but real disruption is not yet being seen. Most companies say that they are focused on the whole value chain but then tend to break it down into its various components or siloed parts. It results in what I call a "highly optimized, suboptimal system." Instead, miners need to rethink the organizational system and implement real design thinking to get a true end-to-end approach to digital and to innovation.

How have you collaborated with other mining companies and original equipment manufacturers (OEMs)?

Mining and metals companies are genetically fierce competitors – we don't have the coalitions

seen in say, the oil and gas industry, to manage sovereign risk. There has been a significant amount of innovation emerging from the OEMs and from the METs sector, but unless we get industry standards and interoperability right, then this engagement may get even harder. Change is coming, but it takes time.

What will change post-COVID-19?

Expect huge changes across the sector – this pandemic has exposed flaws in operating models, but it has also seen the acceleration of the pivot to digital. Companies are finally understanding the role of platforms across their IT and enterprise systems to best support their assets.

Final thoughts

Common practice is seldom best practice. The gun has fired and the data race is on! We now have the tools to profoundly challenge how we operate our assets. We can deliver ever better safety and operational performance outcomes.

Opportunities to accelerate and scale innovation

Opportunities abound for miners to broaden the scope and increase the effectiveness of their innovation agendas, particularly after the sector's rapid pivot in response to COVID-19. The pandemic has provided some valuable lessons on how to take a resource-to-market approach to innovation. We have seen increased innovation and more solutions implemented across the value chain to deal with the impacts of COVID-19, with many innovation projects fast-tracked into reality. The most successful of these share the following characteristics:

- ▶ **An end-to-end approach.** The gap in many innovation agendas is that opportunities to alter the architecture of business models, commercial arrangements or, indeed (in a mining context), process flow sheets are given less prominence than the siloed application of specific technologies. But understanding the true value of a process innovation opportunity is difficult without a "whole-of-mine" business case analysis. For example, ore sorting might reduce energy costs in crushing and grinding but result in lower metal recovery and reduced profit. Similarly, water-saving technologies, such as filter presses and cyclones, might seem expensive until the cost savings in the tailings dam are calculated. Ideally, innovation approaches need to be end to end, across the entire value chain, not just point solutions. This will require a different approach to building business cases for innovation, moving away from a point solution organizational design or incentives to a whole-of-business perspective.
- ▶ **Collaboration with customers.** Consumers increasingly prefer sustainable supply chain practices and, in the future, may be willing to pay a premium for commodities that demonstrate their origin or are less polluting (i.e., of a higher grade). As some customers, including technology and automotive manufacturers, increase their focus on carbon-neutral supply chains, miners will be expected to collaborate on new solutions to reduce emissions.
- ▶ **An innovation culture:** In many companies, institutional barriers prevent the rapid creation and adaption of innovations. And while research disagrees on the best way to create and apply innovation, COVID-19 is providing a natural experiment to see the impact of changes to institutional and decision-making structures. Organizations may discover that these changes allowed innovative ideas to surface and be adopted rapidly. Some may find that the pandemic has even created an environment that now encourages "innovation about innovation."

Implementation of these structural changes will require top-down buy-in, alignment to the company's overall purpose and a supportive innovation culture. Too often, innovation implementation fails due to a lack of ownership (either business or individual) or an inaccurate assessment of the risks inherent in the process. Diversity of people, experiences and thought will also be vital in determining that innovation programs or exercises do not create innovations that are a function of the organization's existing culture.

- ▶ **Balanced expectations around return on investment.** Many organizations view the innovation investment payback as short term, especially with the pressure on shareholder value. Our view is that investment in innovation needs to be considered with a mix of short- and long-term returns in mind.
- ▶ **Increased sector collaboration beyond COVID-19.** The sector response to COVID-19 is acting as a catalyst for greater collaboration across mining and metals companies and creating conditions for applying more creative, agile solutions to issues. For example:
 - ▶ BHP adopted wearable mixed reality devices to enable teams based in Perth, Australia, to assist auto electricians and mechanical fitters on-site 1,300 kilometers away.⁴⁸
 - ▶ The Minerals Council of Australia fostered sector-wide collaboration to tackle the crisis, worked to ensure mining and metals was declared an essential service and led initiatives to protect Indigenous communities from the virus. This cooperation created an innovation pathway that allowed a cohesive approach to health and safety during the pandemic.⁴⁹
 - ▶ Other sector networks have also banded together to share ideas and resources and hold virtual conferences and seminars.

Now, the sector faces a huge opportunity to make the most of the collaborative innovation progressed during the pandemic. Expanding this collaboration, including into the co-evolution of new products or technologies, development of shared incentives and rewards from the application of innovations beyond more sales of devices, and consequent fundamental changes in business systems or practices, can yield significant short- and long-term value for individual companies, the entire sector and communities.

⁴⁸ Isolation and distance drives innovation," *BHP press release*, <https://www.bhp.com/community/community-news/2020/07/isolation-and-distance-drives-innovation/>, accessed 23 July 2020.

⁴⁹ "Keeping remote Indigenous communities safe," *Minerals Council of Australia website*, <https://minerals.org.au/sites/default/files/Keeping%20Remote%20Communities%20Safe%20Update%205%20-%2027%20May%202020.pdf>, accessed 28 August 2020; "A vision for the nation that we can all embrace," *The Australian*, 6 August 2020, via Factiva.

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 license to operate. 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.

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