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Allianz Research

Metals and mining: Do we live in a material world?

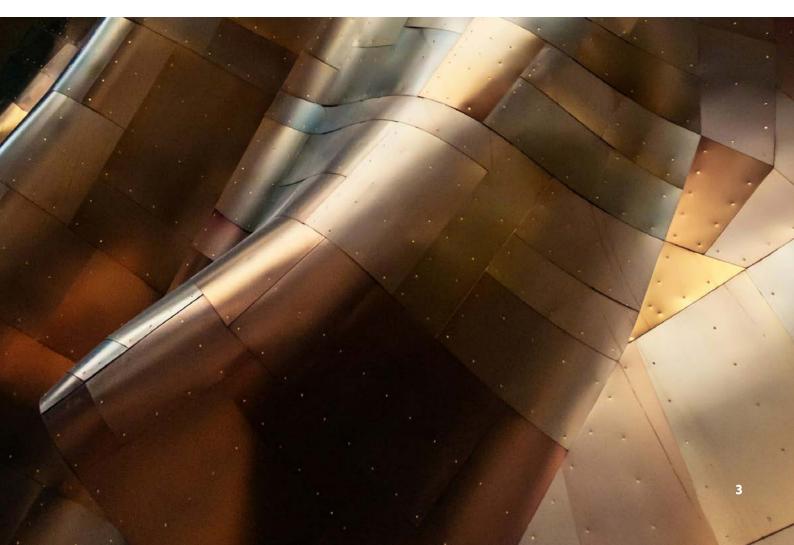
Executive Summary



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- Though demand for metals is skyrocketing, uncertainty, price volatility and CAPEX needs make companies very cautious. According to the International Energy Associations (IEA)'s stated policies scenario (STEPS), demand for metals could double (even triple if we take the Announced Pledges Scenario (APS), which take for granted the fact that governments will reach all announced goals). Copper (2x) and lithium (7x) will be the most in demand, which should lead to higher prices for the sector. But timing the increase in supply is key: In the last 18 months, lithium prices have slumped by -85% as supply has increased by +70% since 2021. Volatile commodity prices and uncertainties around policy and regulations have made companies cautious about committing substantial investments to long-term, capital-intensive projects. Though capex has been growing, in 2023 it stood just 22% above 2015 levels. Instead, companies in the sector are increasing further the pay-outs to shareholders: In 2023, dividends and stock buybacks were almost four times higher than in 2015. This conservative capital allocation is echoed in the growing M&A activity to acquire well-established assets.
- Speculative behavior is on the rise and fuels bubbles which could be detrimental to metals and mining firms as well as downstream sectors. Our analysis reveals that speculation has been rising on a certain number of metals. Since 2022, the speculative index for copper has been on average 30% higher than between 2006-2019. Speculation also remains elevated for cobalt while it has been declining for lithium as prices plummeted recently.
- Exploration needs to step up as mining lead times are getting longer. Some metals are at risk of falling into a supply gap, which will require more investments in exploration and the development of new capacities. In 2023, exploration budgets declined -3% from a nine-year high in 2022 to reach USD12.8bn. These budgets are not expected to increase substantially, which could hinder the sector in the longer run as mining lead times are now close to 18 years for recently opened mines, up from 13 years for mines that opened between 2005 and 2009. Countries such as Canada, Australia and Chile, which have large metals reserves and benefit from significant exploration budgets, could see their metals export increase substantially. Indeed, Canada and Australia expect their metals exports to double by 2030.

- To close supply gaps, governments should broker alliances and partnerships with mineral-rich countries. They could also support in de-risking some projects, while miners should invest in technologies to make exploration and mining faster and more efficient. Recycling should also be high on the agenda for both governments and companies. Client sector firms at risk of a profitability shock due to higher costs should consider diversifying supply chains, vertical integration and looking into alternative technologies to increase their resilience.
- Alternative technologies should incentivize innovation and strategic planning for mining majors and not a wait-and-see attitude. Most technologies related to physical products take anywhere between 15 to 50 years to reach commercial applications and investors should not use technology as an excuse to avoid the green rush. Worse, by not making the proper investments, they incentivize substitution technologies. The recent developments around sodium-ion batteries coincided with sky-high lithium prices. Providing sufficient supply of metals at reasonable prices, strategic planning and innovation should also be at the heart of the metals and mining agenda.





The energy transition: metals & mining's golden nugget

A world fueled by metals. The global shift towards renewable energy and electric mobility is gaining traction as firms and policymakers race to mitigate climate change and reduce dependence on fossil fuels. This transition will be metal-intensive and demands a substantial increase in metal production (Figure 1). Demand could double in the Stated Policies scenario (STEPS), which takes into account all existing policies, and it could even triple in the Announced Pledges Scenario (APS), which assumes all climate pledges made by governments are fully met. In an ambitious Net-Zero scenario, demand could quadruple. Critical metals such as lithium, cobalt, nickel, copper and rare earth elements (REEs) are essential for manufacturing batteries, energy storage, electric vehicles (EVs), wind turbines, solar panels and other technologies

related to the green transition. Copper, for instance, is used extensively in electricity grids and its properties also make it key for solar panels, wind turbines and batteries. REEs are key components in the permanent magnets integrated in wind turbines¹, while lithium-ion batteries are the standard in EVs and electronics at large. Beyond critical minerals, massive quantities of other minerals such as steel and iron will also be required. Steel and iron constitute 80-90% of the material mass of a wind turbine and offshore installations also require steel foundations. Based on current technologies, each new megawatt of solar power capacity requires between 35 to 45 tons of steel, and each new megawatt of wind power capacity requires between 50 (onshore) to 200 (offshore) tons of steel.

¹ For further details on critical minerals see our report <u>Critical raw materials – Is Europe ready to go back to the future?</u>

40000 4.4x Mineral demand for clean 33% energy technologies (kt) 3.4x 30000 20000 2x 40% 10000 1x 10% 9% 0 2022 2040 Stated 2040 2040 Net policies Announced Zero scenario pledges Emissions by scenario 2050 scenario Hydrogen technologies ■ Electricity networks ■ Electric vehicles ■ Grid battery storage Other low emissions power generation ■ Solar PV ■ Wind

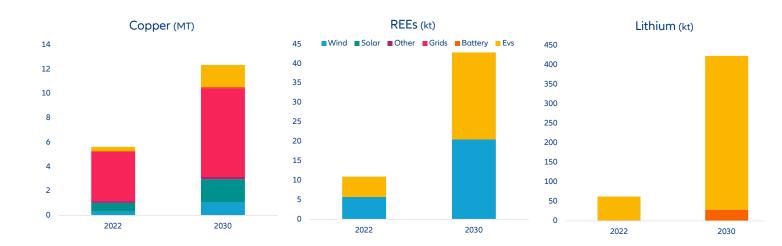
Figure 1: Mineral demand for green energy technologies

Sources: IEA, Allianz Research

Higher demand and higher prices should benefit the sector but timing is key. From a commodity markets perspective, copper demand could rise to 12 Mt (APS – see Figure 2) per year by 2030, from about 6 Mt per year currently. Although its volumes will be more moderate, lithium could see the biggest relative increase, given the larger jump in demand, while demand for REEs could increase 2.5-fold. Against this backdrop, prices for most metals are expected to increase in the future. Cobalt and nickel prices could double by 2050 while lithium and copper prices could go up by +50%. This should boost both revenues and profitability for metals & mining corporates. However, increasing capacity to meet surging demand is not an easy call for players in the sector. The lithium market is a good illustration of the challenges that can

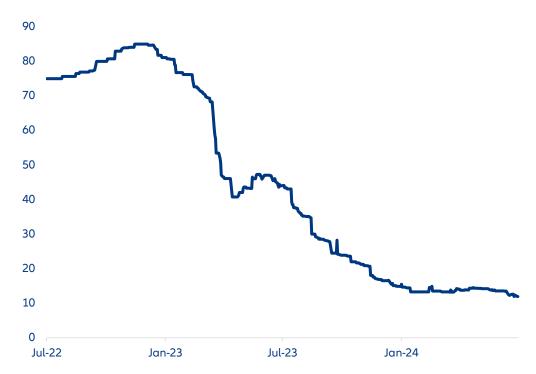
arise when developing new capacity. Between December 2022 and July 2024, lithium prices slumped by over -85% on the back of increased global supply (Figure 3), especially from Australia. Indeed, between 2022 and 2023, global production of lithium increased by about +30%, and between 2021 and 2023 production grew by almost +70%. When large mining capacities become operational, it can lead to downward pressure on prices and put at risk the economics of some projects and companies. Although we expect prices to increase over the long run, episodes of volatility are likely to occur and could pose significant challenges to corporates expanding mining capacity with "bad" timing.

Figure 2: Mineral demand in the APS for selected minerals

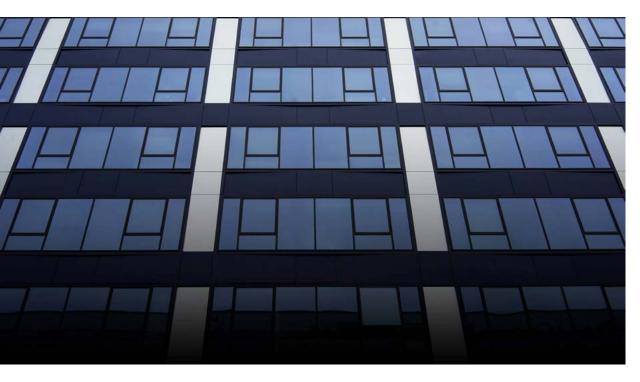


Sources: IEA, Allianz Research

Figure 3: Lithium prices (USD/ton)



Sources: LSEG Refinitiv, Allianz Research

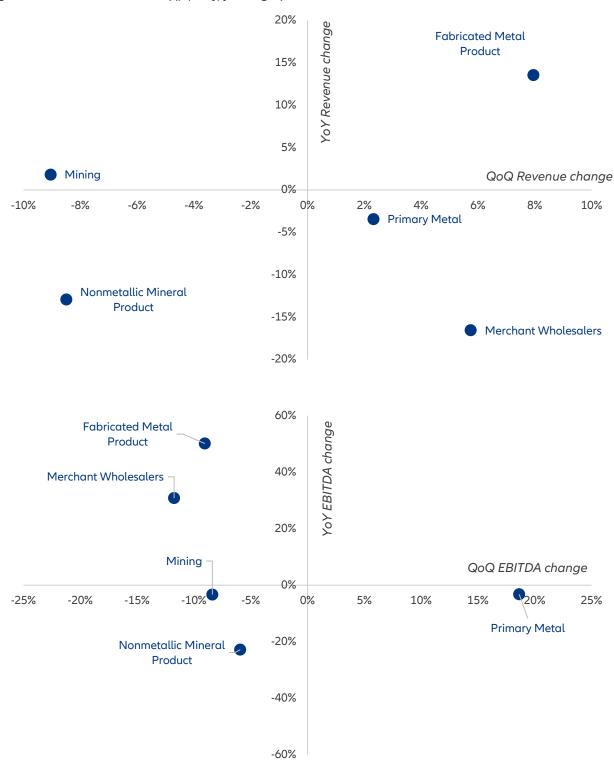


Corporates face a serious growth dilemma

A difficult market with lower prices and thinner margins in 2024. After a very strong 2022, with sky-high metal prices and strong demand from client sectors, the metals & mining sector experienced a slowdown in 2023. Metals prices remained relatively stable, with base metal prices increasing by a meagre +3.6% y/y in 2023. Demand decreased slightly but was offset by supply constraints in some segments (such as cobalt) and transportation issues. The average EBITDA margin for the metals & mining sector stood at about 13% in 2023, a significant

decrease from 2022 when it was well above 20%. Yet, most companies still managed to post decent profitability metrics. Firms in the sector also maintained strong liquidity, with an average current ratio of 1.6 in 2023, slightly down from about 2 in 2022. However, we must note that the dynamic in terms of revenue as well as profitability is rather negative in most sub-segments (Figure 4).

Figure 4: Revenue and EBITDA (q/q vs. y/y changes)

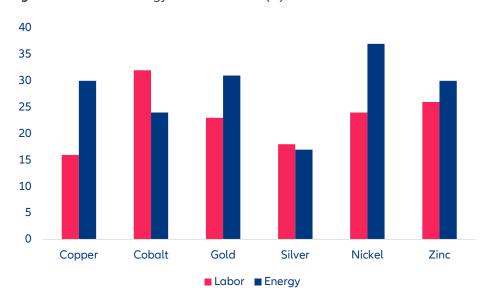


Sources: LSEG Refinitiv, Allianz Research

Energy and labor costs should continue to weigh on profitability. In 2023, rising labor and energy costs significantly challenged corporate profitability across various industries. Following a major purchasing-power crisis, wages surged as workers sought higher compensation. Increasing labor costs made it difficult for companies to maintain profitability without raising prices. However, with demand slowing down, their pricing power is also at risk (as reflected by the momentum in revenues). Furthermore, energy costs also increased substantially

since 2022, particularly in the wake of the war in Ukraine and the consequent supply-chain disruptions. The metals sector is not immune to these pressures (Figure 5), especially in energy-intensive metals (e.g. nickel, zinc) and labor-intensive ones (cobalt). Overall, in 2024, we expect wages to continue to increase significantly by +3.7% in the US, +5.2% in the UK and +3.9% in the Eurozone. They should be lower in 2025 but will remain substaintial.

Figure 5: Labor and energy costs 2019-2022 (%)



Sources: S&P Global Market Intelligence, Allianz Research

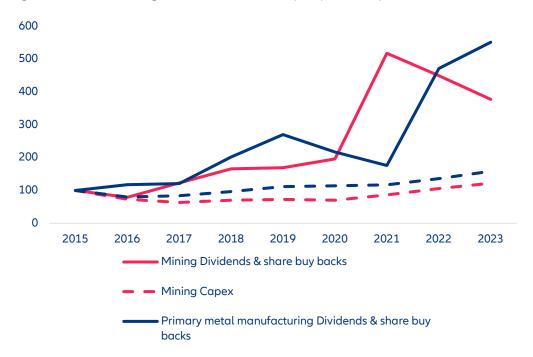
Carbon prices going live. In 2024, the regulatory landscape for carbon emissions will tighten significantly, directly impacting metals and mining. In Australia, the safeguard mechanism is now more stringent, imposing costs on miners and processors based on their emissions relative to industry benchmarks. In Canada, federal carbon prices rose to CAD80 per ton on 01 April, with a target of reaching CAD170 per ton by 2030. Despite partial offsets, Canadian emitters will face some of the highest carbon costs globally, intensifying the financial pressure on the sector. These regulatory changes highlight the increasing financial burden on industries that are heavy carbon emitters, pushing them to adopt more sustainable practices or face escalating costs. In the EU, 2024 is the first full year with the Carbon Border Adjustment Mechanism (CBAM). While this year is mostly about reporting, and direct payments will not be required for two years, some extra costs for reporting and getting ready for 2026 will bite firms doing business in Europe. Moreover, the CBAM could inspire other countries to implement their own such mechanism, even as some look for exemptions.

Conservative capital allocation and increased payouts. In recent years, metals & mining companies have increasingly favored rewarding shareholders through dividends and share buybacks rather than investing heavily in capital expenditures (Figure 6). Although the combined capex of the 66 large mining companies in our analysis increased by about +15% in 2023, it reached a level only 22% higher than that of 2015. Volatile commodity prices and uncertainties around

policy and regulations have made companies cautious about committing substantial investments to long-term, capital-intensive projects. Instead, they have chosen to increase further the pay-outs to shareholders, which yields immediate returns for management and helps gain investor confidence. In 2023, dividends and stock buybacks were almost four times the amount of 2015. These practices also help firms improve some of their

financial ratios and market valuations by reducing outstanding shares – hence increasing earnings per share. In the low-rate era, it was shareholders that increasingly pushed for dividends and buybacks, but now that rates have increased sharply, companies are delivering high pay-outs to keep shareholders invested.

Figure 6: Metals & mining firms' dividends and capex (2015=100)



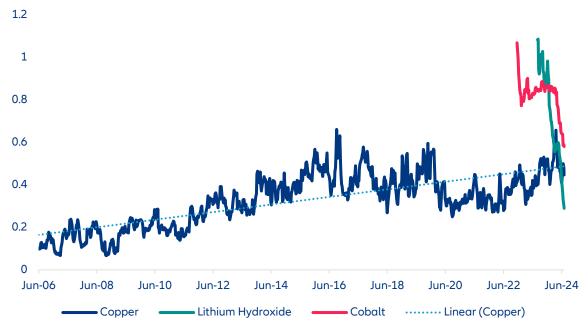
Sources: LSEG Refinitiv, Allianz Research

Rising speculation increases volatility and can deter investments. The risk of bubbles in metal commodities has been a significant concern, particularly in the context of the ongoing energy transition. Of course, the rapid push towards the energy transition increases demand for minerals like lithium, copper, cobalt, and nickel.

This increased demand can fuel sharp price increases. However, these fluctuations are based on fundamentals and can be coped with or at least managed by producers and clients. Nevertheless, on of the main drivers of potential bubbles in commodities markets is speculative investment. This speculative behaviour can draw further speculation and fuel further investments, but this can also backfire as bubbles can burst. This happened to lithium prices as rising prices draw a lot of investors into the hot

metal, but when demand increased sharply prices fell and eventually speculators also started to bet against the metal. This type of volatility is also driving away metals and mining companies driving from making necessary capex. Our analysis of speculative behaviour using Working's speculative index reveals that speculation has been rising steadily on copper and palladium over the last few years (see Figure 7). Since 2022, the speculative index for copper was on average 30% higher than between 2006-2019. Speculation also remains elevated for cobalt while it has been declining for lithium as prices plummeted recently.

Figure 7: Working's speculative index for selected metals

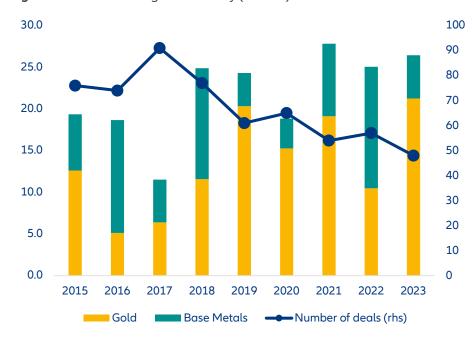


Sources: CFTC, Allianz Research

Strong M&A activity as firms looks to spend cash and acquire assets. In 2023, the metals & mining sector experienced robust merger and acquisition (M&A) activity, with a surprising focus on gold (30 deals, Figure 8). Deal value reached USD26.4bn, the second-highest level in a decade. A major contributor to this figure was the megadeal between Newmont Corporation and Newcrest Mining (USD17bn), which alone accounted for 63% of the total deal value, representing close to 4mn tons of gold and 22.5mn tons of copper in reserves and resources.

Despite the overall increase in deal value, the number of transactions decreased from 57 in 2022 to 47 in 2023. Copper also saw substantial M&A activity, with 14 deals adding up to almost USD5bn, driven by its increasing strategic importance in the energy transition. Despite geopolitical uncertainties, we expect this trend to continue through 2024, particularly in critical metals such as copper and nickel, as interest rates should ease.

Figure 8: Metals & mining M&A activity (USD bn)



Sources: CFTC, Allianz Research

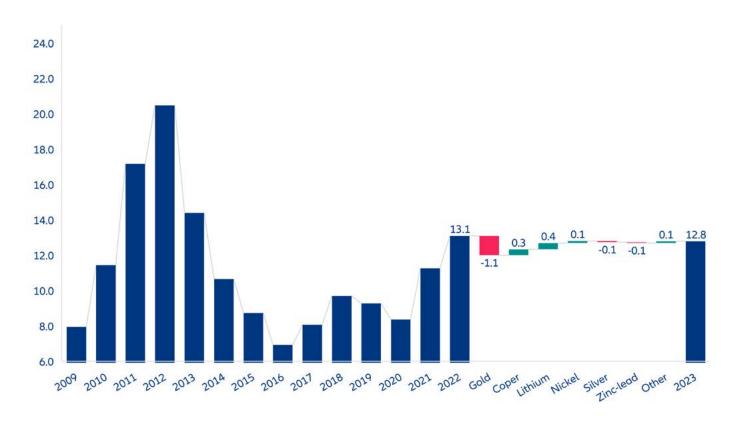


Mining: the race against the clock

A supply gap is looming for copper and nickel sulphate but it can be overcome. According to the International Energy Agency, the expected supply of copper may peak within the current decade. Even with high production scenarios, the supply by 2030 is projected to fall short of meeting the APS requirements by 10% (20% for the NZE scenario). Increasing supply through mining is pivotal to close this gap. Gaps are also expected for the four magnet REEs (i.e. neodymium, dysprosium, terbium and samarium) though these are rather small (5kt in the NZE scenario by 2030) and can be closed. Likewise, there is an estimated 1 Mt supply gap in the APS for nickel sulphate (battery-grade nickel) but capacities can become live in 18-24 months.

Energy transition metals behind exploration budget resilience in 2023. There was a slight decline in mining exploration budgets in 2023, reflecting broader economic challenges and the cautious approach within the industry. The total exploration budget decreased by -3% to USD12.8bn from USD13.1bn in 2022, which marked a nine-year high. Amid weakening metal prices, high interest rates and cautious capex, miners did not spend more on exploration. Unsurprisingly, the share of smaller companies retreated compared to that of larger firms. Despite these challenges, exploration for critical minerals such as copper, lithium and nickel showed resilience. These increases offset the overall decline in exploration budgets, underscoring the pivotal role of critical minerals (Figure 9).

Figure 9: Global exploration budgets (USD bn)

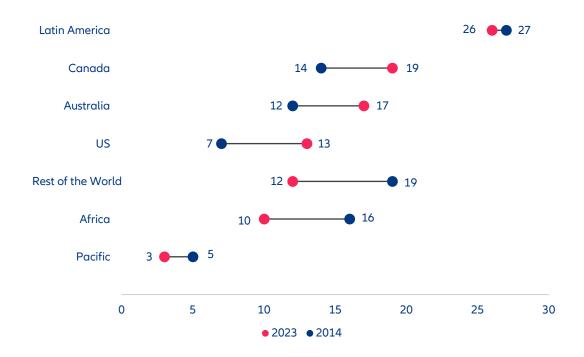


Sources: S&P Global Market Intelligence, Allianz Research

Though junior firms are retreating, the geographical focus remains broadly unchanged. We also notice a shift in exploration stages, with grassroots and mine site exploration budgets falling by -10% and -4%, respectively, while late-stage exploration increased by +4% in 2023. Late-stage exploration became the largest budget category at close to USD5bn, the highest since 2013. These developments are in line with the more caution strategic approach that favors advancing on known deposits rather than embarking on new discoveries, which are typically riskier and costlier. Regionally, exploration budgets in Canada and Australia, which rely heavily on

junior explorers, declined by -9% and -7%, respectively. In contrast, Latin America, dominated by major mining companies, saw a +2% increase in exploration budgets, driven mainly by copper and lithium exploration. However, these recent dynamics do not reflect longer-term trends. Between 2013 and 2024, Canada and Australia have seen their share in global exploration increase substantially (Figure 10), which will set them up well to capitalize on opportunities from the green transition. Indeed, the two countries expect their metals exports to double by 2030.

Figure 10: Share of regions in global exploration budgets 2013 vs 2024 (%)



Sources: S&P Global Market Intelligence, Allianz Research

Exploration budgets should remain resilient in 2024.

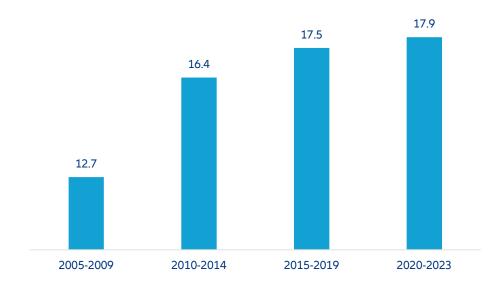
Although economic and geopolitical uncertainty and volatile metal prices are still shaping corporate decision-making, we expect budgets to remain broadly stable. Critical minerals are likely to continue to drive exploration. Nevertheless, many firms could continue to prioritize investing on advanced assets over new exploration, potentially exacerbating future supply deficits for key metals.

With increased regulation and red tape, mining lead times have become quite extensive. The time between the discovery of a mineral deposit to the beginning of commercial production, known as the lead time in the mining industry, has significantly increased in recent years, posing substantial challenges for the industry. The average lead time for mines started between 2020 and 2023 is now nearly 18 years, a sharp increase from close to 13 years for mines that began production between 2005 and 2009 (Figure 11). This trend is primarily being driven by extended exploration and authorization phases,

and the complexities associated with securing financing and building permits. Regulations have become stricter, requiring extensive environmental and social impact assessments that increase red tape. Although this is necessary to mitigate the environmental and social impacts of mining activities, it significantly lengthens the timeline. The time required to secure financing and obtain the necessary building permits has also been increasing. Furthermore, as accessible high-grade deposits are become rare, mining companies are increasingly targeting deeper or lower-grade deposits, which require more sophisticated, hazardous and costly extraction techniques. This technical complexity adds to the exploration and development phases, further extending the timeline to production, especially for metals such as nickel (Figure 12).

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Figure 11: Mining lead time based on production start (in years)



Sources: S&P Global Market Intelligence, Allianz Research

Figure 12: Mining lead time by metals and by phase (in years)



Sources: S&P Global Market Intelligence, Allianz Research



How can governments and corporates boost production?

Governments should aim for alliances and cooperation.

As we underlined in our previous research², metals supply and mineral resources are highly concentrated in a small number of countries. In this context, importing countries should create ties with mineral-rich countries to ensure adequate supply for their industries. For example, the EU has entered into a number of alliances since 2022, including the Minerals Security Partnership (MSP) – involving the US, Australia and Canada, among others. In 2024, additional alliances could emerge. Countries in the Middle East looking to diversify their economies and investments could pave the way for deeper cooperation. These alliances and partnerships should secure supply, reduce the cost of trade and enhance processes (i.e. remove trade restrictions).

Public policy could consider tools to de-risk certain projects while miners should invest in tech. Increased lead times and higher complexity can deter investment in new mining projects, especially those with long horizons. This reluctance could exacerbate the supply-demand

imbalance, making it more challenging to meet the material requirements for the energy transition, or lead to sharp increase in prices. The use of public-private partnerships or engaging in a more proactive foreign investment policy can be tools to bend the risk-return profile of mining ventures. The mining industry must also invest to find ways to streamline exploration. Indeed, innovations in mining technologies and practices can also help reduce lead times by improving the efficiency and effectiveness of exploration and extraction.

Policymakers and corporates should also support recycling and circular economy. Investing in recycling and circular economy initiatives can reduce dependency on raw-mineral extraction and enhance supply security. This would not only provide a steady supply of critical minerals but also support sustainability efforts. Governments should integrate these aspects when designing industrial policies, while corporates should look to suppliers in the recycling business to support demand and foster the emergence of new firms/additional capacities.

² See our report <u>Critical raw materials – Is Europe ready to go back to the future?</u>

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Corporates from client sectors should diversify their supply chains, integrate vertically and develop alternative technologies. Firms buying minerals and products from the metals and mining sector could face higher costs and supply disruptions going forward. They can increase their resilience and mitigate price volatility and supply-chain disruptions through a number of different strategic actions. First, they can diversify supply to avoid an over-reliance on a single country or supplier. This is all the more relevant in the current environment with heightened geopolitical tensions. They can also establish long-term contracts and strategic partnerships with mining companies, which would provide stability in supply and visibility on pricing. Strategic partnerships can even take the form of vertical integration. For example, the automaker Stellantis was involved in three M&A operations within the last 12 months involving a metals & mining target. Corporates can also invest in R&D to uncover technologies that use alternatives/substitutes to some metals. For example, in 2024, we will probably know if alternative chemistries have a realistic claim on the hegemony of lithium-ion batteries. The development and scaling of sodium (Na-ion) batteries technology by a number of Chinese firms could be an important milestone to challenge the dominance of lithium-ion batteries.

Alternative technologies should incentivize innovation and strategic planning from miners and not wait-andsee attitude. The prospect of new technologies replacing current metals by substitutes is a risk for firms in the sector. However, tech development accelerates for 2 reasons: i) if existing technologies are too expensive and ii) if existing technologies do not meet market and consumer demand. The recent rapid tech evolution of sodium-ion batteries is deemed responsible for lower investment in lithium and other metals used in current batteries. Nevertheless, we must note that sodium-ion batteries were being developed as soon as the 1980's, the recent resurgence and improvements around it were also driven by the rising price of lithium. Indeed, most technologies related to physical products take anywhere between 15 to 50 years before commercial applications. From technological challenges to economic viability, there are several hurdles to overcome. Metals and mining companies should make sure to participate actively in innovation and not adopt a wait-and-see approach that can be beneficial (when prices are high) or detrimental (when prices are low or worse when the metal is substituted). They can be involved in research and development on materials, they can partner with industrial or chemical firms, they can explore for the metals of the future etc.



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