



2024 Global Metals and Mining Outlook

Strategies for decarbonization and operational excellence

Executive summary



Decarbonization is the key to operational excellence for metals and mining companies. KPMG’s 2024 Global Metals & Mining Outlook underscores the necessity of investing in decarbonization — not just for environmental benefits, but for transformative operational gains. This shift promises enhanced resilience agility, and a sustainable economy.

The 2024 report draws from the insights of over 450 C-level executives in the largest survey of its kind, and interviews with leading industry thinkers, revealing that effective decarbonization can revolutionize business efficiency and profitability. Yet, despite some progress, the industry’s greenhouse gas emissions remain stubbornly high, demanding urgent action.

As highlighted at the COP28 UN Climate Conference, slow progress in climate action threatens global targets.¹ Metals and mining companies must fast-track the development of low-carbon processes, despite growing supply chain challenges.

This report equips executives and stakeholders with crucial industry insights and best practices to navigate these challenges. With decarbonization goals driving operational and technological transformation, the time to act is now. Investing in decarbonization isn’t just about sustainability — it’s the pathway to unparalleled operational transformation.

¹ “UN Climate Change Conference: Reports and decisions,” United Nations Climate Change, December 12, 2023

Key findings

The opportunity potential is clear.

61%

are more confident than they were two years before about their company's growth prospects. Two-thirds say that this greater confidence is partly the result of increased optimism that their companies can meet their sustainability goals. Therefore, decarbonization is a significant business opportunity, especially when it is merged with operational transformation initiatives and social license to operate commitments. In fact,

57%

of executives say the most effective way of meeting their decarbonization goals is to integrate them into the overall corporate strategy.

But challenges abound. Metals and mining executives will need to raise billions of dollars to fund new production processes, amidst volatile commodity prices and ever shifting demand scenarios while searching labor markets for the vital skills to achieve carbon transformations.

Executives have identified many of the challenges they face.

47%

say skills shortages are the most important challenge that must be overcome when implementing the latest technologies.

They also need to hire more talent to address issues in the supply chain amid faster-changing markets, reflected in see-sawing prices. Commodity price volatility adds a new level of complexity.

66%

say that output prices have become more volatile, heightening business risks. Input-price volatility is more of a factor for mining companies (59 percent) than metals companies (46 percent).

These risks reflect the dramatic changes occurring in the sector in 2022 and 2023 that were highlighted in the KPMG *Mining and Metals Outlook*: severe supply chain disruptions, the war in Ukraine, and a surge in demand for battery materials. In 2023, we focused on the crucial role played by the mining and metals industries in enabling the global economy to shift to a carbon-free future. In 2024, our attention turns to examining efforts made by metals and mining companies to reduce their carbon emissions.

This year's report provides detailed insights into how companies are faring amidst these changes. It examines their priorities for the

next five years,

as they work to increase the cost-effectiveness of their operations while seeking to meet decarbonization goals. How do they balance managing short-term volatility against long-term objectives? How can they maintain confidence, while adapting to the realities of the market? The metals and mining industries have never been more challenging — or exciting.

A long and complex journey ahead

Forty-seven percent of metals and mining executives say that transforming the carbon footprint of their operations through technology investments is the biggest business opportunity over the next five years. Sixty-one percent are more confident than they were two years before about their company's growth prospects. This greater confidence is partly the result of increased optimism that their companies can meet their sustainability goals, 66 percent say.

“
Confidence in the future among mining companies goes from strength to strength, reflecting the global need for mining ores. To add to the bullishness, there is likely to be a shrinking pool of mining companies that will be called upon to deliver them.”

Trevor Hart

Global Mining Leader, KPMG Australia

Perceptions of the sector are improving in acknowledgement of their important role in the energy transition.



But confidence must not turn into complacency. Metals and mining companies need to transform their operations because the pace of change is accelerating and the market for their materials is more complex than ever. Sixty-six percent say that output prices have become more volatile, heightening business risks.

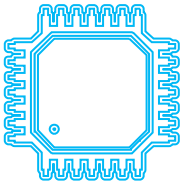
Greater price volatility is the result of abrupt changes in the external environment. This makes it more difficult to predict and adapt to short-term trends in the commodity markets, while focusing on long-term decarbonization goals stretching into the next two decades. Companies are urgently tackling their challenges, but they need to do more if they are to meet their decarbonization objectives.

Broadly, the types of strategic responses are to:

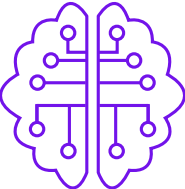
Integrate operational transformation and decarbonization to cut costs and improve resilience



Deploy new technologies to lower their carbon emissions



Focus on artificial intelligence to help them at multiple stages of the operating cycle



Make the most of new technology by identifying and adding new skill sets



Capitalize on the strong supply of funds for well-designed decarbonization projects



Rely on the ecosystem of suppliers and customers to achieve operational and decarbonization goals



“A decade ago, mining and metals were considered difficult and dirty industries, but now they have become a very critical part of the solution to the energy transition.”

Ugo Platania
Global Sector Leader, Steel, KPMG in Luxembourg

Transforming operations and carbon usage

The metals and mining industries will have to perform a remarkable feat if they are to play their full role in the energy transition: dramatically reduce carbon emissions while ramping up supplies of minerals. As mining and metals companies pursue the objective of attaining net-zero carbon emissions by 2050, transforming operations and transforming carbon usage will become increasingly intertwined. The relationship between the two is this: The drive to reduce the carbon emissions of a company is leading to major benefits in the form of cost reductions, as it consumes less energy or uses it more efficiently. At the same time, the effort to decarbonize is most effective when a wide range of steps are taken to transform operations.

Executives say that decarbonization is a significant business opportunity, especially when it is part of operational transformation. In fact, 57 percent of executives say the most effective way of meeting its decarbonization goals is to integrate them into the overall corporate strategy. Despite this realization, metals and mining companies need to accelerate their decarbonization strategies if they are to meet their goals in time. Reducing their carbon emissions should, therefore, not be seen as an expensive add-on intended solely to comply with green government policies, but a key goal, subject to the same kind of cost-benefit analysis that applies to other strategic objectives.

Integrating decarbonization into business strategy is easier said than done however, because the most important change needed to align the company's operations with decarbonization is transforming the end-to-end operating model, 47 percent of executives say. It should not be implemented in piecemeal fashion but ought to be integrated in everyday operations, including the entire supply chain, upstream and down, to ensure the organization maximizes the benefits from decarbonization.

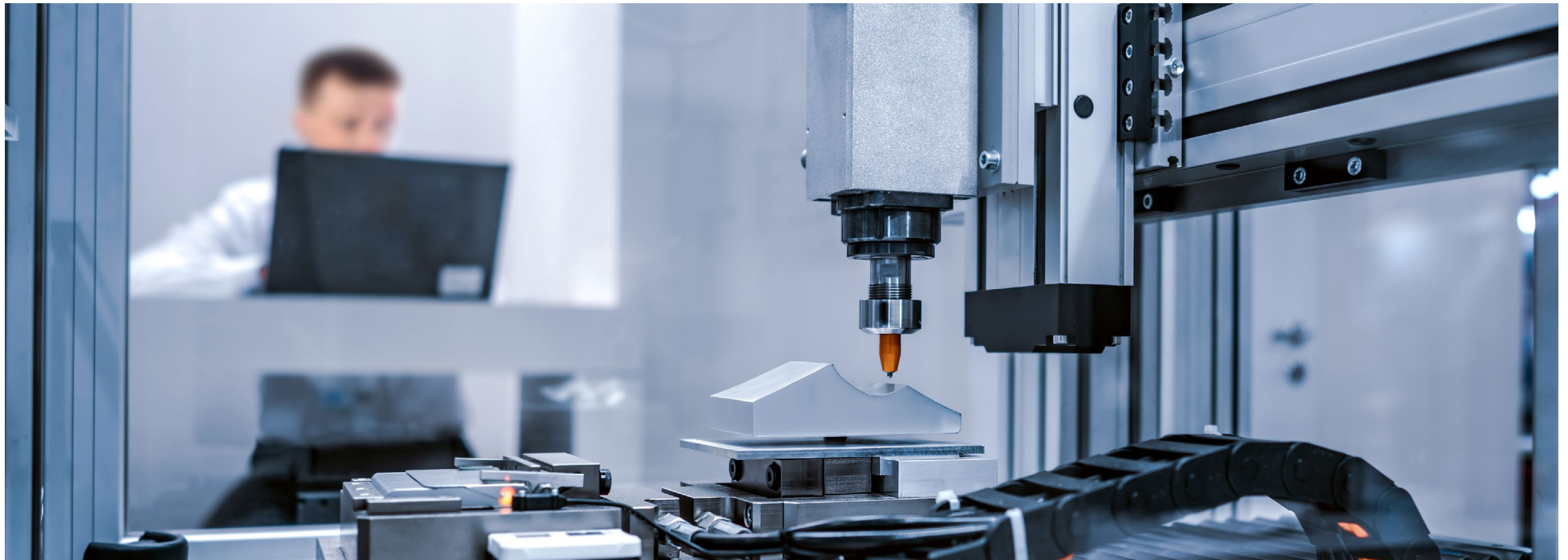


Accelerating technology investments

Mining and metals companies see investments in new technologies as crucial if they are to accelerate their decarbonization strategy. Fifty-five percent of executives say that the most effective method of attaining net-zero emissions is to invest in relevant, new technologies, such as those that reduce the carbon emitted in steel production. Forty-four percent believe that the most important outcome of the new technologies will be increased operational agility.

Implementing IT systems to measure and report decarbonization KPIs for executives and the Board was the highest priority over the past two years for metals and mining companies (43 percent), as the key operational change to meet decarbonization goals. In the next two years, it will become more important (48 percent).

For the enterprise, artificial intelligence (including generative AI) is regarded by executives as the most important technology, because it can be deployed at many stages of the process. Metals and mining companies are not commonly perceived as leaders in AI, but 43 percent say it will be implemented to help the company solve some of its biggest strategic issues, as well as for more tactical purposes. In fact, 45 percent say all forms of AI and machine learning will be key if companies are to capitalize on their business opportunities.



AI use cases for mining and metals

AI in the context of heavy industrial operations such as mining and metals aligns with operational outcomes, says Andrew McHardy, National Decarbonization Hub Leader, KPMG in Canada. Its purposes include:



Optimizing maintenance and scheduling processes



Predictive maintenance, such as detecting faults and assessing energy efficiency



Creating a 30-year decarbonization plan



Developing a platform to evaluate decarbonization decisions going forward



Detecting changes in regulations and predicting where changes are likely to occur

Mining companies are already seeing the benefit of the new technology. “AI and advanced analytics have cut the time it takes from exploration to commissioning a mine from 16 years down to nine,” observes Robert Wilt, the Chief Executive Officer of Ma’aden of Saudi Arabia, which has an annual exploration program of \$130 million, he says. “Processing geophysical data used to take two years to do manually and now takes a matter of weeks. Evaluating core samples used to take 45 days and now takes 12 minutes.”



Ecosystem collaboration

Closer partnerships with suppliers, customers, and others will be vital to managing decarbonization. Steel companies will need the support of their ecosystem if they are to decarbonize. To reduce carbon emissions, many are shifting, or are planning to shift, their inputs from iron ore and coking coal to iron pellets. By doing so, the consumption of electricity will increase dramatically, so this power will need to be generated by non-fossil fuels if they are to meet their Scope I and Scope II emissions targets.

In terms of global carbon impact, the amount of energy required by miners is less than for steel makers, but they face the same objective of lowering carbon emissions in their ecosystem. Mining companies are building renewable energy projects in wind and solar, much of it through third-party purchase agreements. This gives access to “green” electricity with no capital outlay from the mining companies and immediate cost savings.

Transforming the ecosystem to lower carbon emissions is just one part of the long-term management of the supply chain. In the short term, metals and mining companies are dealing with many issues disrupting their supply chains. Executives in the survey were asked to select the most important supply chain problems that need to be tackled over the next two years. Eight challenges clustered at the top, including decarbonization, sharp price movements, and logistical issues, but the number-one choice (31 percent) is a lack of skills in supply chain management.

Executives do not regard hiring skilled professionals as the main solution; investing in technology is the most popular choice by 10 percentage points. Technology is nevertheless crucial in helping to track, measure, and analyze the immense amounts of data generated by the ecosystem. If AI and data analytics can help companies to predict future disruptions in the supply chain, this would help to smooth the flow of inputs and outputs.

But new technology is only a partial solution to skills shortages. Companies still need people with the know-how to operate the technology and to apply human judgment when faced with intricate ecosystem challenges.





Mining for talent and finding funding

If companies are to make the most of their investments in new technologies, then they need the skills that could maximize the benefits. Executives concede there are gaps to be filled here. Skills shortages are the most important challenge that must be overcome when implementing the latest technologies (47 percent) and, as noted, in supply-chain management.

By contrast, raising money seems to be easier than addressing skills gaps. Forty-seven percent say that it has become easier to attract debt or equity finance for large decarbonization projects in the past two years. Loans, grants and incentives from government-backed organizations are the most promising sources of finance for capital projects (38 percent). Others are making use of financial innovations such as “green” bonds (34 percent).

When it comes to mergers and acquisitions, executives in the survey are not emphasizing them to improve efficiency. M&A receives the lowest priority in terms of driving the transformation of costs and operations. Nor is it seen by executives as an important business opportunity over the next five years. This is surprising because M&A activity in metals and mining, particularly among smaller companies, has been growing, as companies rebalance their asset portfolios to streamline their operations.

Conclusion: Five ways to future-proof metals and mining

The metals and mining industries must accelerate the reduction in their carbon emissions while striving to meet the growing demands of customers that are decarbonizing their operations. This is extremely challenging, but there is a big payoff: If they manage a successful decarbonization program, it is likely to transform their overall operations and add business value.

To achieve the goals of metals and mining companies, here are five takeaways for executives:



It's the ecosystem

Metals and mining companies have never needed to collaborate as closely with their customers, suppliers and business partners as they do now. Mining companies are working with car manufacturers to test hydrogen-powered taxis. Metals and mining companies are becoming deeply involved in the electricity-supply business. Open innovation should become the order of the day as executives search for the most effective partnerships in their drive to decarbonize.



Transformative AI

Artificial intelligence and its associated technologies of machine learning and predictive analytics are going to revolutionize every aspect of mining and metals, from surveying ore bodies to the predictive maintenance of electric arc furnaces. To ensure the benefits of this revolutionary technology are maximized and the risks minimized, metals and mining companies must use AI wisely and learn from others in their ecosystem about best practices.



Humans at the heart

Highly skilled people are required not only to keep AI and other new technologies on the rails but also to maximize the benefits and minimize the risks. Metals and mining industries have made great strides to clean up their dirty image to attract the best and brightest. They have a great story to tell, and they need to tell it well. Opening mines and smelters in new regions offers the opportunity to attract new workers who are keen to be part of the energy transition.



Many financial levers

There is an array of financing opportunities, indicating that banks and other financial intermediaries are keen to work with metals and mining companies to help fund their operational transformation. But the area of greatest divergence between expert opinion and the survey findings is mergers & acquisitions. Polled executives do not seem to be paying sufficient attention to the importance of mergers, acquisitions and divestitures as important means of rationalizing asset portfolios. Mining and metals executives must deploy all the financial arrows in their quiver, including M&A, if they are to meet their carbon goals.



Strengthen staying power

The story of the next quarter century for mining and metals companies is essentially one of resilience. They are rightly focused on long-term sustainability for themselves, for their customers and for the planet. But supply chains are fragile, prices are volatile, and investments take years to bear fruit. Even the most powerful AI systems cannot predict the future with any certainty, given the speed of change. It will require human judgment and human ingenuity to build companies that can recover quickly from adversity, take advantage of new, disruptive trends and play their full part in the global energy transition.

How this connects with what we do

KPMG firms help mining and metals companies achieve operational excellence and decarbonization through a wide-ranging approach. Leveraging our expertise in transformation and regulatory compliance, we guide companies in navigating the complex landscape of environmental regulations and implementing sustainable practices. Our professionals work across the entire mining lifecycle, from exploration and evaluation to closure, helping clients reduce costs, integrate digital tools, manage asset portfolios and assess climate-related risks.

The impact of ESG issues cannot be denied. That's why we're committed to strengthening our global ESG offering — backed by the recognition of our responsibility to help build a better future for all.

ESG is the watermark running through our global organization — from empowering our people to become agents of positive change, to providing better solutions and services to KPMG clients.

KPMG has been recognized as a global leader in the Verdantix Green Quadrant: ESG and Sustainability Consulting 2024.² Through the integration of sustainability into its broader offerings,³ the report states, “KPMG has enhanced its ability to support large firms seeking to address sustainability concerns holistically.

KPMG has also been named a global market leader by ALM Intelligence in their latest Pacesetter research, “ESG: Environmental, 2023-2024.”³ For KPMG, the report explains, “ESG is everything a business does and how it does it. Therefore, authenticity in an organization's ESG approach is critical to developing a sustainable future. In addition, to optimize ESG and build sustainability, KPMG works with organizations to embed ESG into the business strategy with board-level support to drive financial value, and effectively communicate goals throughout the organization using ESG metrics to understand KPIs.

As a result, KPMG provides an integrated and holistic ESG framework that is embedded throughout the organization to ensure a successful transformation.

² KPMG, KPMG firms recognized as a global leader in ESG and Sustainability Consulting, 2024

³ KPMG, KPMG recognized as 'a global market Leader in ESG Environmental Services', Nov 2023



Our financing services enable clients to secure the necessary capital for decarbonization initiatives, ensuring they have the financial backing to implement sustainable projects. KPMG firms' digital transformation provisions streamline operations, enhance efficiency and reduce carbon footprints. By integrating cutting-edge technologies and digital tools, we help companies optimize their processes and improve overall performance.

KPMG's human capital advisory services ensure that organizations are equipped with the right talent and leadership to drive these changes effectively. We work closely with companies to develop strategies for talent acquisition, leadership development, and workforce planning, ensuring they have the skills and capabilities needed to thrive in a rapidly changing industry. This holistic approach ensures that companies are not only meeting their current operational needs but are also positioned for long-term success.

By integrating these levers, KPMG provides a holistic strategy that not only meets immediate operational goals but also positions mining and metals companies for long-term sustainability. Our specialists collaborate closely with organizations to tackle day-to-day operational challenges while crafting long-term growth strategies. This approach is detailed in our latest report, showcasing how our services align with industry needs to foster resilience and growth.



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