



The New Era of Mining

One year ago, when the inaugural edition of *The New Era of Mining* was published, the price of gold was just below \$2,000 per ounce—a historic high. Twelve months later, the precious metal has appreciated by approximately 35 percent, rising to over \$2,600 at the time of writing.

Gold purchases by central banks in developing countries have remained the primary force driving prices, but the magnitude of their stockpiling suggests intentions beyond merely hedging against geopolitical risk. China, as the primary suspect, has purchased over 2,800 tons of gold from overseas in the last two years—more than all the metal backing gold ETFs globally. As a number of industry leaders recognize, a frenzy of such scale is the marker of a seismic shift. In simple terms, the BRICS countries, led by Beijing, are attempting to de-dollarize their economies. As the CEO of Alamos Gold, John McCluskey, explains: “This trend suggests a growing reliance on gold to underpin a parallel economic trade bloc, driven by mutual distrust among these nations.”

Part of Beijing’s motivation is to acquire immunity against potential future sanctions like those the West imposed on Russia. “When the U.S. froze Russian assets, central banks took notice, and now countries like China are diversifying to ensure their assets cannot be frozen in future disputes,” Martino De Ciccio, the CEO of Montage Gold says. Although it is difficult to predict when the gold-purchasing spree will end, De Ciccio, whose company has recently obtained all the permits for its mine in Côte d’Ivoire, is confident that we are witnessing only the beginning of a persistent trend. Indeed, China’s gold reserves, in relative terms, are still the lowest of any major economy, indicating that Beijing’s aggressive purchasing strategy is set to continue in the long term. With this in mind, many gold producers are confidently expanding their operations around the world. The Canadian B2Gold, for example, is investing heavily in further exploration and development, planning to produce about 600,000 ounces of additional gold per annum soon.

IN THIS REPORT...



KATHLEEN L. QUIRK |
PRESIDENT & CEO,
FREEPORT-McMoRan

We are currently in a new era for copper. Copper is essential to reducing CO2 emissions and supporting the transition to greener energy sources like solar and wind, as well as the electrification of daily life. These trends are major drivers of future demand.



TIM GITZEL |
PRESIDENT & CEO,
CAMECO CORP.

Cameco is the second-largest uranium producer globally, just behind Kazatomprom in Kazakhstan. We are currently ramping up production after several shutdowns, aiming to produce 36 million pounds from our key operations.



RAYMOND GOLDIE |
PRESIDENT,
**PROSPECTORS &
DEVELOPERS ASSOCIATION
OF CANADA (PDAC)**

We have highly effective investor incentives like flow-through shares and mineral exploration tax credits that boost Canadian competitiveness, economic activity and productivity. The longevity of these incentives is key to sustaining our top rank in the world.





We are committed to responsible gold production and growth through our current mines, development projects, and aggressive exploration. In 2024, we aim to produce 800,000-870,000 ounces, with a sharp increase to 1,030,000-1,150,000 ounces in 2025.

CLIVE JOHNSON |
PRESIDENT & CEO, **B2GOLD**



The strange disconnect

Naturally, this is good news for gold companies. Yet, for many of them, the results have not been as impressive. The stocks of a great deal of gold miners have not mirrored the surges in the metal's price, especially in the case of juniors. "This is the biggest disconnect I have seen in over 20 years, worse than 2008. Metal prices are high, yet investors are capitulating," says the CEO of Dakota Gold Corp., Jonathan Awde. One major reason for this is that, in the past 15 years, bull runs in the industry have not been sustained enough to impact stocks. Major investors are therefore more cautious to lock their money in mining companies.

This caution is compounded by the changing investment landscape, where accessibility to passive products such as ETFs and indexes has redirected capital away from mining stocks. The advent of crypto and the continuous bull runs of instruments like the S&P 500 have exacerbated that trend. Mining companies, therefore, have had to adapt. Looking for the right kind of M&As to boost investor confidence has been key for some. "Our team decided to buy an asset in production instead of going through the long process from exploration through development, permitting, and construction. This strategy allowed us to avoid the slow, monotonous cycle that can take 10 to 20 years. Companies that are in production but cannot find more gold at their current operations have to continuously invest in exploration or turn to M&As," illustrates Ryan King from Calibre Mining. His company has thus successfully attracted a suite of investors. Calibre is also changing its marketing strategy, targeting retail investors. As King puts it, "The major difference today is that almost everyone has access to online banking and trading accounts. This means that individuals now manage their investments, relying on their own research rather than solely on investment advisors. This shift means that publicly traded companies must adapt their marketing strategies."

At any rate, many are confident that the current gold rally will make a difference soon, especially as companies report higher cash flows due to elevated prices. Their expectations are further heightened by the fact that gold prices hit all-time highs during significant interest rate increases. "I predict that the gold price will easily hit \$3,000 by the end of 2024," Ewan Downie, the CEO of i-80 Gold said in June, projecting that the ongoing interest rates cuts will push the metal's price even further.

Where's the money?

Having spoken of the strange disconnect between gold prices and the value of gold miners' stocks, it should be noted the mining industry at large suffers from the retreat of major investors. In short, big money is hard to find nowadays. The deficit is most notable for companies at the stage of exploration and development. "A few years ago, if you had predicted a gold price of over \$2,000 an ounce and a copper price of over \$4 a pound, you would expect junior explorers to raise money easily, but that has not been the case," says the CEO of Faraday Copper, Paul Harbidge. This is a pressing issue not just for miners themselves, but for all of us, since the world needs way more primary materials in the context of the green transition.



RANDY SMALLWOOD |
PRESIDENT & CEO,
WHEATON PRECIOUS METALS

China's goal to increase its gold reserves, which currently make up about 4 percent of its central bank reserves compared to 8.5-9 percent in the U.S., will continue to support gold demand.



JOHN MCCLUSKEY |
PRESIDENT & CEO, **ALAMOS GOLD INC.**

Unlike previous cycles driven by Western investment, the current rise is fueled by Asian central banks, particularly those allied with India, China, and Russia.



Smart investors, especially those focused on Responsible Finance and Development Finance Institutions, will recognize the necessity of industries like mining for the energy transition and other societal needs and will invest accordingly if companies address these risks head-on.

BRADLEY ANDREWS | CEO,
SLR CONSULTING LIMITED



SilverCrest Metals' president, Christopher Ritchie, summarizes the problem: "Mining requires a significant upfront investment with an unknown outcome and a finite resource. Investors are reluctant due to high initial costs, ESG concerns and the long timeline to bring new mines online. The lack of capital investment critically impacts supply." ESG considerations, in particular, seem to be at the heart of the retreat of institutional investors from the sector. Yet, for the green transition to happen we will need more silver, more copper, more rare earths, more lithium, etc. For this, new mines need to be opened or older ones expanded—activities which come with bulky capital expenditures. In addition, the withdrawal of big financial institutions from the sector may have an extra counterproductive layer to it: "Banks with high ESG standards for mining projects ensure maintenance of tailings dams and proper social practices. With their withdrawal, new investors who may not uphold these high standards are stepping in, which could lead to a decline in industry practices," observes Rodrigo Barbosa, the CEO of Aura Minerals, a mid-tier gold and copper producer in the Americas.

Not all is bleak, however, as the sustained high prices of many metals are beginning to draw attention to mining. "It is only in the last year or two that metal markets have started to rebound, and people are beginning to realize the underinvestment in an industry needed to support ongoing urbanization and the energy transition to address climate issues," says McEwen Mining's CEO, Robert McEwen. Moreover, the industry is turning increasingly to third-party consultants who can help it streamline its sustainability efforts to regain attractiveness to investors. Bradley Andrews, the CEO of one such company, SLR Consulting, highlights the need for transparency: "For example, when we track the supply chain of a material like cobalt, we trace its journey from a mine in the Democratic Republic of Congo through the refinery process, all the way to an electric vehicle in California. This level of transparency and traceability builds trust, allowing our clients to present clear evidence of their responsible practices."



The Silver Prince of sustainability

The other major anomaly in precious metals has been silver's underperformance relative to gold. The gold-silver ratio is a metric that tracks the two metals' relative prices. The ratio has gravitated around 60:1 in the past decades. Currently it stands at 85:1. But industry leaders are sure that this is a temporary phenomenon. "Silver has better fundamentals than gold due to its significant industrial demand," shares Randy Smallwood, the CEO of one of the biggest precious metals streaming companies in the world, Wheaton Precious Metals. Due to its wide applications, the demand for silver is projected to grow significantly in the coming years, driving up prices. "Currently, about 65 percent of global silver production is consumed in industrial applications," Smallwood adds.

In addition, the silver supply is limited. In fact, there are only a few purely silver mines in the world, as the metal is most often a byproduct of copper, gold, lead or zinc. "Silver has been in deficit for three years and we expect that to continue. The demand for silver in technology and industrial applications, most notably solar, is growing, and new technologies are looking to use more and more silver. This growing demand, coupled with supply not keeping pace, will likely cause silver prices to rise in the future," emphasizes the interim CEO of Hecla Mining, Catherine Boggs.

Uranium - rising from obscurity

It has been a golden year for uranium. After the heavy metal received two heavy consecutive blows – the 2008 financial crisis and the Fukushima disaster, —2024 marked its stellar return, with prices more than doubling compared to the previous year. Supply concerns and nuclear energy renaissance—these are the main factors behind the spike. We spoke with some of the major Western players in the sector to get a deeper sense of the story.]

After over a decade of nuclear energy facing challenges, 20 countries, including the U.S. and Canada, announced at COP28 in Dubai plans to triple nuclear capacity by 2050. This shift is largely due to a growing recognition of the limitations of renewables to sustain the power grid on their own. As David Cates, CEO of Denison Mines, a Canadian company developing deposits in the uranium-rich Athabasca Basin, puts it: "There is a broad recognition that while renewables are desirable, they need to be paired with supplemental and reliable power sources to ensure stable energy supply."

But the capacity of the West to meet the anticipated demand surge is uncertain. Tim Gitzel, CEO of Cameco, the world's second largest uranium company, is confident of the company's capacity to ensure supply: "We would first restart our closed operations and then consider



KEITH NEUMEYER | PRESIDENT & CEO, FIRST MAJESTIC SILVER CORP.

Copper is the highway, but silver is the glue. Without silver, nothing works. Silver is essential in virtually all modern technology—your cell phone, automobile, refrigerator and even your television wouldn't function without it.



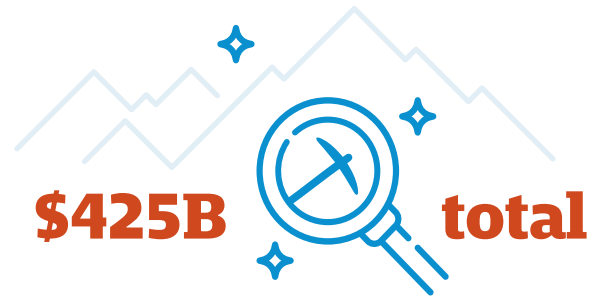
CATHERINE BOGGS | INTERIM PRESIDENT & CEO, HECLA MINING COMPANY

Primary silver is becoming harder to find globally, and the development of new sources is challenging due to lengthy permitting processes and other regulatory hurdles. As demand continues to grow faster than supply, we expect the market dynamics to favor a rise in silver prices.



We aim to be a reliable supplier of uranium, conversion, and nuclear fuel, maintaining our record of never missing a delivery in 36 years. We hope to see our Global Laser Enrichment project advancing ... For Westinghouse, we envision a full order book for various reactor models, indicating strong global demand.

**TIM GITZEL | CEO,
CAMECO CORP.**



potential of technological advances in mining

Source: World Economic Forum

new mines. In Saskatchewan alone, there are 102 uranium companies exploring in the Athabasca Basin, indicating a resurgence in interest as market conditions improve." Cameco is also advancing its Global Laser Enrichment project in the U.S., which has the potential to re-enrich tails and produce nuclear fuel.

Others, like the CEO of the exploration company CanAlaska Uranium, Cory Belyk, are more cautious. "To truly meet our uranium needs, there must be an investment in discovery. (...) A critical factor is incentivization, which includes long-term contracting and a supportive uranium price. Many deposits in the Western world are not economically viable below \$80 per pound, so the market needs to support higher prices." Cates echoes this concern, also pointing to the cumbersome permitting processes that slow down the development of new uranium projects: "Extended timelines for approvals present challenges for Canadian uranium projects and our country's ability to be globally competitive. Given the added federal regulation by the Canadian Nuclear Safety Commission, uranium mining in Canada is subject to additional regulatory oversight when compared to most other mining projects."

To this day, the West remains far from self-sufficient, importing large uranium quantities from Kazakhstan—the world's largest producer. The war in Ukraine and Russia's close ties with the Asian country have casted doubts regarding its reliability as a supplier. "Our production from Kazakhstan is significant, and they are crucial for the global uranium supply, contributing about 45% of the world's production," shares Cameco's CEO, Gitzel. David Cates from Denison Mines, however, warns that Western utilities are uneasy about the influence of Moscow over Kazakhstan, projecting that there will be more and more appetite for Western, and especially Canadian uranium. The latter country is both rich in the metal and geopolitically safe — an almost unique combination. (Australia being the other exception.) But whether this appetite can be satisfied remains an open question.

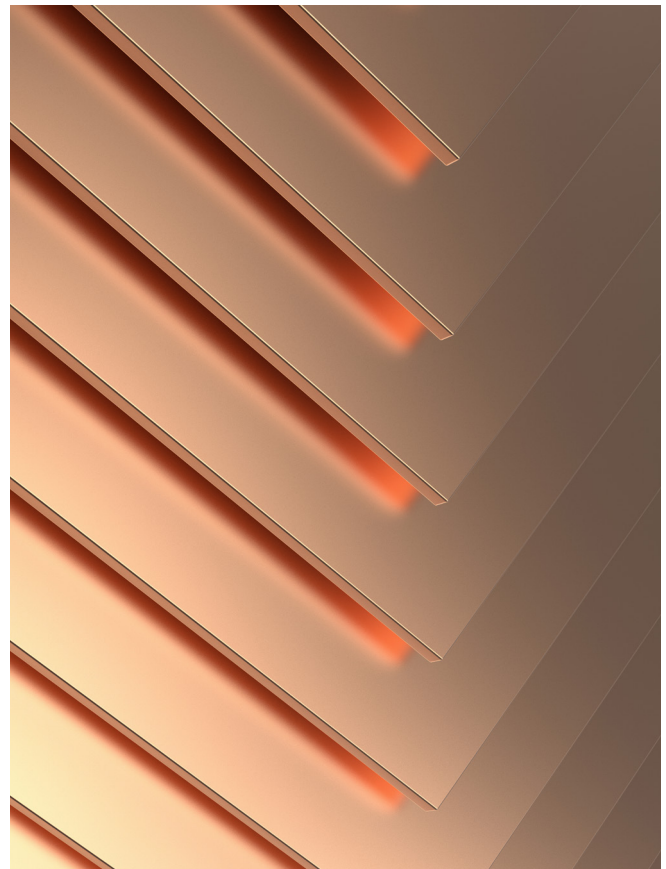
The end of Dr. Copper

When copper prices go up, the global economy is in good health—that correlation goes by the name of Dr. Copper. It all boils down to the usage of copper in large infrastructure projects. Recent developments, however, have demonstrated that Dr. Copper is obsolete. The oldest metal has hit record prices in the last two years, in spite of China's economic hurdles. Beijing is the world's largest copper consumer, and its property crisis was supposed to significantly affect demand. Where is the catch then? Renewables. "Even with tepid economic growth in areas like Europe and China, copper consumption continues to grow at attractive rates due to the push for renewable energy," points out the CEO of Capstone Copper, John MacKenzie. MacKenzie is confident that copper prices will remain high, as the metal is essential for solar and energy installations, as well as EV batteries.

Essential as it is for the green transition, copper supply in the future may be scarce. "There have been no significant recent copper discoveries, and the pipeline of new projects is shrinking. The opportunities are becoming

smaller, and the timelines for bringing new projects online are getting longer," confides Kathleen Quirk, the new CEO of Freeport-McMoRan. Quirk believes in the power of new technologies to address the potential supply gap. "We are revisiting previously mined stockpiles, where ore that was once considered unrecoverable can now be efficiently processed using advanced technologies. This approach allows us to increase production at a low incremental cost and with a minimal carbon footprint, as the material has already been mined," she illustrates.

Another example of innovatively producing copper comes from Amerigo Resources. The company specializes in the production of copper through the processing of tailings from the El Teniente mine in Chile. Amerigo's CEO, Aurora Davidson, says that miners are yet to appreciate the opportunity coming from tailings: "Tailings are the waste material from the mining process, often seen as an environmental responsibility rather than an opportunity. Companies manage their tailings responsibly, but traditionally, tailings are considered waste after the economically viable metals are extracted." Changing our way of viewing tailings can be one of the answers to future supply shortages, not just with respect to copper.





ERNESTO BALAREZO |
CEO & DIRECTOR, SIERRA METALS INC.

At a recent metals conference in Lima, data was presented showing that for the next 10-15 years, supply will not meet demand, and the gap is expected to widen. This makes me very bullish on copper, especially given its critical role.



OSCAR GONZALEZ ROCHA |
PRESIDENT & CEO,
SOUTHERN COPPER CORPORATION

We are optimistic about future growth. We are preparing to meet the market demand by gearing up for copper production from Tia Maria, where we expect to commence production in two years.

Lithium high, lithium low

Platinum has recently lost its honorary title of “the white gold” to lithium. The latter’s fame grew tremendously as the global strides to achieve a green economy accelerated. As is well-known, lithium is one of the pivotal elements for the transition, essential for batteries. It may be surprising, therefore, that it is the only metal analyzed in this report whose price has markedly dropped.

“The volatility in lithium’s price is primarily due to it being a nascent, immature but very dynamic market,” explains Ernie Ortiz, president & CEO of the biggest royalties company in the space, Lithium Royalty Corp. The novelty of the market for lithium exacerbates the surges and dips that can lead to a mismatch between supply and demand at any given time but over the long term, deficits are expected to materialize at current growth rates. Ortiz assures us that these will normalize with time. “We model and invest with a long-term perspective to ensure profitability regardless of



Capstone is building copper mines in good jurisdictions in the Americas, with sector-leading growth at a time when the world needs more copper. Mantoverde is ramping up, and our project team is now shifting across to Santo Domingo next door.

JOHN MACKENZIE |
CEO, CAPSTONE COPPER



short-term price fluctuations,” he adds, emphasizing that lithium’s growth rate is projected to be more than 20 percent CAGR over the next decade. As a royalty company, Lithium Royalty does not directly engage in mining but provides capital to mining companies in return for royalties. One of its key assets is Sigma Lithium, a major global lithium producer. “We are doubling production next year, which is a substantial step forward for us. Our expansion includes a second plant, reinforcing our commitment to meeting growing demand,” Ana Cabral, Sigma Lithium’s CEO says. Cabral adds that her company is amongst the lowest cost producers, expressing confidence that the current lithium prices will not impact Sigma’s operations. High-cost producers, however, will likely be phased out until the market finds equilibrium.

Harder, costlier, further

One trend that is characteristic of the entire sector is that it is becoming increasingly difficult to start a new project. In addition to permits, which have become more complex, mining costs have risen substantially. Part of that last point is due to inflation. Significantly, however, because of resource depletion mining tends to take place deeper and deeper, and in more remote areas.

To help miners in this environment, the likes of Boart Longyear, a mineral exploration and drilling services company, have focused on data. “Mining often occurs in remote or inaccessible areas, and having quick, accurate data allows us to minimize disruptions and make informed decisions on the ground,” says the CEO of Boart Longyear, Jeffrey Olsen. Major Drilling, another drilling services provider, now presents itself as centered first and foremost on data. “Our drilling service is essentially about producing data,” the company’s CEO, Denis Larocque tells us. The industry, Larocque adds, has changed massively in recent years: “We used to say we produced rock samples, but now there is more to it. We gather information while drilling, which helps mining companies understand ground composition and predict what the mine will look like.”



ERNIE ORTIZ | PRESIDENT & CEO,
LITHIUM ROYALTY CORP.

Over 100 new lithium mines need to be built by 2030, highlighting the large volume of mining expertise and development required.



ANA CABRAL-GARDNER |
CEO AND CO-CHAIRPERSON
SIGMA LITHIUM CORPORATION

Lithium is not rare, and when its prices rose significantly, there was excess supply last year, which caused the prices to crash.



ALEX WYLIE | PRESIDENT & CEO,
VOLT LITHIUM

We are a very low-cost producer, with all-in operating costs at around \$2,800 per ton. This is much lower than others extracting lithium from brines because we do not have the upfront costs of developing a mine.



As global production declines, companies struggle to find new sources of precious metals. Chesapeake Gold's proprietary Oxidative Leach technology provides an environmentally friendly solution to unlock a vast wealth of refractory precious metals.

JEAN-PAUL TSOTSOS |
INTERIM CEO,
CHESAPEAKE GOLD CORP.



Companies like Dräger, known for its advanced safety equipment, are also having to adapt to the new mining realities. "Digital solutions play a crucial role in today's mining, particularly in communication and asset management. Communication can be challenging since radio waves do not easily penetrate underground rock, but experiments with drones deploying repeaters are underway," shares the company's CEO, Stefan Dräger. Innovations of this kind are key to ensuring that miners are better equipped to handle the challenges posed by more complex and remote projects.

One example of how mining companies themselves can come up with innovative solutions comes from Chesapeake Gold Corp. The Canadian company's technology is designed to unlock gold deposits that were previously unexploitable. Chesapeake's interim CEO, Jean-Paul Tsotsos, shares: "Our technology replicates nature's own oxidation process, which typically takes millions of years, but with our proprietary technology, we are able to do the same in just weeks to months. This approach makes previously uneconomical refractory deposits viable."

Crucially, fostering a more tech-driven mining industry may be key to tackling one of the sector's biggest challenges in the West. "Money is easier to find than people!" exclaims the CEO of Atalaya Mining, Alberto Lavandeira. This sentiment was echoed by most interviewees. Despite lucrative salaries, young people are not willing to join the high-skilled end of the industry. The main issue is the negative perception of the sector: Seen as technologically backward and environmentally unfriendly, few are inclined to dedicate their careers to mining today. "The negative view of mining has had a dramatic impact on student enrollment in geology and mining engineering courses. In America, this enrollment has dropped by at least 80 percent since the 1970s, and in Canada, by almost 65%," says Robert McEwen.

If this trend is not reversed, the future needs of Western economies will be in danger, particularly in the context of the green transition. While the labor shortage partly reflects misconceptions about how mining has evolved, it is also clear that the industry needs to change. "The mining sector has relied on certain ways of operating for years, but now it needs to adapt and, with our help, it can become more technologically advanced," stresses the CEO of SGS, Géraldine Picaud. SGS assists mining clients with ESG compliance, safety protocols, and innovation. But Picaud is quick to note that companies like hers cannot be a substitute for the mining workforce.

The positive news is that the industry is already making strides. Several universities with mining programs are adapting their curricula to reflect these changes. "Seeing autonomous fleets in action, understanding the use of environmental impact measurements, and recognizing the emphasis on safety can be eye-opening," says Paul Johnson, the president of the Colorado School of Mines (MINES). These efforts are helping to reshape how students perceive mining. "Over the past three years, we have experienced steady growth in student enrollment in the mining program," adds the dean of Queen's University's Smith Engineering, Kevin Deluzio. This suggests that while challenges remain, efforts to modernize the industry and improve its image are beginning to pay off.



JORGE A. GANOZA |
PRESIDENT, CEO & DIRECTOR,
FORTUNA MINING

In terms of water usage, 20 years ago, Fortuna required one cubic meter of fresh water for every tonne of ore processed. Today, we only need 0.2 cubic meters per tonne, reflecting our commitment to environmental efficiency.



STEFAN DRÄGER | CHAIRMAN OF THE
EXECUTIVE BOARD, DRÄGER

The most significant part of our mining portfolio is the 'Drägerman,' a term also used for the mine rescuers, which are increasingly including Drägerwomen. These rescuers come into action after a mine accident and are typically regular miners who receive special training for rescue operations.



PAUL JOHNSON | PRESIDENT,
COLORADO SCHOOL OF MINES

I have seen a shift where the challenges that graduates face now include not just the technical aspects but also social and community issues. Engineers today need to be well-versed in these areas, as they are often the enablers of our mining projects.



Mining provides the raw materials essential for every aspect of modern life from basic needs to infrastructure. It is the foundation of the global industrial processes. Without mining, production of essential goods and technologies that support transition to a sustainable future will not be possible.

STEVE TRUSSELL |
EXECUTIVE DIRECTOR,
ARIZONA MINING ASSOCIATION

