



# 2023 Global Mining and Metals Outlook

Executive insights  
on decarbonization

KPMG International

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# Foreword



“Our 2023 Outlook report shows metals and mining company executives understand that to succeed in reconciling ambitious growth targets with stringent carbon-reduction objectives, they will have to design their operating model to accommodate both objectives.”

**Trevor Hart**  
Global Head of Mining  
KPMG International



“The drive to decarbonize is redrawing the map of the metals and mining industry. Metals manufacturers need to shift their business models toward a new, global environment that reflects the true cost of carbon reduction.”

**Ugo Platania**  
Global Head of Metals  
KPMG International

**The mining and metals industry has played a pivotal role through history, speeding the transition from Bronze Age to Iron Age and through the Industrial Revolution. Now it must play a similarly crucial role in a global revolution no less momentous than the others before it. If we are to stand a reasonable chance of slowing, and ultimately reversing, climate change, the world economy must become carbon-free.**

For the mining and metals industry, the challenge is unique. It must quickly increase production to supply global business with the materials it needs to shift to a carbon-free future. Yet it must do so without harming the environment, while restructuring its own operations so that they consume less carbon.

This transformation will depend partly on the mining and metals executives we contacted to compile this report and on the readers of it – plus thousands of others like them. As leaders of their companies, their responsibility is to guide the industry onto a more sustainable path and to convince a skeptical audience that they are doing so in a sustainable fashion. As one industry leader explains in this report, there has never been greater demand for metals and minerals, but it’s never been harder

to develop new mines. The same challenge can be said for makers of steel and other materials that need to invest rapidly in new processes that will cut carbon emissions.

KPMG International compiled this report to provide insights on these challenges and the opportunities it presents.


We would like to extend special thanks to our external contributors of the report, Tom O’Leary, Managing Director and Chief Executive Officer of Iluka Resources, Dale Henderson, Chief Executive Officer of Pilbara Minerals and Rohitesh Dhawan, President and Chief Executive Officer of the International Council on Mining & Metals. Their expertise was able to provide additional color and depth to the findings of this report.


# Executive summary

The mining and metals industry will play a crucial role in enabling the global economy to shift to a carbon-free future. To find out more about its plans to supply the world with “green” materials, KPMG International surveyed more than 400 C-suite executives and board members from across the globe about their expectations. Among the main findings:


 The mining and metals industry appears confident that it can meet the tremendous increases in the demand for minerals that will enable clean-energy technologies. **Optimists outnumber pessimists by 12 to 1, but by 6 to 1 among producers of materials critical to a net-zero future, such as lithium and copper.**

 Mining and metals executives are confident the industry can increase production without compromising its own objectives for a net-zero future and respond to environmental, social and governance (ESG) concerns. **The ratio of optimists to pessimists is nearly 10 to one.**

 If the industry is to achieve its net-zero and ESG objectives, it must integrate them into enterprise strategy. **But only 28 percent have already done so, and 34 percent say their company has only just begun this.**

 **One reason why executives are confident about the future is that they regard decarbonization plans as a growth opportunity and not merely a cost of doing business.**


The specific opportunity over the next five years is to transform the carbon footprint of their operations through technology investments.


 The rapid progress mining companies are already making to reduce carbon emissions is encouraging them to invest more in efforts to decarbonize. **The survey shows that improving energy consumption efficiency is the highest priority for tackling the environmental challenges from mining and metals processing.**

**While mining and metals companies invest heavily in reducing their carbon footprint, they are also focusing on ESG goals.** Executives consider that the highest priority for tackling the social impact of mining and metals processing is to provide its workforce with healthcare, paid leave and retirement benefits.

 Leaders in the industry are aware that they must play a crucial role in this carbon transformation. **The survey shows that the most effective measure to help companies meet their ESG objectives is to ensure that the CEO and the Board of Directors are committed to these goals.**

**A main driver of the changes that characterize this new phase of the mining and metals industry has been the introduction of new technologies and innovations.** Technological changes are seen as the most important factor affecting executives' five-year demand projections.

 Tougher government scrutiny of ESG and net-zero performance is regarded by executives as the biggest risk to operations in the next five years - almost 50 percent say so. **By contrast, around 25 percent say climate risk to operations is very significant.**

 The drive to decarbonize is redrawing the map of the mining and metals industry. Almost a quarter are planning to increase their geographical footprint significantly **and a further 41 percent plan to do so by a small amount.**



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# Entering a new phase



# Entering a new phase

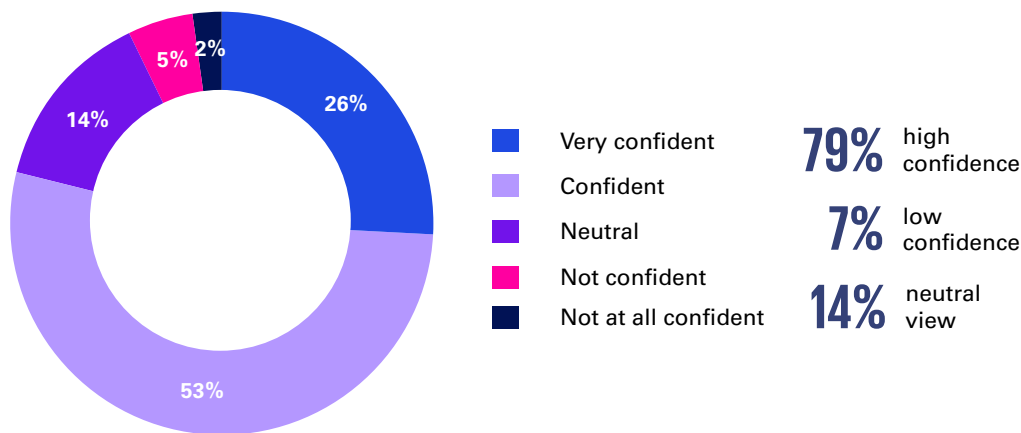
As the global economy pivots toward a carbon-free future, one big question is whether mining and metals companies will be able to supply the growing quantities of materials needed for such things as wind turbines, solar panels and electric vehicles to support the transition to a net-zero world. As the International Energy Agency notes<sup>1</sup>, mineral requirements for clean energy technologies would need to quadruple by 2040 to reach the Paris Agreement goal of a temperature rise of well below 2 degrees centigrade. “An even faster transition, to hit net-zero globally

by 2050, would require six times more mineral inputs in 2040 than today,” says the IEA.

While many anxiously wait for the answer to this question, the mining and metals industry appears confident that it will be able to meet these demand projections, according to a global survey by KPMG International of more than 400 C-level executives selected to represent a range of mining and metal production activities, ranging from steel to coal to lithium. Optimists outnumber pessimists by nearly 12 to 1, but by 6 to 1 among producers of

materials critical to a net-zero future, such as lithium and copper. To find out why executives overall are optimistic and how they believe they can achieve these goals, KPMG International undertook a detailed analysis of the survey data and interviewed two chief executive officers of key companies producing critical minerals. We also relied upon the insights of several subject matter experts with deep experience within the industry.

## Demand for materials used in the transition to a greener planet will have to rise dramatically over the next 10-20 years. Overall, how confident are you that the metals and mining industry can meet the increasing demand?



Source: KPMG International 2023 Global Mining & Metals Outlook - Survey Results

KPMG International spoke to Rohitash Dhawan, President and Chief Executive Officer of the International Council on Mining & Metals (ICMM), whose members comprise a third of the global industry. From his position as spokesperson for the global industry’s role in a range of issues, Dhawan understands its crucial role at this point in history.

“We’re entering a new phase that we’ve never had before. The world is now fully invested in our industry in a way it was not previously. This means that the things that got us here aren’t the things that will take us to the next phase in our relationship with society. It requires us to engage differently,” he says.

<sup>1</sup> The role of critical minerals in clean energy transitions, IEA, May 2021



# In search of green strategies



# In search of green strategies

The mining and metals industry as a whole, especially with regards to critical minerals, is entering uncharted waters. One executive who relishes the prospect is Western Australia-based Dale Henderson, the CEO of Pilbara Minerals, the largest independent hard-rock lithium operation in the world. His company’s product is a crucial ingredient in electric vehicle batteries.

“Given that it’s a relatively new industry, there’s no playbook to follow,” says Henderson. “But by thinking deeply and carefully around this landscape, there’s a big opportunity to get it right. That’s certainly where I am spending my time. It’s been a crazy journey for our business, but it’s exciting.”

Equally confident is Tom O’Leary, Managing Director and Chief Executive Officer of Iluka Resources.

By 2027 his company is positioned to produce the “overwhelming majority” of heavy rare earths globally, outside of China, in particular dysprosium and terbium, which are used in electric vehicles and in the defense industry.

“The expectation is widely acknowledged in the industry that there is a going to be a shortfall in global supply into the early 2030s, though, and we’ll be looking to meet some of that shortfall,” O’Leary says.

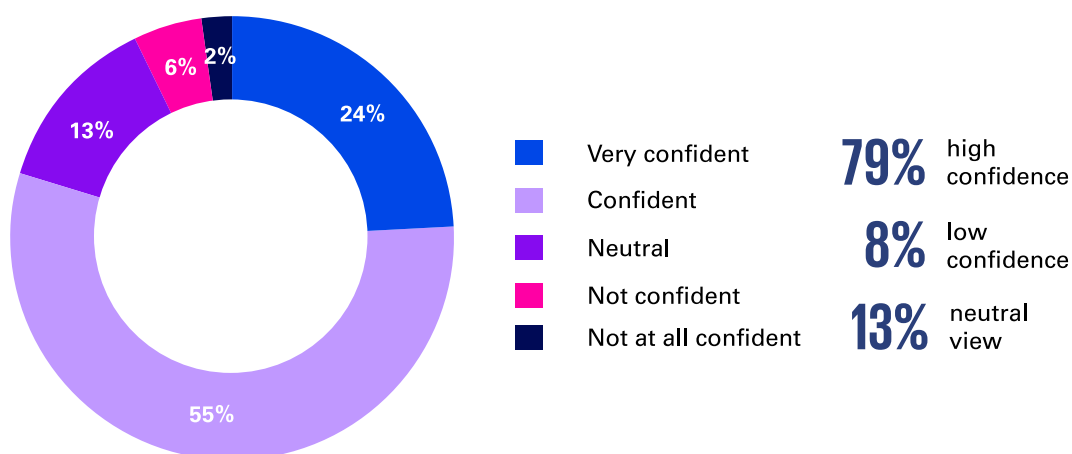
Behind the optimism in the industry, however, are two other, related questions.

- Can the mining and metals industry increase production without compromising its own objectives for a net-zero future and respond to ESG concerns?
- How does the industry integrate these objectives into enterprise strategy?

These matters, which were assessed in the survey, will be examined in more detail in this report, but it should be noted at the start that parts of the industry are somewhat less confident regarding these two questions.

On the first question, the mining and metals industry as a whole is confident it can reconcile rapid output growth with sustainability goals. The ratio of optimists to pessimists is 10 to 1. But there is a lower ratio among producers of materials critical to a net-zero future. These include suppliers of chromium, cobalt, copper, lithium, manganese, nickel, silicon and rare earths.

## How confident are you that the metals and mining industry can meet growing global demand without compromising its own ESG and net-zero objectives?



Source: KPMG International 2023 Global Mining & Metals Outlook - Survey Results



A majority of them are also confident of growing fast in a ‘green’ way, but the ratio is narrower: 6 to 1.

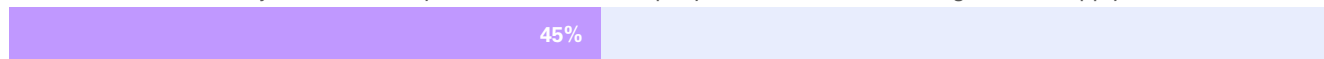
On the second question, 34 percent say their company has only just begun to integrate its ESG and net-zero objectives into a long-term strategy. Only 28 percent have already done so.

“If they are to succeed in reconciling ambitious growth targets with stringent carbon reduction objectives, mining and metals companies will have to design their operating model

to accommodate both objectives. Achieving net-zero carbon emissions by 2040 or 2050 may seem a long way off, but the research and development effort, the lead times and capital required means that companies must now begin integrating them into enterprise strategy,” says Trevor Hart, Global Mining Leader, KPMG International.

### What are the key factors affecting your level of confidence that the metals and mining industry can meet growing global demand without compromising its own ESG and net-zero objectives?

Our ESG and net-zero objectives take fully into account our company’s forecasts of the future growth in supply



My company has deliberately set ESG and net-zero objectives that are less stringent than our peers so that we won’t have to compromise on hitting production targets



My company has only just begun to integrate its ESG and net-zero objectives into the long-term enterprise strategy



My company has integrated its ESG and net-zero objectives into long-term enterprise strategy



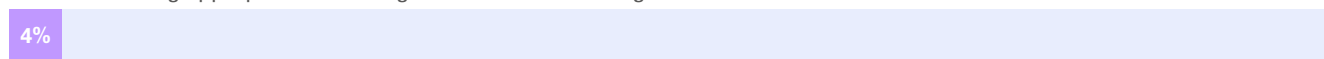
It is difficult to measure the progress my company is making towards ESG and net-zero targets



My company lacks the labor and money to implement ESG and net-zero goals



We are not using appropriate technological tools to reach our goals



Source: KPMG International 2023 Global Mining & Metals Outlook - Survey Results

# A big opportunity



# A big opportunity

An overwhelming majority of executives are confident in the growth prospects for their company and the industry as a whole, according to the survey.

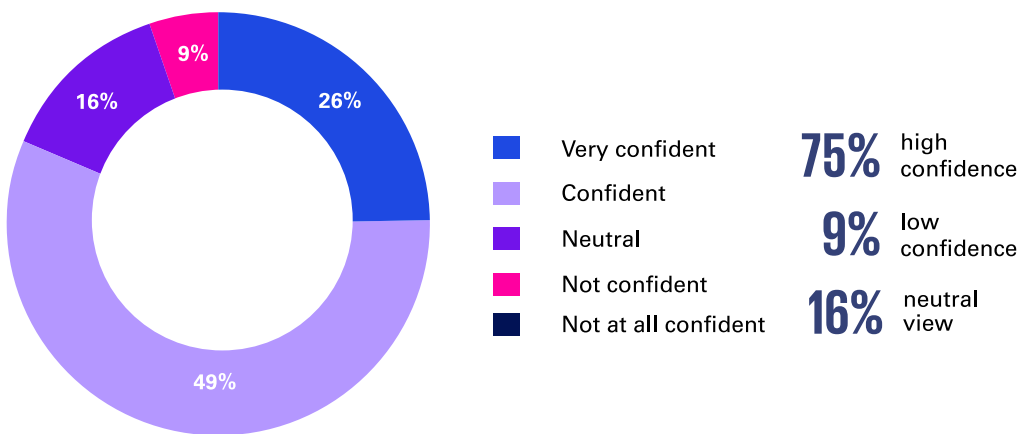
Producers of critical minerals are in a particularly sweet spot. “With the market predicting a significant deficit in lithium supply relative to demand over the next 10 years, this presents a challenge for the world, but a massive opportunity for us,” says Pilbara Minerals’ Dale Henderson. “We have a strong level of confidence that, through our strategy, we can

deliver into that, so, for us, the game plan is pretty simple: Put the foot down and maximize the value of the resources as rapidly as we can,” adds Henderson. One reason why mining and metals executives are confident about the future is that they regard decarbonization plans as a growth opportunity, and not merely a cost of doing business. The specific opportunity

over the next five years is to transform the carbon footprint of their operations through technology investments.

Transforming the cost-efficiency of operations through technology investments comes a close second (43 percent to 41 percent). More than a third plan to transform their operations by means of acquisitions and divestments.

**Please indicate your level of confidence in terms of growth prospects over the next two years.**



Source: KPMG International 2023 Global Mining & Metals Outlook - Survey Results

## What do you regard as your company's biggest business opportunities over the next five years?

Transform the carbon footprint of our operations through technology investments



Transform the cost-efficiency of our operations through technology investments



Transform our operations by means of acquisitions and divestments



Access new customers and markets



Significantly change the geographical location of our operating assets



Drastically reduce our costs through enhancing productivity initiatives



Significantly change our company's portfolio of products toward commodities & metals (such as copper and lithium) used to accelerate the transition to cleaner energy sources



Source: KPMG International 2023 Global Mining & Metals Outlook - Survey Results

"Fundamentally, reconciling green goals and fast growth is not a trade-off, it's a win-win situation," says Amit Bhargava, Partner, Business Consulting, Mining and Metals Lead, KPMG in India.

"If a company optimizes its processes, it can reduce fossil fuels and it's a clear ESG driver. Critical strategic decisions

such as capital expansion or operational remodeling have to have an ESG dimension.

We see that, in terms of positioning in the sector, companies that are ESG leaders will be the winners in the future."



# Freedom from carbon



# Freedom from carbon

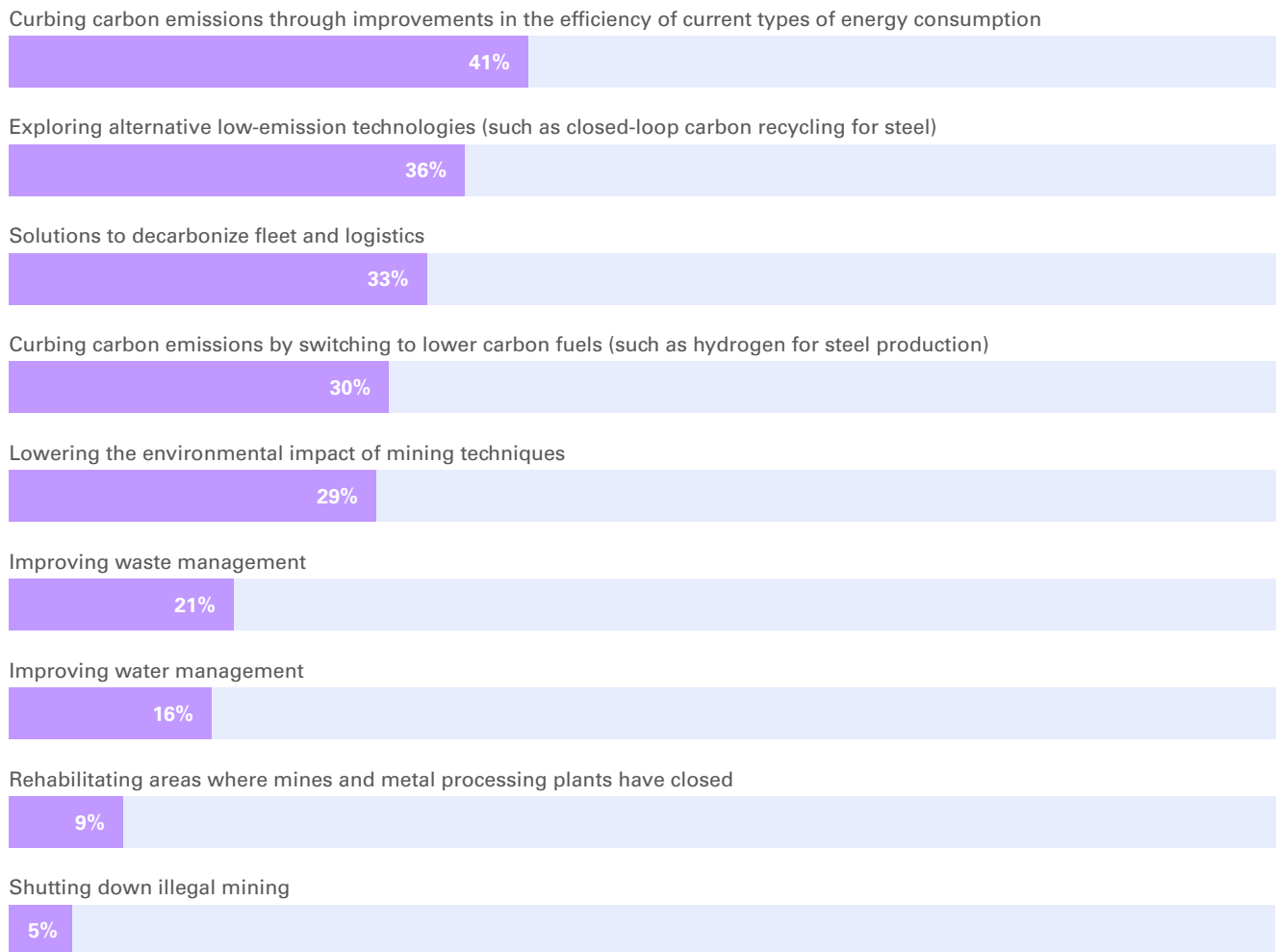
The rapid progress mining companies are already making to reduce carbon emissions is encouraging them to invest more in efforts to decarbonize.

The survey shows that improving energy consumption efficiency is the highest priority for tackling the environmental effects of mining and metal processing (41 percent). It is seen as twice as important as improving water and waste management.

“When you consider that renewable energy is so cost-competitive in most parts of the world, there is a very clear pathway to achieve zero Scope 2 emissions [from suppliers of energy] soon for

those who aren’t already there yet,” says Dhawan. Scope 1 (direct, greenhouse gas) emissions are more challenging because the main contributor to mining emissions is diesel. There are about 28,000 trucks in mining operations globally and the vast majority run on diesel. “We are starting to get much better availability of zero-emission mine-haul trucks, using a combination of batteries and hydrogen technology,” Dhawan says.

## Which do you consider the highest priorities for tackling the environmental impact of mineral and metal processing?



Source: KPMG International 2023 Global Mining & Metals Outlook - Survey Results

The makers of trucks and the mining industry have collaborated to speed up the shift, so by 2027, **“We should have zero-emission vehicles available at scale. It shows the power of bringing the whole industry together with the truck OEMs to solve the challenge,”** adds Dhawan.

With regard to Scope 3 emissions, elsewhere in the value chain, a third of executives say their company plans to eliminate them by 2040 and another 39 percent believe it will be done by 2050.

For bulk commodities, such as iron ore, metallurgical coal and thermal coal, Scope 3 represents the overwhelming majority of the total climate impact of the commodity. In the case of iron ore, it can be up to 90 percent, but the prospects are bright.

**“I’m really encouraged that leading mining companies are starting to see Scope 3 as an opportunity, as well as a risk,”** Dhawan says. **“We’re moving to a world in which we are interested in the end product. I, as the miner, have a common responsibility with you as the steelmaker, but our responsibilities are differentiated by the fact that you’re in charge of the technology that you use and I’m in charge of the product I supply you with. We’re both better off if we find a way to take carbon out of the production process,”** adds Dhawan.

One mining company, for example is developing a new product, iron ore briquettes, that reduces the need for sintering, thus saving up to 10 percent of emissions from steel production. Others are supplying higher quality steelmaking coal that

leads to as much as a 30 percent reduction of carbon intensity.

Many metals companies are as confident as mining companies about the speed of progress. Saurabh Bhatnagar, Partner Industry 4.0 and Innovation, KPMG in India, cites four factors:

- Fast improvements in technologies to minimize and sequester carbon emissions.
- Increased use of hydrogen in making steel, especially in Western Europe and China.
- Rapidly growing availability of renewable energy sources.
- Government incentives to collect and reprocess metal scrap, which, naturally, does not depend on oxidization to be processed.

Bhargava points out that the challenge to meet Scope 3 emissions targets for metals companies is similar to what it would be for a consumer goods manufacturer or a chemicals company. But – unlike a maker of household detergent that is reliant on plastic containers or cardboard boxes – steel, copper, and aluminum will remain recyclable indefinitely.

“Most firms that are under pressure to be net zero are on a journey of ‘learn–understand–internalize–plan–experiment’ to find new ways of getting to net zero,” says Bhargava. In India, the world’s second largest steel producer, producers are at a very early stage of learning. “When firms integrate, they must take a short-term and a long-term view. They will start by investing in areas where the gains are quick and easy. In Europe, they are a bit further ahead, but they are still doing it incrementally. Many are not sure as to

what their strategy should be, since net zero is still 30 years away.”

Miners of critical minerals, such as rare earths, are balancing decarbonization and rapid output growth. **“We see that our core role in the global push to decarbonize is to facilitate others’ drive to net zero through the production of rare earths,”** says Tom O’Leary of Iluka Resources. **“We are continuing to apply research and development money to refine and metalize critical minerals in ways that are most attractive from a carbon perspective, but many of those processes cannot be done in a zero-carbon way at the moment,”** O’Leary says.

**“Australia’s objective of decarbonization is a sound one, not just from a jobs and development perspective, but from a diversification of supply chain and environmental perspective, to see those minerals processed in a manner that meets high Western standards of environmental outcomes and ESG more generally,”** O’Leary says.



# A focus on ESG goals



## A focus on ESG goals

While mining and metals companies invest heavily in reducing their carbon footprint, they are also focusing on ESG goals.

Mining firms are tackling many of the environmental impacts of their operations. The ICMM, for example, has been working with the UN and the Principles for Responsible Investment, guided by an independent expert panel, to develop a global standard for managing tailings safely. ICMM's Dhawan has been pushing for the industry **"to engender greater trust as a responsible contributor on all things related to sustainability. We're in this strange world where we've never had greater demand for metals and minerals, but it's never been harder to open new mines."** The ICMM's discussions with the UN and the Principles for Responsible Investment have been challenging. **"The process of negotiation was infinitely more complex than if the industry had done it on its own, but it also made it significantly more trusted,"** Dhawan says.

The ICMM's goal is **"to engender greater trust in the mining industry in being responsible on sustainability, not just climate. Once the industry has gained the trust of stakeholders"**, he comments, **"the ultimate outcome is that the world gets the metals and minerals that it needs, and those materials are supplied in the most responsible way possible."**

At the same time, the industry is focusing much attention on the letter 'S' in the three-letter acronym. **"ESG goals are becoming more of a fundamentally people-driven agenda,"** observes Bhargava of KPMG International's focus on these, particularly regarding stakeholders such as employees and local communities. Executives in the survey

### The way forward



Rohitesh Dhawan is the Chief Executive Officer of the International Council on Mining & Metals (ICMM), whose members comprise a third of the global industry.

KPMG International interviewed Dhawan to ask about the progress which ICMM has made in implementing its mining principles, including zero harm, nature preservation and restoration, alongside net-zero carbon emissions. He

said that the mining and metals industry simply has not made sufficient progress in the area of zero harm. **"In 2021 alone, 43 of our colleagues in ICMM member companies went to work and did not come home. That is a stain on our collective conscience. We simply have to do better."**

In the area of carbon emissions, progress has been impressive. **"When you consider that renewable energy is cost-competitive, there is a clear pathway to achieve zero scope emissions for companies who aren't already there yet,"** he says. **"We are starting to achieve better availability of zero-emission mine-haul trucks, using a combination of battery and hydrogen technology."**

The makers of trucks and the mining industry have collaborated to speed up the shift by 2027: **"We should have zero-emission vehicles available at scale,"** he says.

consider that the highest priority for tackling the social impact of mining and metals processing is to provide workers with healthcare, paid leave and retirement benefits.

The focus on people extends toward the communities that surround the mines and metals factories.

**"Our priority is to continue to ensure that we maintain strong local connections wherever we're operating and ensure that we are meeting the objectives of our local stakeholders,"** says O'Leary of Iluka.

Offering non-salary benefits is seen by executives as an important way of attracting and retaining workers. **"The most practical challenge for us is labor shortages,"** says Henderson of Pilbara Minerals.

**"We're not alone in this regard. The industry is thriving, so there's no shortage of jobs and opportunities for people, particularly those who are skilled and happy to work on a remote site."**

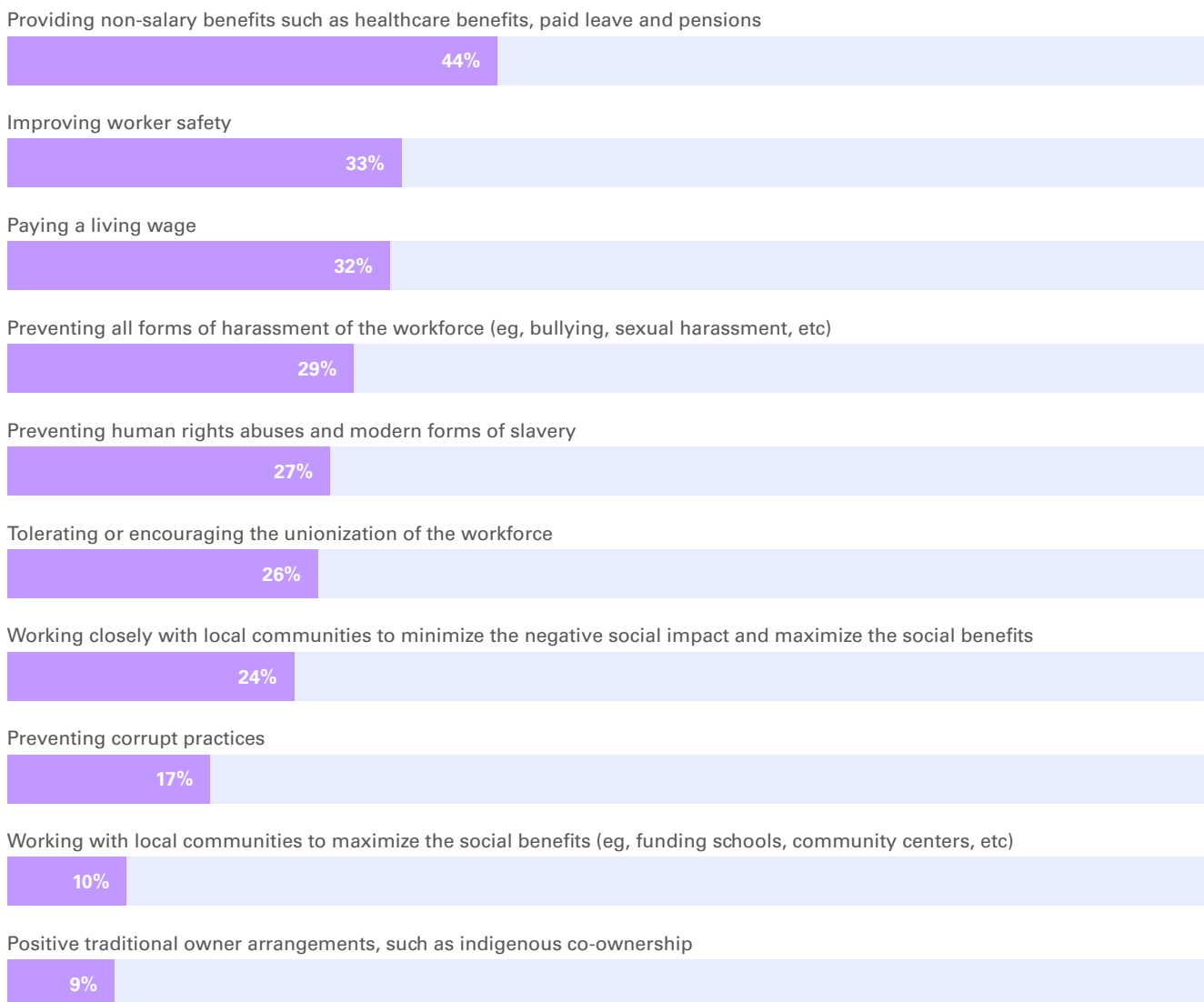
But, in our view, it’s solvable and our company has done pretty well through a competitive offering and that lithium ‘glow’. Being in the lithium industry is a real strength. Some of the younger generation are a bit more altruistic in their outlook. The lithium industry is future-facing, and it helps being on the right side of this carbon-reduction push,” adds Henderson.

Some believe that mining and metals companies need to pay greater heed to citizens at large, not just local communities.

“The general public has become a very significant force in persuading companies to take a more responsible approach to the environment,” says Bhargava of KPMG in India. “In India when you set up a new steel plant, the communities have to be partnered and assured there will be no deterioration in air, water, and soil. This trend will become more pronounced because the younger generation seems to be more aware and passionate about the protection of the environment,” adds Bhargava.

Henderson of Pilbara Minerals is aware of the issue. “I think mining is equated as being ‘old school’, maybe representing some of the old biases,” he says. “However, with the strong shift towards more sustainable practices and the innovation in the industry, we are making progress, but I think there’s always more work to be done.”

### Which do you consider the highest priorities for tackling the social impact of the development of mineral and metals processing?



Source: KPMG International 2023 Global Mining & Metals Outlook - Survey Results

# Leaders needed



# Leaders needed

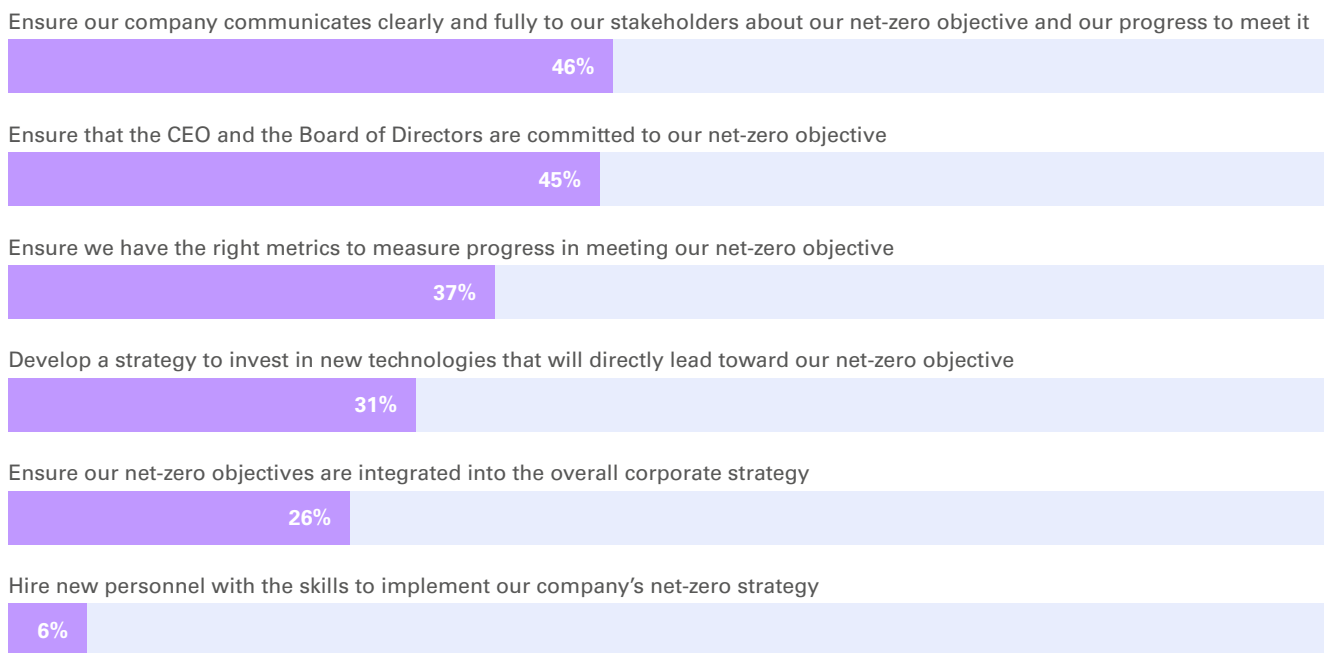
There is another aspect of the human element within ESG, namely the importance of capable leadership.

The survey shows that among the most effective measures to help companies meet their ESG objectives is to ensure that the CEO and the board of directors are committed to these goals, and that they have appropriate governance structures that enable the realization of these objectives.

“Corporate leaders have the mandate and the responsibility to align their strategy with key stakeholders,

including governments, customers, technology providers and suppliers and companies in their ecosystem,” says Bhargava of KPMG in India. “This is critical and requires a very clear roadmap. They also need to structure executive and employee incentives so that they align with ESG initiatives.”

## Which of the following measures will be most effective in helping your company to meet its net-zero objectives?



Source: KPMG International 2023 Global Mining & Metals Outlook - Survey Results

In addition, he says, they need to take the lead in building the company’s capabilities. “There is going to be a talent war in shaping and executing ESG agendas,” he predicts.

If decarbonization is to be integrated into enterprise strategy, it will require the full support of the leadership. Executives in the survey say the most effective ways to meet net-zero objectives are

both to ensure that corporate leaders are committed to net-zero objectives and to communicate clearly and fully to stakeholders about the progress to meet them.

Those outside the industry need to understand the new relevance and strategic importance of mining and metals companies to the global economy. “**Provided the industry**

continues to engage candidly with our stakeholders and industry participants and do so truthfully and pragmatically, then, as we advance further through this process of electrification, it’s going to become more and more evident for stakeholders and the public the necessity of certain critical minerals,” says O’Leary.



# The importance of technology



# The importance of technology

A main driver of the changes that characterize this new phase of the mining and metals industry has been the introduction of new technologies and innovations.

Technological changes are seen as the most important factor affecting executives' five-year demand projections. Technologies are emphasized somewhat less regarding supply projections. For mining companies, advances in exploration and extraction technology, AI, 5G networks, and IoT are the technologies that will have the most impact on mineral supplies.

## What are the most important factors affecting your company's range of demand projections over the next five years

Technological changes

54%

Government policies

49%

Customer preferences and / or sentiment

31%

Energy transition

24%

Recycling practices

22%

Geopolitical challenges

13%

Source: KPMG International 2023 Global Mining & Metals Outlook - Survey Results

Apart from zero-emission mine-haul trucks, mining companies are deploying technologies such as unmanned aerial vehicles to monitor assets; wireless sensor technologies to track processes and mine safety; and private 5G networks to help conduct preventative maintenance.<sup>2</sup>

For metals companies, AI and data analytics are likely to have the biggest impact, the survey says. "We need to demystify the technology by breaking it down into four types," says KPMG in India's Bhargava:

1. Digital technologies to ensure production processes achieve the best possible outcome.
2. Circular technologies to extract metals from waste (Bhargava is advising a large metals company which is collaborating with up to 25 technology partners around the world).
3. Carbon-capture technologies.
4. Disruptive technologies such as hydrogen that either reduce or obviate the need for carbon.

Bhatnagar adds a fifth: applying technology to use the energy in off-gases more efficiently, which is especially important in India.

Bhatnagar says, "It is almost impossible to open a new steel factory making metals using traditional technologies. The only way to obtain a license to operate is if a company can prove that the factory will have a significantly smaller carbon footprint or it is producing materials that are critical to national security, such as rare earths and lithium."

<sup>2</sup> How is Digitalization Transforming the Face of Mining Industry? TechSci Research, May 2022

<sup>3</sup> "Carbon Border Adjustment Mechanism," Taxation and Customs Union, European Commission, December 2022

European metals companies face a different challenge. In December 2022, EU ministers finalized a carbon border adjustment mechanism. This took the form of a tax designed to ensure that carbon-intensive industries such as steel, which must comply with strict emissions standards, are not undermined by competitors from outside the EU that have weaker emissions rules.<sup>3</sup>

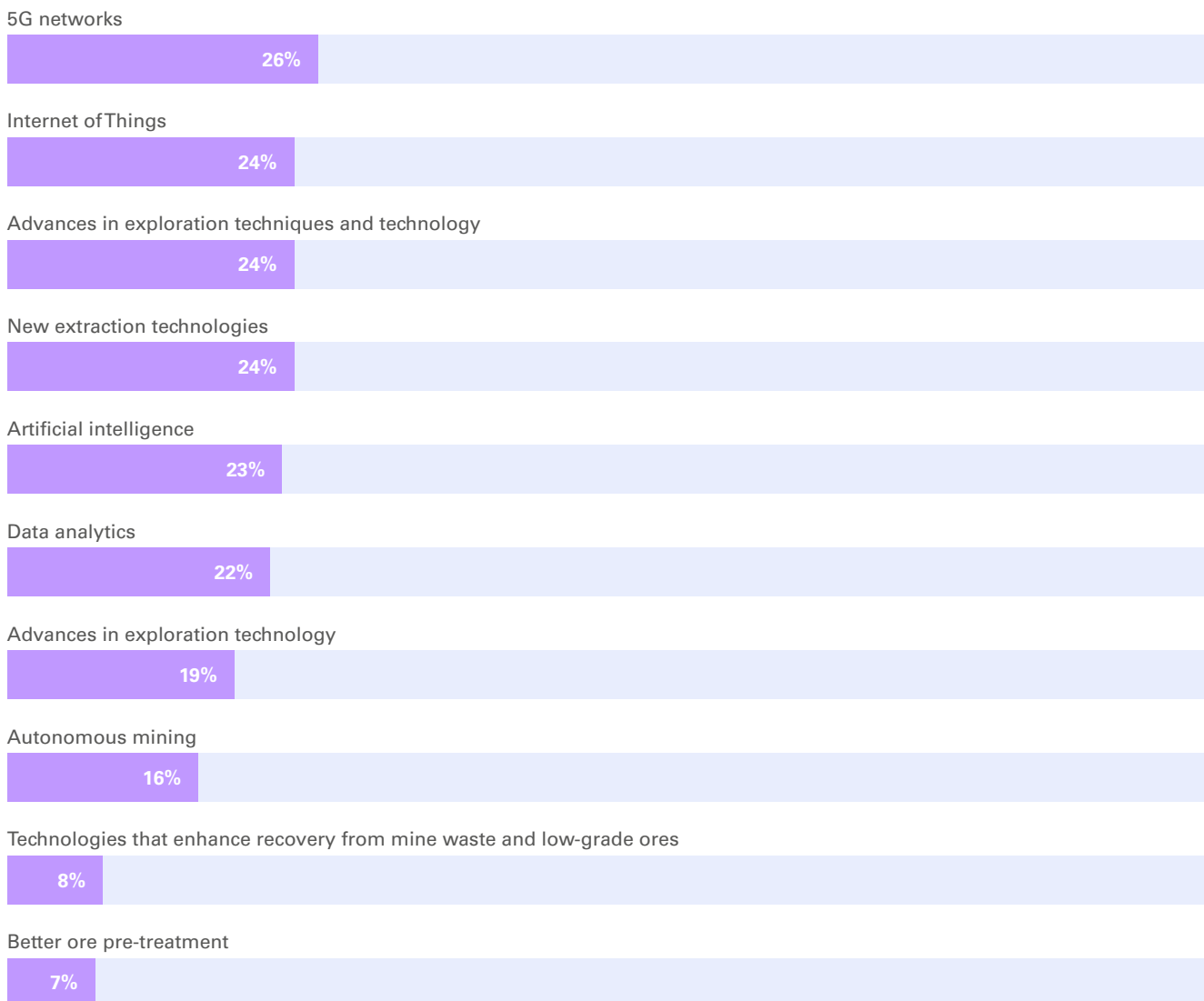
“The EU aims to create a level playing field for metal manufacturers, particularly concerning their environmental footprint, which will likely influence the competitive market

dynamics in Europe. As market participants worldwide progress toward their net-zero goals, they must individually and collectively consider these shifting dynamics and adapt accordingly,” says Ugo Platania, Global Metals Leader, KPMG International.

Markus Zeimes, Head of Metals, KPMG in Germany, says there will be massive technological changes among the European steel companies over the next few years as they reduce their carbon emissions. The largest such firm in Germany is aiming to use hydrogen-based direct reduction to remove the oxygen from iron ore.

“The German steel industry is heavily investing in new technologies to become greener. Producing steel based on the use of hydrogen is one way to do so,” Zeimes says. “The energy requirements of new technologies are immense. Cost and availability of renewable energy, therefore, are crucial for a successful conversion of the steel industry to approach zero carbon emissions. We currently see that strategic partnerships securing future hydrogen and energy demand are gaining more importance.”

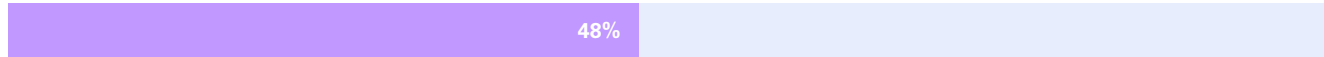
**Which two technologies are likely to have the most impact on increasing mineral supplies over the next five years?**



Source: KPMG International 2023 Global Mining & Metals Outlook - Survey Results

## Which two technologies are likely to have the most impact on increasing metal supplies over the next five years?

Artificial intelligence



Data analytics



5G networks



Technologies that enhance recovery from recycled materials



Internet of Things



Autonomous steel production (such as autonomous vehicles)



Satellite imaging



Source: KPMG International 2023 Global Mining & Metals Outlook - Survey Results

## What are the most important factors affecting your company's range of supply projections over the next five years?

Government policies



Customer preferences



Technological changes



Recycling practices



Geopolitical challenges



Source: KPMG International 2023 Global Mining & Metals Outlook - Survey Results



# Raising the bar



## Raising the bar

The carbon border adjustment mechanism highlights the important role played by governments in moving toward a carbon-free future.

Tougher government scrutiny of ESG and net-zero performance is regarded by executives in the survey as the biggest risk to operations in the next five years. Almost half (48 percent) say so. By contrast, only a quarter say climate risk is very significant.

### What are the most significant risks you expect for your company's operations in the next five years?

Tougher government regulatory scrutiny or compliance burden of ESG and net-zero performance

48%

Declining resource quality

35%

Rising operating costs

29%

High geographical concentration of production

29%

Long project development lead times

29%

Tougher investor scrutiny of ESG and net-zero performance

25%

Higher exposure to climate risks, such as water stress or extreme weather events

24%

Political instability/nationalization in a host country

19%

Trade war

8%

Inability to raise capital funds

3%

Source: KPMG International 2023 Global Mining & Metals Outlook - Survey Results

Bhatnagar of KPMG in India points out though, that as of now, there are long-term net-zero goals, not compliance requirements. “In the next five years, governments in key countries will seek to understand and observe the visible steps being taken by mining and metals companies to show their commitment to net-zero goals by 2050 in Europe and by 2070 in India.”

In response, says Bhargava, “This is a perfect time for companies to start to work on measuring and verifying emissions as accurately as possible. To prepare for the carbon border

adjustment mechanism, they should start carrying documents showing the carbon content of their metals.”

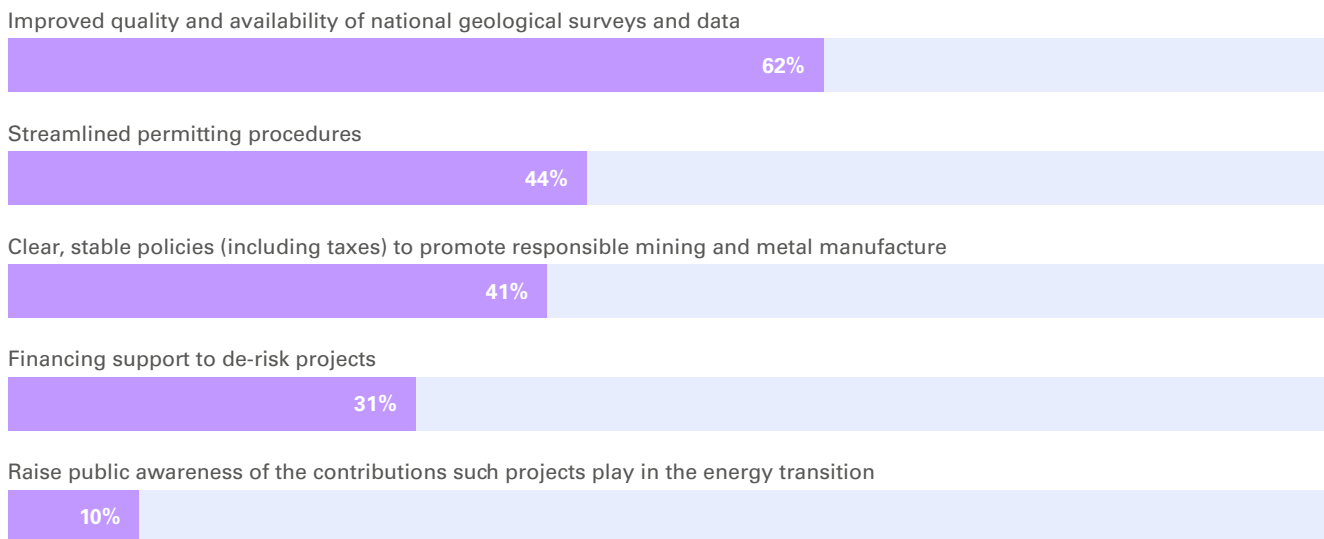
The survey shows that government policies are the biggest factor affecting supply projections and that the improved quality and availability of national geological surveys and data is seen as the most important government measure for ensuring a smooth minerals supply over the next few years.

In the case of Iluka, the company received a A\$1.25 billion non-recourse loan from the Australian Federal

Government for the development of the country’s first integrated rare-earth metals refinery in Western Australia.

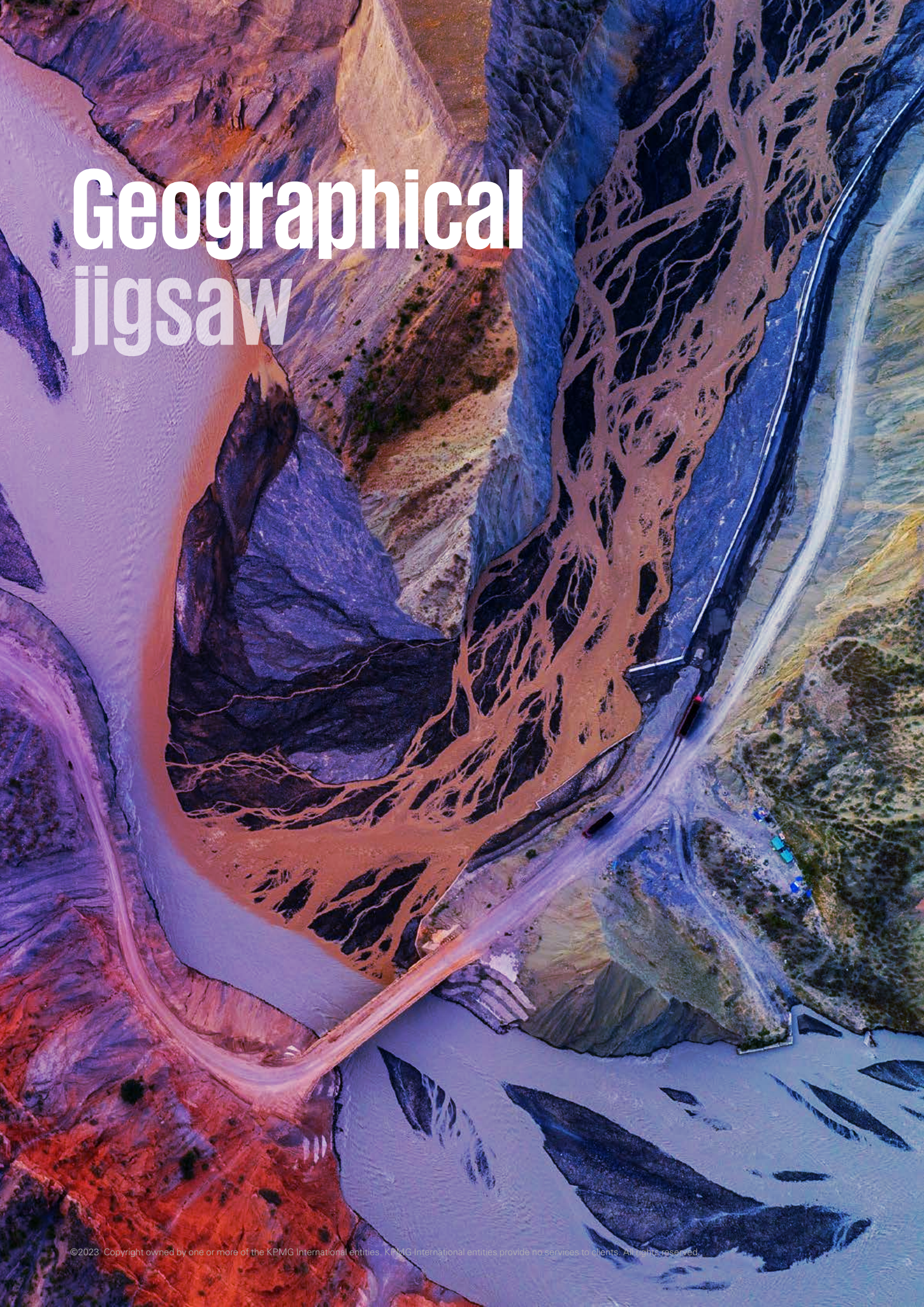
“The objective of the government was not merely to enable Iluka to process our own deposits of rare earths, it was really to enable the development of a rare earths industry in Australia and that objective is being achieved. The government was facilitating the diversification of the supply chain for rare earths from the current concentration in China,” says O’Leary.

### Which is the most important of the following government measures for ensuring smooth minerals supply?



Source: KPMG International 2023 Global Mining & Metals Outlook - Survey Results



An aerial photograph of a river delta system. The river flows from the top left towards the bottom right, where it branches into a complex network of smaller channels. A road runs parallel to the main river channel on the right side. In the lower right, a dam structure is visible, with a reservoir behind it. The terrain is rugged and appears to be a mix of rocky and sandy soil. The overall color palette is dominated by earthy tones like brown, tan, and grey, with some green vegetation visible in the lower right.

# Geographical jigsaw



## Geographical jigsaw

The drive to decarbonize is redrawing the map of the mining and metals industry.

“The cost of carbon intensity will, in future, be baked into investment decisions and will change the cost dynamics,” observes Bhatnagar. “To be future-ready, some steel producers will try to diversify to the Middle East where there are plentiful supplies of natural gas and then move to hydrogen-based direct-reduction steel furnaces.”

These sentiments are borne out by the survey. Almost a quarter (24 percent) are planning to increase their geographical footprint significantly and a further 41 percent plan to do so by a small amount.

### Over the next five years are you planning to increase the number of countries in which you operate or explore in or, in the case of metals companies, buy the minerals from?

Yes, by a small amount



Yes, by a significant amount



We do not plan any increase



No, we plan to decrease the number of countries



Source: KPMG International 2023 Global Mining & Metals Outlook - Survey Results

There is also the question of the impact of US–China rivalry on supply chains, particularly of critical minerals. “The geopolitical piece is definitely on the radar,” says Pilbara Minerals’ Henderson. “At the business-to-business level, we don’t have any cause for concern. It’s always been a healthy relationship, but of course we watch the geopolitical utterings between the US and China. I don’t foresee China making any detrimental move to increase the distance between Australia and China, in respect of raw materials, particularly within the lithium supply chain, because it

would hurt them massively. Their industries are very dependent on Australia, and we have a very co-dependent relationship.”

Henderson adds, “We are thinking about strategies to manage the geopolitical dimension. From the inception of the business, we have a strategy of being diversified, because it makes business sense.” Pilbara has made one diversification move by forming a joint venture with Korean steelmaker POSCO to develop a lithium hydroxide conversion facility in South Korea. “We’re balancing the fact that the whole lithium industry

pretty much looks to China for the processing of raw materials, so we can’t sever that tie, nor do we want to. We continue to diversify into other markets, although we can’t pivot elsewhere too quickly,” says Henderson. Henderson adds, “The expansions we are executing will deliver a considerable step-up from current production levels and enable us to further integrate down the supply chain. The combination of our scale, downstream integration and innovation efforts will further support our objective to be a leader in sustainable battery materials.”

# Conclusion

This survey and report analyze one of the greatest conundrums facing global business: how to pivot rapidly toward carbon-free solutions without harming the environment, while, at the same time, developing a strategy that aligns the interests of shareholders, workers, communities, consumers and governments.

All stakeholders want to build a global economy that is more sustainable, but the question remains:

## **Are they willing to make the sacrifices needed to achieve a net-zero future?**

The survey and interviews show executives are tremendously confident of the future, but many outside the industry are skeptical. Factual evidence and rigorous research are essential for success.

Ultimately, this optimal blend must lead to more effective decision-making. Executives face the difficult task of aligning the interests of governments, the public, their workers and investors to take the mining and metals industry where it needs to go, while ensuring the business is financially sustainable. The world will not achieve a net-zero carbon state unless companies can make a return in doing so.

# Survey demographics

In March 2023, on behalf of KPMG International, Vantage Research conducted an online survey of 434 mining and metals executives, all of whom are in the C-suite or are board members. Forty-two percent are in the Americas (Canada 13 percent and the US 10 percent), 30 percent are in APAC (16 percent in Australia) and 27 percent in EMEA.

Most of the mining and metals companies are large: 36 percent have annual revenues of US\$1 billion to US\$10 billion and 33 percent are in the US\$11 billion to US\$25 billion range. To assess their product breakdown, the survey asked executives to choose from a list of 20 minerals and metals. The results were widely distributed among the commodities, with 33 percent selecting copper, 20 percent aluminum and 18 percent steel.

There is a similarly wide distribution of job functions in the C-suite, with 31 percent in general management and 29 percent responsible for the supply chain. Twenty-eight percent are chief financial officers and 20 percent are chief executive officers.

**434** Mining and metals executives, all of whom are in the C-suite or are board members

**42%** The Americas (Canada 13 percent and the U.S.A 10 percent)

**30%** APAC (16 percent in Australia)

**27%** In EMEA

**Most of the mining and metals companies are large:**

**36%** Annual revenues of US\$1 billion to US\$10 billion

**33%** Annual revenues of US\$11 billion to US\$25 billion

**C-suite job functions**

**31%** General management (inc Heads of)

**29%** Supply chain

**28%** Chief financial officers

**20%** Chief executive officers

**Chosen minerals by executives**

**33%** Copper

**20%** Aluminum

**18%** Steel

# Contact us

**Trevor Hart**  
Global Head of Mining,  
KPMG International  
thart@kpmg.com.au

**Nick Harridge**  
Mining & Metals Lead,  
KPMG Australia  
nharridge@kpmg.com.au

**Heather Cheeseman**  
Mining Lead,  
KPMG in Canada  
hcheeseman@kpmg.ca

**Patrick Chu**  
Mining Lead,  
KPMG China  
patrick.chu@kpmg.com

**Kashmira Bhana**  
Mining Lead,  
KPMG in South Africa  
kashmira.bhana@kpmg.co.za

**Bernardo Moreira**  
Mining Lead,  
KPMG in Brazil  
bmoreira@kpmg.com.br

**Vic Naathen**  
Mining & Metals Lead  
KPMG in the UK  
Victor.Naathen@KPMG.co.uk

**Ugo Platania**  
Global Head of Metals,  
KPMG International  
ugo.platania@kpmg.lu

**Marcus Zeimes**  
Metals Lead,  
KPMG in Germany  
mzeimes@kpmg.com

**Amit Bhargava**  
Partner and Lead,  
Mining and Metals  
KPMG in India  
amitbhargava@kpmg.com

**Fred Von Eckardstein**  
Metals Lead,  
KPMG in South Africa  
fred.voneckardstein@kpmg.co.sa

**Norbert Meyring**  
Metals Lead,  
KPMG China  
norbert@meyring@kpmg.com

**Eric Logan**  
Metals Lead,  
KPMG in US  
ericlogan@kpmg.com

**Eduardo Algado**  
Metals Lead,  
KPMG in Mexico  
salgado.eduardo@kpmg.com.au

**Hervé Michelet**  
Metals Lead  
KPMG in France  
hmichelet@kpmg.fr

**[KPMG.com/mining](https://www.kpmg.com/mining)**  
**[KPMG.com/metals](https://www.kpmg.com/metals)**

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