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The Copper Gambit: Peru, Politics, and Congo

What image does Peru project?

In February 2024, Peruvian President Dina Boluarte appointed José Arista as the new Minister of Economy and Rómulo Mucho as the new Minister of Energy and Mines. However, these changes in the cabinet were not the only ones since 2024 began.

While the Peruvian delegation was attending PDAC in March 2024, Peru's Prime Minister was flown back to Lima from Toronto. He subsequently resigned over allegations of using his influence to assist a woman in obtaining lucrative government contracts. Gustavo Adrianzén was then designated as the new *Premier*.

As March unfolded, on Saturday 30, Peruvian Police raided President Boluarte's home as part of a preliminary corruption case, searching for Rolex and other luxury watches. This prompted the resignation of some ministers and led her former party, Perú Libre, to sign a petition for her removal from office, citing "permanent moral incapacity." In less than two months, Boluarte again reshuffled the cabinet, appointing new ministers for key sectors, including Interior, Education, Agrarian Development, Production, Foreign Trade and Tourism, and Women and Vulnerable Populations.

Finally, on April 3, the new *Premier*, Adrianzén, received a vote of confidence from Peruvian lawmakers. During his speech, he outlined the Government's commitment to facilitating mining investments in the order of US\$4.6 billion and strengthening the national mining industry by prioritizing projects like Tantahuatay, Huancapetí, Romina, and the expansion of Antamina and Raura.

Recent events have undermined Peru's efforts during the second half of 2023 to regain investor's confidence and attract more capital. On April 25, S&P Global Ratings downgraded Peru's long-term foreign currency sovereign credit rating from "BBB" to "BBB-" (It must be noted that

Fitch Ratings and Moody's opted to maintain a BBB rating). "Peru urgently requires a comprehensive national strategy and policy for the mining sector to offer clarity to investors and communities. The lack of government cohesion leads to uncertainty in stakeholders," commented Steve Botts, president of consultancy firm Santa Barbara Consultants.

Critical times call for critical measures, and Peru has no time to waste: "It is crucial to convey this message to the public as we continue to grapple with a global challenge in shaping a positive perception of mining," commented Rómulo Mucho, Minister of Energy and Mines, to GBR.

But how can Peru develop a cohesive national strategy for the mining sector when ministerial changes occur almost every month? "The inconsistency in governmental policies disrupts continuity and negatively affects the entire economic landscape," added Marcial García, partner at EY.

The goal is 3 million t/y of copper

"Congo has already surpassed us [...] Congo's reserves are small compared to Peru's. We have almost 10% of the world's reserves [...] In time, we will become even richer in copper," stated current Minister of Mines, Rómulo Mucho, during an interview with the Peruvian media outlet RPP Noticias.

According to more recent figures from the Central Bank of the Democratic Republic of Congo (DRC), the African country surpassed Peru as the second-largest copper producer in 2023, having produced around 2.84 million t/y, while Peru's output was 2.75 million t/y.

Does this mean that everything is lost for Peru? Not at all. There is a window of opportunity for Peru to get back on track and regain that second position.

Between late 2023 and early 2024, the Ministry of Energy and Mines (MINEM) appeared to have listened to the industry and, after working with the Executive Branch, who launched the "Plan Unidos" to reactivate the economy and boost the productive sectors, managed to include within the 25 measures a release of mining projects worth US\$4.64 billion for 2025 and US\$4.65 billion for 2026. Among these projects, we find the short-term extensions of Antamina and Toromocho (US\$2.41 billion), Yumpag, Romina, Corani, and Chalcobamba (US\$964 million), and Zafrañal (US\$1.26 billion).

Some of these projects have already obtained their respective permits. For example, Zafrañal has received approval for its Environmental Impact Assessment (EIA), Antamina has been granted an extension for its Modification of the Environmental Impact Study (MEIA), and Buenaventura has obtained approval for the EIA for its Yumpag project. However, others, such as Corani and Romina, require their respective companies to address financial concerns before progressing with the projects.

Minister Mucho made two interesting announcements during his speech at the "ProExplo 2025" launch in March 21. First, he stated that by 2024, Peru aims to surpass 3 million mt/y of copper production. Second, he proclaimed: "I can announce that in the last few days [...] we have arranged, with just a ministerial mining regulation, to increase production capacity by 10%."

Days later, the MINEM presented a draft of Ministerial Resolution No. 125-2024-MINEM/DM, which amended Article 3 of Supreme Decree No. 030-2016-EM. This amendment indeed explains the reasons behind Peruvian production turnover, stating that "it is technically viable and op-



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"Peru could be in a better situation. If the authorities inform us that we can start developing our projects tomorrow, rest assured that we will assemble teams with the best professionals to achieve benefits for all."

Óscar González Rocha,
Executive President, Southern
Copper Corporation



portune to increase installed capacity by up to 10%."

As the first half of 2024 approaches, mining is at a crossroads. On the one hand, there is the opportunity to increase production, but this must be balanced with maintaining positive relationships with local communities, which can often be fragile. On the other hand, the Peruvian government needs to demonstrate unity, transparency, and efficiency to attract foreign investors for exploration. Simultaneously, it must expedite mining permits to overcome the bottleneck hindering the development of new projects.

Illegal mining vs artisanal mining

Based on information from the Financial Intelligence Reports (IIF) by the Superintendence of Banking and Insurance (SBS), in their Financial Intelligence Unit (UIF) report of June 2023, illegal mining is the crime worth the highest accumulated amount, reaching US\$8.2 billion, surpassing drug trafficking, which amounted to US\$640 million.

Addressing illegal mining is a complex challenge. According to Marcial García, partner at EY, when informal mining emerges, there is no clear response, especially from specific leftist sectors that

oppose formal mining activities due to environmental risks: "The lack of control has allowed these illegal activities to grow, even infiltrating certain power structures, backed by lobbyists who hinder necessary legislative changes," he explained.

The most delicate aspect of illegal mining is its impact on Artisanal and Small-Scale Gold Mining (ASGM), particularly regarding public perception. Unlike illegal mining, ASGM is legal and adheres to environmental standards. According to the World Gold Council, ASGM is among the fastest-growing rural livelihoods in numerous developing countries. Various reports from the UN Environment Programme and the World Gold Council suggest that ASGM contributes between 15% and 25% of the world's gold. However, this practice is often overshadowed by the prevailing perception of environmentally unsound extraction methods and the association of such activities with illegal mining.

Dynacor Group is one of the few companies in Peru focusing on ASGM. To ensure that the gold that it exports to Switzerland does not originate from illegal mining, the Peruvian government requires the company to guarantee the traceability of gold to its origin commented Jean Martineau, president and CEO of the company.

Peru has been trying to formalize several informal mining operations through the Reinfo (Integral Mining Formalization Registry). However, for Víctor Gobitz, president of the SNMPE, the Reinfo is not enough: "The solution does not lie solely in the Reinfo but in designing a broader and deeper strategy in collaboration with the government. It is necessary to understand the entire production chain and find ways to formalize it gradually, recognizing the complexity of the problem and avoiding social upheaval," he said.

Energy mix: The final test?

How will we find enough clean energy to overcome our dependency on fossil fuels, and can we achieve this before 2050? With just over 25 years remaining until 2050, these questions have become central to the debate surrounding the transition to a green economy.

If this transition is a test, what roles do non-conventional energy sources like

Rómulo
Mucho



Minister of Energy
and Mines,
Government of
Peru

"What happened in Panama should serve as a warning to Peru. If we do not manage our laws, regulations, and modern mining projects adequately, we could face similar situations."

Could you provide an overview of the current state of the mining industry?

In 2023, mining maintained positive results. Despite Peru's overall economic growth dipping to -0.55%, mining contributed approximately 1.5% growth, mitigating what could have been a more severe downturn. It is crucial to convey this message to the public as we continue to grapple with a global challenge in shaping a positive perception of mining.

We anticipate 3% growth in 2024, and mining will play a key role. To achieve this growth, mining must take decisive steps forward. The current government recognizes the importance of mining, which I believe is the reason for my appointment.

Peru must intensify exploration and efforts to attract investors and meet the growing demand for metals. We aim to exceed US\$500 million in exploration investments, building upon last year's closing figure of US\$481 million. Peru has more political stability than a year ago, an attractive legal framework for investments, and abundant local talent and capital.

How are mining projects in Peru's pipeline progressing?

The Zafrenal project, scheduled for 2026, could move forward if there is a favorable disposition and surface land issues are resolved. Meanwhile, San Gabriel is actively undergoing construction. Corani has all the necessary elements in place and is awaiting the resumption of financing. Conversely, the Magistral project is currently not on Nexa Group's immediate agenda, mainly due to its complex logistics, including access challenges. Romina, a medium-sized project, is progressing. Regarding Newmont's Yanacocha Sulfuros project, although it was ready for development, it was indefinitely postponed during Castillo's government.

What is the status of the projects stalled due to social issues?

We expect the start of operations at Las Bambas' second pit, Chalcobamba, this 2024. The integration of Corocchuayco at Antapaccay also holds promise for a significant increase in copper production.

Has the forced closure of First Quantum's mine in Panama increased the perceived risk of investing in Latin America?

Yes, investors often group all of Latin America into a single category. In Panama, the focus on ESG and communication was insufficient to avoid the population's opposition to the project.

Following the events in Panama, First Quantum has decided to focus on Peru. The Panama incident should serve as a warning to Peru, as it demonstrates that if we do not handle our laws and regulations properly and manage modern mining projects adequately, we could face similar situations.

Do you have a final message?

Peru remains an attractive country for investments. The general perception that we only sell raw materials must change, so we must gradually modernize our conditions and refineries. The population needs to see mining as a solution, not a problem. ■



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wind, solar, and the currently trending green hydrogen play? Furthermore, what synergies can the mining industry leverage with the energy sector?

According to a report published by the Institute of Mining Engineers of Peru in December 2023, the Peruvian mining sector consumes 9% of Peru's energy and accounts for 2.5% of the CO₂ emissions, far behind other sectors, such as transportation and fishing.

There are several alternative solutions in this journey to a green economy, but discussing these initiatives lacks significance without considering a comprehensive green energy mix. So, how "green" is the Peruvian energy mix? According to figures from the National Society of Mining, Petroleum, and Energy (SNMPE), in 2023, hydroelectric generation accounted for 48% of Peru's energy mix, while thermal generation accounted for 47% (gas accounted for 45% of thermal generation, with the remaining 2% shared between diesel, coal, biomass, and biogas). Eolic energy represented 4%, while solar generation 2%. The balance between hydroelectric and natural gas —the "cleanest" fossil fuel— share is almost equal, making Peru a "greener" country, at least from a generation perspective.

Rosa María Flores-Araoz, CEO of Kallpa, one of the Peruvian energy power generation companies, said the challenge for Peru does not lie in generation but rather in emissions: "Unlike many other countries, the main challenge does not lie in the power generation sector, but in other sectors such as transportation," to which she added that Peru has an ideal mix from both conventional renewable energies and non-conventional ones, all backed by the security and efficiency of natural gas.

The fact that the mining industry only represents 2.5% of CO₂ emissions in Peru is not a valid excuse for mining companies not to allocate efforts to reduce them. Additionally, companies have a growing incentive to reduce consumption by integrating cheaper energy sources such as solar or wind power. The problem? Availability: "Finding the balance between a clean system that uses renewable energies and security of supply is crucial. Renewable energy sources like solar or wind are not permanent and, thus, not 100% re-

liable, so the mining industry, as a large energy consumer, must incorporate other sources into its energy mix, finding the right balance between a cleaner supply without losing the reliability essential to the business," expanded Flores-Araoz.

Worley is an Australian firm offering sustainability-focused services in Peru. In discussions with Marcello Pirri, Peru's country director, and Andrew Roy, president for Latin America, they explained that Worley possesses the expertise to develop energy projects, including green hydrogen and converting vehicles and mining units to electric power. They shared two interesting insights on the costs associated with energy.

For Pirri, new technologies are critical for the long-term sustainability of the mining industry because challenges

are more significant from a geological, infrastructure, supply chain, and regulatory perspective: "An innovation that enables cleaner, more efficient, and lower-cost copper mining and refining could help increase supply directly. One of the challenges we see may arise in achieving the balance between the speed of development of these technologies versus the cost of implementing them in mining projects," he added.

On the other hand, according to Roy, there will likely be a *premium* for companies that adopt decarbonization solutions: "Companies embracing such technologies and prioritizing sustainability are positioned for better pricing advantages than their counterparts," he concluded.

Balancing Reliability with Renewables



"Renewable energy sources like solar or wind are not permanent, so the mining industry must incorporate other sources to their energy mix, finding the right balance between a cleaner supply without losing the reliability essential to the business."
Rosa María Flores-Araoz, CEO, Kallpa



"Projects that are technically sound, prioritize safety and innovation, adhere to a sustainable approach, and promote circular economy principles will be well received by stakeholders and gain a competitive advantage."
Marcello Pirri, Peru Country Director, Worley



"Renewable energies regulation is well-established but constantly evolving. Environmental standards change as new practices emerge and projects progress, potentially leading to stricter requirements in some areas and more flexibility in others."
Gonzalo Morante, General Manager, Walsh Peru



"The main challenge is ensuring an adequate supply of green hydrogen. Some hydrogen production methods may be equally or more polluting than conventional energy sources, primarily due to energy availability."
Luciano Macías, General Manager, Terpel Peru



"A paradigm shift is underway, with initiatives gaining traction and major mining companies formally requesting their suppliers to submit carbon-neutralization plans. This approach is particularly relevant for larger mining companies."
Kai Rothgiesser, General Manager, Bosch Rexroth

"A regulatory gap has created an environment akin to 'the law of the jungle', enabling the unchecked proliferation of informal mining and processing facilities masquerading as small-scale operations."

Víctor Gobitz,
President, SNMPE



"While high gold prices are advantageous, they also act as a double-edged sword by incentivizing informal and illegal mining activities."

Marcelo Santillana,
General Manager,
Minera Poderosa



One-size-does-NOT-fit-all

The mining industry has undergone significant changes, and today, a broad spectrum of trends, opportunities, and challenges are transversal and intersect more frequently. Within this intersectionality, one factor stands out as the convergence point: society and, consequently, community relations. Societal needs drive the demand for minerals like copper, while local communities' approval is, in most cases, the key to a new mine. Mining and society share an intrinsic and mutually influential relationship.

In this context, it is crucial to recognize that understanding social phenomena is not solely the responsibility of the State but also falls within mining's responsibility. From exploration, where high expectations of mineral potential and economic benefits arise, throughout production, and ultimately during closure — when companies should leave a positive legacy in their area of influence for future generations—, community relations are integral to mining operations. "It is essential to gain and maintain the trust of communities, which involves solid commitments and timely execution of concrete objectives to establish long-term

credibility," commented Gonzalo Morante, general manager of Walsh Peru.

Mining-community relations in Peru are often fragile. There are many examples of projects in the pipeline that are not yet mining, and many examples of operations halted due to social issues, especially in 2023. This makes one wonder: Have Peruvian mining companies learned valuable lessons from these experiences over the years?

According to Gonzalo Delgado, director of the Center for Studies in Mining and Sustainability (CEMS) at the Universidad del Pacífico, there has been a notable evolution among companies in understanding social issues. However, there seems to be a reluctance to showcase positive results in the face of criticisms: "Criticism is important and necessary. But it is equally important to acknowledge progress and positive outcomes. We still have a long way to go in this regard," he stated.

Delgado also highlighted the complexity of Peru, emphasizing the need to analyze it through clusters. He explained: "The mining context in Cajamarca, for instance, differs significantly from that in the south of Peru. Therefore, solutions cannot be one-size-fits-all".



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"We need to emphasize the importance of collaboration across all sectors to fully seize this unique moment in the history of the mining industry."

Gonzalo Quijandría,
President,
XV Simposio



The surplus of students

Paradoxically, while jurisdictions like Canada, Australia, and the USA are dealing with a talent shortage in the mining industry, and universities are striving to attract fresh young talent, Peru finds itself at the opposite end of this spectrum.

At a forum organized by the Institute of Mining Engineers of Peru in 2023, Mario Cedrón, a professor at PUCP, UNMSM, and UPC, highlighted that Peru had 16,650 mining students in 2023. He anticipated that around 1,000 would have graduated in 2024 and approximately 1,500 from 2025 onward. However, the Peruvian mining industry will only be able to hire around 150 of these

graduates, representing a mere 10%. To address this issue, Cedrón suggests equipping young people with additional skills to enable them to thrive beyond the confines of traditional mining.

In discussions with GBR, Pedro Grados, director of the Graduate School at the University of Lima, revealed that the university had previously offered a metallurgical and steel engineering degree. However, this program was discontinued due to a lack of student interest. Nonetheless, Grados acknowledges the presence of numerous alternative career paths within the industry: "In addition to the technical aspect, which encompasses water management, systems, and plant operations, it is crucial to comprehend the sector as a whole. This includes management roles specialized in human resources within the mining industry. Since Peru's primary export product is minerals, international business students are likely to find employment opportunities as traders," he commented.

From a purely mathematical perspective, whether the surplus of students is male or female is irrelevant. However, understanding this information could be interesting, particularly considering Peru's relatively low female workforce rate and the mining industry's efforts to increase female representation: "We expect to reach 30% of female participation by 2030. In Latin America, we are already very close to that, with 26% in Chile and 25% in Peru. In Peru, only 7% of students with mining-related degrees are female, and only 11% in Chile. So, we need to promote female talent not just internally, but externally," commented Luis Rivera, executive vice president at Gold Fields. ■

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Mining Production Overview

Pursuit of efficiency

In 2023, Cerro Verde grabbed the lead as the primary copper producer in Peru, experiencing a 1.6% increase in output (466,463 t/y compared to the 459,100 t/y produced in 2022). In contrast, Antamina, which held the top position in 2022, saw a 7% decrease, from almost 468,000 t/y to 435,378 t/y.

Southern Peru (Southern) maintains its third-place position, showing a significant 9.4% increase to 374,189 t/y from the 341,898 t/y produced in 2022. According to Óscar González Rocha, executive president of Southern, the company continuously strives to enhance efficiency and productivity at Toquepala and Cuajone, the company's assets in the Andean country. "In the specific case of Cuajone, we want to expand our operations to achieve the necessary volume to justify the con-

struction of an additional smelter to the current one with a processing capacity of 1 million t/y of concentrates, along with an expansion of the copper refinery in Ilo. This will also represent a new logistical challenge for transporting over 500,000 tons of copper concentrate to the new smelter in Ilo," commented González.

Southern has several projects in the pipeline in Peru, including Tía María, Los Chancas, and Michiquillay, which collectively amount an investment of US\$6.5 billion, according to González. However, these projects have been in the pipeline for decades, with Tía María being the most contentious. The project was initiated in 1994, and over the past three decades, it has faced opposition from various authorities. Under Boluarte's administration,

there have been mixed messages from key leaders. For instance, former Peruvian Prime Minister Otárola stated: "Tía María is not within the Government's agenda." However, the current Prime Minister, Gustavo Adrianzén, expressed a different stance during an interview with Peruvian media outlet RRP Noticias, stating: "We have turned our attention to Tía María. We have high expectations there...". José Arista, the newest economy chief, expressed "optimism" about the project's progress under Boluarte's administration when asked if the project was going to move forward, stating: "We hope so. We hope that will be achieved..."

González Rocha acknowledges that the attitude of the current government has improved. He stated: "As a result of the pandemic and uncertainties regarding establishing an investment-promoting policy, Peru has experienced a recession that needs to be reversed as soon as possible. The country could be in a better situation, and Southern Peru has always been willing to work throughout Peru."

Continuing with the top copper producers, Anglo American's Quellaveco presented a 219.9% increase, becoming the fourth-largest copper producer in Peru, having produced 319,061 t/y of copper. The mine was brought online in late 2022, so this uptick in production is logical, though crucial for Peru.

Las Bambas demonstrated an 18.5% increase following a challenging first half of 2023, with operations picking up swiftly. The mine, operated by the Chinese MMG, produced 302,039 t/y of copper in 2023 (vs 254,712 t/y in 2022). On the contrary, Chinalco experienced an 18.1% decrease (200,317 t/y in 2023 compared to 244,712 t/y in 2022). The remaining companies in the top 10, namely Antapaccay, Marcobre, Hudbay, and Sociedad Minera El Brocal, also showcased positive variations.

In 2023, there was a surge in copper prices, particularly towards the year's end. Concerns arose about declining produc-



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tion due to lower grades and the suspension of activities at First Quantum Minerals' Cobre Panama mine, among other factors. Consequently, 2023 concluded with the average copper price at US\$3.89/lb. As 2024 began, the copper price increased by 10%, reaching its highest since 2022. Another contributing factor to this uptick was when giant BHP, the world's largest miner, offered an unsolicited bid for Anglo American valued at US\$39 billion, which Anglo American rejected. This contributed to the red metal trading at around US\$4.70/lb.

Despite current favorable prices, which should encourage increased production and allocation of capital in exploration to replace depleting reserves, mining companies have struggled in the past months with costs and inflation, which seems to be eating up profit margins.

Javier del Río, Hudbay's vice president South America and USA, highlighted that the interplay between a looming supply deficit and challenges related to declining grades and depleting resources globally exerts pressure on prices. Rising costs further contribute to narrower profit margins despite the positive outlook for copper. "In this environment of heightened operational complexity and rising costs, it is imperative to streamline processes and enhance operational efficiency to safeguard profitability," he said.

The copper company invested in Magnetic Aggregation equipment for ultrafine particle filtration and a system to accelerate bubble discharge to enhance copper and molybdenum recovery. It also explored the implementation of ore sorting technologies, which not only improve copper output but also help to reduce energy consumption: "We have invested in new technologies, such as ore sorting, following the experience of Copper Mountain (British Columbia), which we want to implement it in Peru. At Constancia, we employ machine learning in throughput modeling, achieving over 90% effectiveness in predicting mill events. This allows optimized metallurgical responses by anticipating mineral behavior from crusher discharge to the processing plant," concluded Del Río.

Adolfo Vera, president and CEO of Southern Peaks Mining (SPM), emphasized the need to improve process efficiency and renegotiate terms with suppliers. In 2023, SPM encountered challenges in meeting the projected budget for Condestable's production ramp-up, causing missed opportunities with the higher copper price. However, it recovered throughout 2023 to successfully meet the annual target: "As part of the renewal process of our EIA, we are including, among a few changes in some components, a production increase to 10,000 t/d. We are finalizing the technical details and drafting of the EIA for Condestable," explained Vera.

In line with enhanced mining efficiency, SPM transitioned to a global approach, consolidating mineralized blocks into a single reserve block. "While this integration may lead to a loss of ore grade in some areas, the gained efficiency outweighs the drawbacks. This has boosted our in-situ resources to over 120 million tons of copper, narrowing them down to 70 million tons of resources and 40 million tons of reserves. This represents a substantial 25% increase from our previous reserves of 32 million tons," concluded Vera.

Precious metals

The closing average price for gold in 2023 was US\$2,033.31/oz. As 2024 progressed, gold's value increased even further. Geopolitical tensions continue to escalate, and growing expectations of Federal Reserve interest rate cuts in the second half of the year have fueled a rally in gold prices with a bullish momentum. This has resulted in the gold spot price hitting another record high of US\$2,313.50/oz on April 3, 2024.

Gold production in Peru demonstrated a strong performance, with a 2.8% increase (3.4 million oz produced in 2022 vs 3.5 million oz in 2023). In contrast, the silver segment experienced a slight dip of 1.3%, though less severe than the decline observed in 2022 (108 million oz in 2022 vs 107 million oz in 2023).

The top performers in gold production for 2023 included Minera Yanacocha, leading the rank with a production of 275,681 oz/y, marking a significant 13.1% increase compared to 2022.

Compañía Minera Poderosa followed closely, producing 269,518 oz/y, but experienced a slight decrease of 11.1% in its production. Poderosa has been subjected to attacks by illegal miners. For example, on December 2, 2023, a group of illegal miners attempted to seize control of Minera Poderosa's operations in Pataz, killing nine security agents by detonating multiple charges of ANFO (high-powered explosive) in one of the underground galleries of the mine. More recently, in January 2023, illegal miners brought down a high-tension tower that supplies power to the operations.

During a conversation with GBR, Marcelo Santillana, Minera Poderosa's general manager, explained that the combination of these events and road blockades that interrupted mineral transportation to the company's plant led to the company's failure to meet its production expectations. "Despite our efforts to maintain production, we had a setback resulting in a reduction of 28,000 oz of gold output for the year, below our estimated production of over 290,000 oz," he added.

While it is true that gold prices have been flirting with historic records, Santillana, like his copper counterparts, pointed out that while prices have increased, so have costs. Furthermore, the current prices add another layer of complexity for Poderosa: they could further incentivize informal and illegal mining activities.

Consorcio Minero Horizonte exhibited notable growth, with a gold output of 203,108 oz for 2023, representing an 8.3% YoY increase. On the other hand, Minera Aurífera Retamas saw a modest decline of 5.5% in gold output, yielding 196,503 oz for 2023. Meanwhile, Minera Boroo Misquichilca demonstrated a remarkable surge, achieving a 68.7% increase in production, totaling 175,649 oz/y. Lastly, Hochschild's Compañía Minera Ares faced a downturn, with a 13% decrease in production, reaching an output of 144,323 oz/y for 2023.

Despite facing challenges in early 2023 due to disruptions, Eduardo Landin, the new CEO of Hochschild Mining, commented that the company surpassed the reviewed production target, achieving a production of 300,749 oz of gold equivalent. A significant milestone for the company was securing approval for the Modified Environmental Impact Assessment (MEIA) for Inmaculada, enabling another 20 years of production with 262 hectares and 558 km of underground development.

Given the uncertain nature of gold price fluctuations, the company is preparing for both high and low-price scenarios: "To address

this, the company implemented a 'Zero Cost Collar,' placing 100,000 oz of gold at a price range of between US\$2,000 and US\$2,252. If the price stays within this range, we receive the market price. If it falls below US\$2,000, we receive this guaranteed figure; if it exceeds US\$2,252, we receive the latter price. Although common in trading, this strategy is novel for the company and represents a proactive measure to manage exposure to the gold price, providing security in a fluctuating environment," explained Landin.

Buenaventura ranked as the 10th largest gold producer in Peru and experienced a 3.9% increase in production, aligning with the projected guidelines for 2023, according to Leandro García, Buenaventura's CEO. Focused on the San Gabriel project, continuous efforts have resulted in noteworthy progress: "At San Gabriel, we concluded 2023 with engineering reaching 90%, procurement at 89%, and construction at 14%, contributing to an overall advancement of 28% by year-end. Additionally, we accomplished a CapEx of approximately US\$140 million in 2023, with expectations to invest around US\$200 million in 2024," García commented.

Buenaventura aims to complete construction at San Gabriel in 2025 and secure the first gold bar by the end of that year.

Looking at the broader scenario, Peru has been showing a declining trend in gold production since 2005, when it reached its peak with a total output of 6.68 million oz/y. This might be a sign that

the Peruvian gold segment has been maturing; thus, companies must replenish reserves with exploration.

Tailings management could be another indication of the mining industry's maturity. Cerro Corona represents the Peruvian operation of the international mining company Gold Fields. Luis Rivera, executive vice president of Americas, reported that Gold Fields' Peruvian assets produced 238,000 gold equivalent ounces and generated free cash flow of around US\$70 million. Rivera further mentioned that, in 2023, the company initiated the minelife extension program: "The basis of this extension is using the old Cerro Corona pit, where mining will stop towards the end of 2025, as a tailings storage facility. So, we will be extracting ore until 2025, stockpiling it on the side, and that ore will be processed until 2030... The technological challenge is to be able to accelerate the natural process that makes tailings consolidate and become more compact, thus making more space. The real limitation to another minelife extension at Cerro Corona is the tailings storage capacity, not reserves or resources," he added.

Prices rush, investors don't

Despite the current uptick in precious metals prices, there appears to be a discrepancy between the actual price of gold and the stocks of gold miners, a trend that several global asset managers have analyzed. For instance, Sprott suggested in April 2024 that gold mining stocks are

historically undervalued, citing the ratio of GDX/GLD as a metric. Similarly, Incrementum AG, an independent investment and asset management company based in Liechtenstein, compared the gold price with the HUI (NYSE Arca Gold BUGS Index) and, according to them, miners are trading 170% lower than their highs in 2011.

There seems to be a prevailing sentiment among companies, particularly in the junior segment and small producers, that there is a disconnect between investors and reality. For example, Graham Speirs, general manager of Sierra Sun Group, had previously expressed intentions to list the company on the London Stock Exchange during an interview with GBR in 2022. However, his plans have changed, and during our interview in the first quarter of 2024, Speirs shared that after securing assistance from a local bank, the company may circumvent seeking equity through the stock markets. "In Canada, despite demonstrating operational excellence, including robust safety measures and strong community engagement, investors typically require reserves spanning 15 to 20 years. Although we replenish reserves annually for a three-year period, we are hesitant to allocate capital towards drilling to showcase a 15-year reserve life to potential investors," he concluded.

John Thomas, PPX Mining's interim CEO, observed: "Gold's recent surge in price has not sparked the same rush to invest in gold mining as it has in the past. It is a bit perplexing. Despite the favorable gold prices



Mining Producers Focus on Growth

A mix of organic expansion and M&A



"[The Antofagasta-Buenaventura transaction] may result in further investment around our Cerro Corona mine, while we are very active in Titán Árabe, an adjacent property. It is likely that the different actors in the province will sit down to explore synergies, such as sharing tailings facilities or processing plants."

Luis Rivera, Executive VP Americas, Gold Fields



"Antofagasta's share purchase signals the market's confidence in us. We trust their expertise in copper projects will enhance our value."

Leandro García, CEO, Buenaventura



"In Peru, we emphasize that Constancia is not the endpoint but the starting point. We have a significant interest in the development of Maria Reyna and Caballito."

Javier del Río, Vice President South America and USA, Hudbay Minerals



"We are considering integrating a copper project in southern Peru into our portfolio, similar to Condestable in operational terms. Our plan also includes using seawater, creating another milestone in modern mid-sized mining."

Adolfo Vera, President and CEO, Southern Peaks Mining



"We have signed a JV with Antofagasta to explore prospective copper zones located on the same trend as Toromocho. The agreement entails significant investments in the coming years that could change Volcan's exposure to different metals."

Luis Herrera, CEO, Volcan



"Our aim is to acquire a third asset for the company through M&A. The ideal asset profile includes being in the production or near-production stage, preferably in Peru, Mexico, or the broader Americas."

Ernesto Balarezo, CEO, Sierra Metals



"Out of a global exploration budget of US\$33 million, the majority will be allocated to Peru, leveraging off the new permit at Inmaculada."

Eduardo Landin, CEO, Hochschild Mining



"We are looking for investors for our green play to allow us focus our capital on our precious metal division."

Graham Speirs, General Manager, Sierra Sun Group

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there has not been a notable uptick in investor interest, particularly in smaller gold mining companies like ours,” he commented.

In the development segment, Bear Creek has all the permits in place to bring Corani, a silver project, online. Bear Creek’s CEO, Eric Caba, elaborated that the company is primarily focusing on infill drilling and additional metallurgical testing to reinforce the company’s projections and strengthen investor sentiment toward the project: “We are evaluating test results and preparing to restart the financing process for the project,” said Caba.

With another asset in Mexico, the Mercedes mine, Bear Creek Mining has been restructuring the company’s agreement with Sandstorm and retiring the Nomad Gold Stream. This effort has reduced the “stream burden” by close to 80%, significantly improving Bear Creek’s financial status: “This reduction in stream burden has provided us with increased cash flow, which we are utilizing to ramp up exploration efforts, stabilize our financial books, and align our operations with our long-term goals. These

measures have significantly improved Bear Creek’s financial standing and positioned us more favorably to progress with projects like Corani,” concluded Caba.

Base metals

Regarding base metals, Peru’s zinc production reached 1.47 million t/y in 2023, marking a substantial 7.2% increase compared to 2022 figures. Antamina continued to lead in zinc production, reaching an annual output of 527,979 t, followed by Volcan at 171,117 t and Nexa Resources at 84,710 t. Antamina and Volcan both showed positive trends, with a 5.6% and 13.2% increase in production, respectively. However, Nexa Resources experienced a 6% decrease in its zinc production. Lead also demonstrated a robust 6.9% rebound in 2023, with Volcan, Nexa, and Compañía Minera El Porvenir emerging as the primary producers.

Volcan has achieved remarkable silver production of nearly 15 million oz/y and 250,000 fine t/y of zinc. With the ambitious Romina project in the pipeline for Peru, the company anticipates significant

growth in both cash flow and metal production, reinforcing its position in the industry: “Romina has a forecasted mine life of 14 years with a production rate of 50,000 to 70,000 t/y of zinc equivalent,” commented Herrera, Volcan CEO.

Romina requires US\$150 million CapEx, but first the company must ensure it has the necessary resources to execute the project on time. While Romina remains the company’s priority, Volcan has signed a JV with Antofagasta to explore prospective copper zones on the same trend as Toromocho: “The agreement has much potential, but there is a lot of work ahead of us, and it entails significant investments in the coming years that could change Volcan’s exposure to the metals it produces. We have a large package of almost 350,000 hectares in mining concessions that are highly prospective,” added Herrera.

This joint venture represents the second strategic move by Chilean company Antofagasta in Peru. In December 2023, the gold producer Buenaventura revealed that Antofagasta had acquired an approximate 19% equity stake in the company.

Another player in the Peruvian zinc production segment is Sierra Metals, a mid-sized producer with polymetallic assets across Mexico and Peru. In Peru, Sierra Metals owns the Yauricocha underground mine, which has been in operation for 75 years and has had a historical production capacity of 3,600 t/d. Due to the sparsely distributed mineral deposit, Yauricocha has faced challenges maintaining this production level, leading Sierra Metals to transition to a cut-and-fill mining method. By the end of 2023, the mine was operating at around 2,500 t/d. To address this issue, the company initiated the permitting process last year to extend mining operations below level 1120 level. This permit, obtained in February 2024, will enable Sierra Metals to transition from cut-and-fill to sublevel caving, a more efficient and extensive mining method and achieve its full capacity: “By Q4 of 2024, we anticipate ramping up production to 3,600 t/d, matching our historical production levels. This represents a 40% increase in production, reestablishing Yauricocha as a highly profitable asset for Sierra Metals, generating significant EBITDA, and reducing costs to comparable levels in 2020 and 2021,” highlighted Ernesto Balarezo, Sierra Metals’ CEO. ■



Photo courtesy of Forte Minerals

Junior Exploration

Copper has psychedelic prices

The Peruvian exploration portfolio has remained relatively stagnant over the past few years, and the latest document published by the MINEM in early 2024 includes 75 projects with a combined investment of US\$644 million. Despite the millions of dollars in the pipeline, the total exploration budget executed in 2023 reached US\$433 million, indicating a modest 2.4% increase compared to the figures from 2022.

As reported by the MINEM, 2023 saw the highest exploration figures of the last five years, representing the third consecutive year of growth. Meanwhile, data from S&P indicates that in 2023 majors increased their exploration budgets by 1.2% for their existing assets, while intermediates and juniors reported a decrease of 4.5% in their budgets compared to 2022. This has resulted in the grassroots share of exploration falling to an all-time low of 23.4%.

The lack of liquidity in the market and limited equity financing opportunities have placed financial strain on junior mining companies. However, despite unfavorable market conditions, a company that made strides was Camino Corporation. In June 2023, Camino welcomed Nittetsu Mining as a partner for its Los Chapitos project, an IOCG (iron oxide-copper-gold) deposit. Nittetsu, a Japanese company, has invested CAD\$10 million over three years, which, according to Jay Chmelauskas, CEO and president of Camino Corporation, will propel the company’s progress towards resource delineation and potentially a feasibility study. “We aim to establish multiple pits feeding a central processing plant for a prospective SX-EW copper oxide mine,” commented Chmelauskas.

“Juniors are more important in the present day for exploration than in the past. Moving forward, I believe we will see a lot more discoveries being made by juniors. Majors are going to rely on juniors as their exploration arm.”

Ian Gendall,
President and CEO,
DLP Resources



In March 2024, the company carried out a step-out drilling campaign and intends to proceed with a follow-up drilling program in the latter half of the year. Additionally, regarding another project, María Cecilia, a copper porphyry, Camino began constructing drill pads in April 2024 in preparation for an upcoming drilling campaign: “With an emphasis on discovery drilling, we aim to uncover a substantial deposit and achieve success in delineating a new porphyry center,” emphasized Chmelauskas.

From a global perspective, the insufficient focus on exploration exacerbates the shortage of new projects essential for the energy transition. McKinsey & Company forecasts that the demand for copper is projected to reach 36.6 million t/y by 2031. A substan-

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tial gap of 5.1 million t/y exists compared with the projected supply. According to David Kelley, president and CEO of Chakana Copper, there was already a supply gap for copper before the clean energy transition became a prominent topic.

Chakana owns the Soledad project in the Áncash region. In June 2023, Chakana received a permit to drill on the southern half of the project, enabling it to explore different types of mineralization, which include a porphyry target, referred to as Mega-Gold, and a high-sulfidation epithermal style of mineralization called La Joya. Despite the political instability, Kelley maintains an optimistic outlook regarding investors and Peru: “I think investor confidence is returning. We could not have raised CAD\$3 million if investors did not have confidence in Peru. I hope more foreign investment is coming into Peru in 2024,” he commented.

In April 2024, Chakana started a 3,000 m exploration drilling campaign at the Mega-Gold porphyry target.

DLP Resources is another junior company with its flagship project in the Miocene belt. The Aurora copper-porphyry project is at an advanced stage and was initially drilled by Bear Creek Mining in 2001. DLP acquired the project in 2021 and conducted deep drilling down to 1,000 m. “We commenced the current drill program in August 2022 with three drill holes. In 2023, we completed 10 holes in the project. In total, we have performed 9,910 m of drilling. We have a program in place for 2024 to drill 10 holes and 10,000 m,” commented Ian Gendall, president and CEO of DLP Resources. “We must go through a financing round to raise CAD\$4-5 million

"The mining industry in Peru is defined by its giant copper and gold deposits; we are on the doorstep of discovering the next one."

**David Kelley,
President and CEO,
Chakana Copper**



to complete the proposed drilling campaign to advance it to the point where it has a defined mineral resource by 2025”.

In April, DLP Resources announced that it had entered into an agreement with Paradigm Capital to raise US\$6 million through a private placement. While the offer has yet to be closed, DLP has been making progress with its other asset in Arequipa, the Esperanza project, a porphyry copper-molybdenum project with promising rock sample results: “The program intends to bring Esperanza to the point of being drill-ready by the end of 2024,” commented Gendall.

Are investors biased?

In 2023, there was a prevailing perception that Peru was losing its opportunity in the energy transition, leading investors to explore alternatives in other jurisdictions. Interest was heading north to countries like Canada and the US, known for their robust rule of law and policies promoting the development of critical minerals such as copper. Others seemed to look for stability in more regional options, such as Panama and Ecuador. Interestingly, due to twists of fate and socio-political changes, it appears that the opposite scenario is unfolding: There is a war against narcoterrorism in Ecuador, and protests in Panama shut down a mine from First Quantum Minerals.

While potentially favorable for Peru in the short term, these events in Latin America may raise concerns among investors about the possibility of a long-term contagious effect. Luquman Shaheen, president and CEO of Panoro Minerals, pointed out that Peru often faces misjudgments due to broader regional perceptions. North American investors tend to generalize their views of Latin American countries based on isolated incidents. “The stigma of being painted with the same brush as Panama poses difficulties for us to overcome. However, many investors understand the nuanced nature of the exploration story in Peru and Latin America,” said Shaheen.

During PDAC 2024, GBR interviewed the new Minister of Energy and Mines, Rómulo Mucho, who echoed Shaheen’s concerns and emphasized the need for Peru to take heed of the situation: “The Panama incident should serve as a warning to Peru, as it demonstrates that if we do not handle our laws and regulations properly and manage modern mining projects adequately, we could face similar situations,” said Mucho.

What happened in Panama was a hard blow for the whole industry, especially for First Quantum Minerals (FQM). This raises questions about how the Canadian producer will approach its

two projects in Peru: Haquira and La Granja, a project in Cajamarca to be developed in a joint venture with Rio Tinto.

Jorge Benavides, legal and corporate affairs manager – South America at FQM, explained that Haquira marked FQM’s initial entry into LATAM. However, the company prioritized Cobre Panama, allowing Haquira to progress cautiously. After a suspension period, FQM secured an access agreement with communities in the direct influence area by mid-2023. Since September 2023, the company has been drilling at the Haquira East deposit to enhance understanding of the deposit and to increase its volume.

According to Benavides, La Granja boasts resources of 4.32 billion t at 0.51% copper and has significant expansion potential: “Our current focus is on an extensive two-year drilling campaign initiated in October 2023. This drilling campaign, geared towards improving geological, metallurgical, and geotechnical knowledge, will enable the upgrading of inferred resources and their eventual conversion into reserves to allow the design of a mine plan,” he added.

Reflecting on the looming copper shortage, Benavides commented: “Copper deposits are few and far between, and any easy projects are already in operation. In order to deliver the increasing amounts of copper that the world needs, we need to operate in increasingly complex environments that require more advanced technologies and techniques with consequently higher costs,” posited Benavides.

Regardless of their size, mining companies have plenty to risk, from reputation to millions of dollars in investments. Perhaps because of the complexity and intricacies of developing new mines, such as navigating complex jurisdictions and more difficult terrain, we are witnessing more partnerships in various forms for developing future mines in Peru, exemplified by the JV between FQM and Rio Tinto.

The paradox of the energy transition without capital

We cannot rely on new mines coming online merely on the sheer strength of commodity prices. Different pieces of the puzzle are required to stimulate this. Regulatory environments, enthusiastic investor support, technological advancements, and geopolitical stability, as well as high prices are all equally required to incentivize more exploration.

But, how “high” is high? How much higher must prices go to incentivize new mines and exploration? Indeed, the saying “ask three different people, and you’ll get three different answers” seems fitting here.

Goldman Sachs suggested that a long-term copper price near US\$10,000/t (US\$4.53/lb) is necessary, while Olivia Markham of BlackRock commented that copper would need to reach US\$12,000/t (US\$5.43/lb) to spur such investments. On the other hand, Robert Friedland, founder of Ivanhoe Mines, stated that copper should reach US\$15,000/t (US\$6.79) and remain at that level for the long term to activate new mines. The market appears to be moving in that direction, or at least getting closer to those price levels.

In this context, what do Peruvian junior’s C-executives think? For Graham Carman, president and CEO of Tinka Resources, there is a “glaring disparity” between the energy transition discourse and the investment trends for junior mining firms. “This highlights the need for increased investment in new mine devel-

opment. While the current market conditions may seem bleak, I believe we are at the bottom, and there is a promising outlook for the future,” predicted Carman.

Patrick Elliott, president and CEO of Forte Minerals, a company focusing on copper and gold projects at an earlier stage in the value chain with its Pucarini, Esperanza, and Don Gregorio projects, believes that the mining industry can uncover new reserves and bring them into production by expanding exploration budgets and investing in new technology: “While higher copper prices may incentivize the development of certain lower-grade deposits, sustained exploration and resource development efforts are essential to ensuring long-term supply stability,” commented Elliot.

Forte obtained the DIA for Pucarini in September 2023, and later, the DIA for Esperanza, while still working on acquiring a third permit; an FTA for Don Gregorio. “We anticipate commencing drilling activities sometime in 2024, aligning with our strategic planning and commitment to responsible resource development,” stated Elliot.

The company more recently acquired the Alto Ruri, a high sulfidation epithermal gold prospect in central Peru, along with the Cerro Quillo porphyry gold-copper-molybdenum prospect from GlobeTrotters Resources, a strategic project-generation partner.

Within the same ‘strategic partnership’ umbrella under GlobeTrotters, we find Element29, a company positioned as more advanced than Forte. Richard Osmond, chairman and CEO of Element29, shed light on the market dynamics in Peru, noting that while the company once boasted a market cap of CAD\$50 million during favorable times, shifts in market conditions have led to a drop in the market cap to between CAD\$15-20 million. This underscores the necessity to cut costs and safeguard capital. “With GlobeTrotters in place, we identified an opportunity to consolidate our infrastructure, allowing us to share the same administrative team. This consolidation aims to reduce costs by a factor of three, targeting a decrease in our monthly burn rate from nearly US\$200,000 to less than US\$100,000,” explained Osmond.


Lithium and uranium

In LATAM, the lithium focus is on the Lithium Triangle, an area shared by Bolivia, Argentina, and Chile, which, according to different sources quoting the USGS, is thought to hold more than 50% of the world’s lithium resources.


Due to its hard rock nature, lithium in Peru differs from the brines found in Bolivia, Argentina, and Chile. However, Peru’s lithium story is unfolding with the publication of a 2024 Preliminary Economic Assessment (PEA) for the Falchani project by American Lithium. The PEA, released in January 2024, increased the measured and indicated categories by 476%.

According to this economic analysis, Falchani is projected to produce over 85,000 t/y of lithium carbonate. “We saw a tripling in NPV from the prior economic analysis; it grew from US\$1.5 billion to US\$5.1 billion, showing the scale and purity of the project. Operating cost will be approximately US\$5,100/t, placing it in the lower quartile of the global cost curve,” commented Simon Clarke, CEO of American Lithium.

Following President Biden’s passage of the Inflation Reduction Act (IRA), several reports indicate that lithium demand for the US energy transition will be 15% higher by 2035 than initially



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"The nexus between Peru's manganese production and lithium projects could pave the way for a focused battery industry. Such a development would be highly beneficial, aligning with Peru's strategic position in the battery metals market and contributing to the economic growth."

Mike Parker,
COO, Aftermath Silver



projected previous to the IRA. Despite the US trying to achieve lithium self-sufficiency with projects on the brink of production, it is suggested that the US will need to rely on allies.

This holds particular significance for Peru, as both countries share a free trade agreement, and the type of rock mined in Peru will not be shipped to China. "This makes it unique among hard rock deposits. Battery-grade lithium products will be produced onsite at Falchani without the need for beneficiation overseas and reducing reliance on China for processing," explained Clarke.

In addition to Falchani, American Lithium also owns the Macusani uranium project, another mineral not commonly found in Peru. Clark suggested that the escalating tensions between Russia and the West and a tightening supply from Kazakhstan, coupled with the world's shift towards the green transition, further empha-

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Patrick Elliott,
President and CEO,
Forte Minerals



sizes the increasing demand for uranium, which Macusani is poised to meet. "Our Macusani uranium project has a relatively simple flowsheet and low CapEx at US\$300 million. With the ability to produce 6-7 million lb/y of U3O8. Tthis is a top tier asset that will significantly contribute to annual global uranium supply," said Falchani.

Silver and manganese

Silver serves both as a haven during an economic crisis, and also plays a crucial role as an industrial metal. However, it does not receive the same attention as copper, particularly in energy transition.

When discussing this with Peter Dembicki, president and CEO of Tier One Silver, he complained about silver being thought of only as a byproduct of copper production, adding that there are very few true silver producers: "Silver has outperformed gold by a

large margin in the eight previous bull markets. When it is silver's time, it shines brighter and moves higher and faster than gold," he emphasized.

Silver Mountain Resources is a more recent entrant into the Peruvian exploration segment, capitalizing on silver's fundamentals. Since going public in 2021, the company has been focused on rehabilitating the Reliquias mine in the Castrovirreyna district, with over 35,000 m drilled. "It will be an underground mine, and we are in the first phase of a two-stage strategy to revive Reliquias and commence operations at the Caudalosa plant, where we aim to achieve a daily production of 2,000 t," commented Álvaro Espinoza, CEO of the company.

The Spanish saying "Vine buscando cobre y encontré oro" translates to "I came looking for copper and found gold." While Aftermath Silver was searching for copper and silver in its Berenguela project, it did not come across gold; instead, it discovered manganese. Ralph Rushton (president and CEO) and Mike Parker (CEO) explained to GBR that the potential for recovering silver and copper from Berenguela has been widely recognized for the past two decades. Thus, in the last months, the company has shifted its attention intensely towards the manganese side of the story. Their goal now is to produce high-purity manganese sulfate. They have successfully tested this process in a small-scale laboratory setting and are now looking to upscale it to the pilot plant level. "The goal is to develop the metallurgical flow sheet into a basic process design, enabling engineering work for cost estimation and preliminary project economics. We aim to achieve this by the fourth quarter of this year, although industry uncertainties make setting precise dates challenging," commented Rushton.

During discussions on the significance of manganese in today's era, particularly in the context of the electric vehicle (EV) transition and increased demand, alongside Peru's potential in copper and lithium production from the previously mentioned Falchani project, Parker emphasized the strategic importance of producing manganese sulfate. Doing so could establish Berenguela as a critical player in the global manganese sulfate market outside of Asia and further solidify Peru's pivotal role in the industry. "The nexus between Peru's manganese production and lithium projects could pave the way for a focused battery industry. Such a development would be highly beneficial, aligning with Peru's strategic position in the battery metals market and contributing to the country's economic growth," concluded Parker. ■

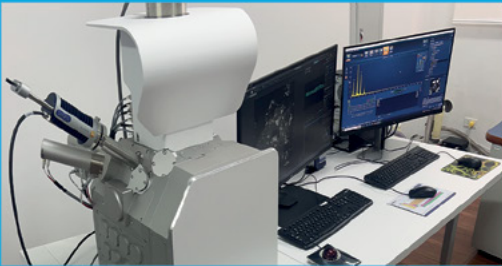
"Battery-grade lithium products will be produced onsite at Falchani without the need for beneficiation overseas and reducing reliance on China for processing."

Simon Clarke, CEO,
American Lithium



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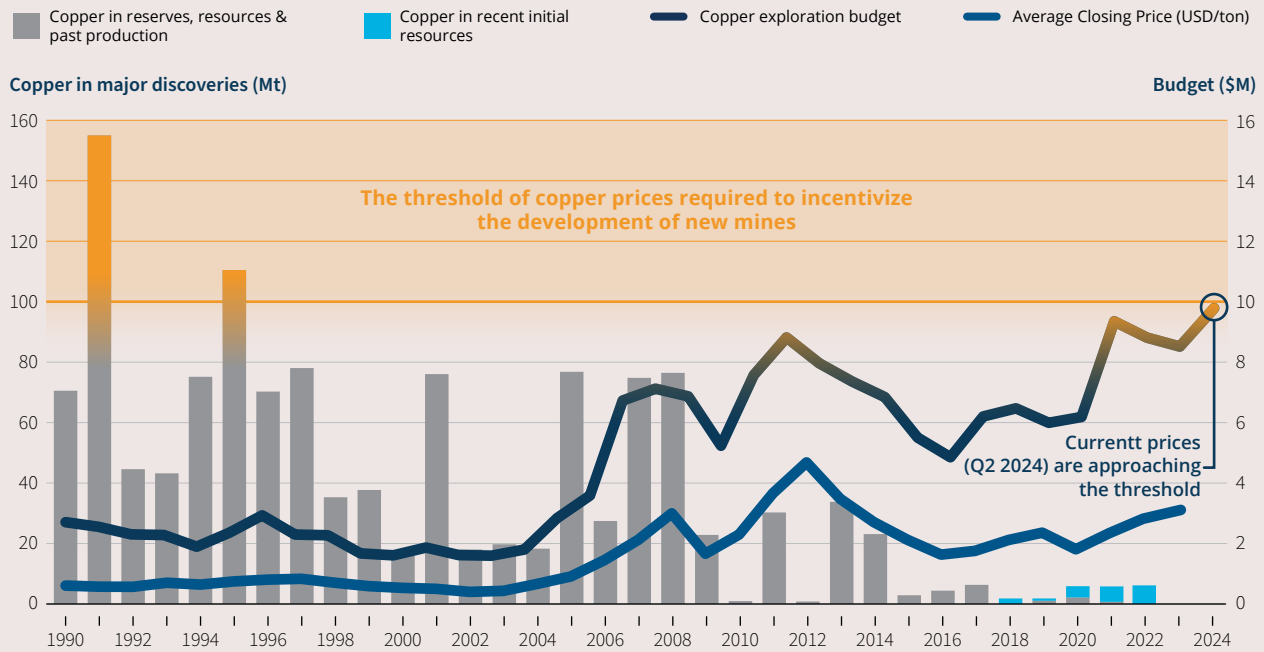
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Copper discoveries still trending down despite higher budgets and prices



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Adapting to climate change

Miners must now anticipate and plan for the increasing influence of climate-related events on their daily productivity and the health and safety of their workforce. In this context, consultancies and engineering firms are valuable allies for mining companies. When addressing the implications of climate change and the El Niño phenomenon, Guillermo Barreda, the general manager of Knight Piésold Peru, emphasized that relying solely on reactive measures is not enough: “In northern projects, it is crucial to factor in the impact of the El Niño phenomenon. This phenomenon, unique to this region, leads to excess water, a factor that all mining projects must incorporate into

their planning. Addressing the El Niño effects should be a priority from the project’s outset”. Considering the potential negative impacts on production, mining companies cannot afford to postpone addressing the effects of climate change on their operations. As highlighted by Barreda, the challenge lies in the industry’s recognition that the environmental aspect of operations goes beyond permit acquisition. A comprehensive risk assessment is necessary, along with the implementation of actions supported by the development of corresponding models and designs. “Instead of reactive measures, like determining the location of the main mine infrastructure, it is

advisable to adopt preventive solutions,” Barreda concluded. Comprehensive risk assessments and forward-thinking strategies are paramount, requiring the integration of a holistic vision. WSP has been working on this through its Future Ready Program, a methodology that analyzes diverse trends and variables like climate change, society, and technology, emphasizing their impact on projects. “Our focus extends beyond green energies to include aspects like constructability, the complete lifecycle of assets, closure plans, and mining infrastructure, ensuring a holistic and sustainable vision,” commented Gonzalo Covarrubias, managing director for Peru and Mexico of WSP.

Crusade for water stewardship

While northern Peruvian mining operations may have to cope with challenges related to excess water, climate change is also expected to cause droughts. In January 2024, the Centro Nacional de Estimación, Prevención y Reducción del Riesgo de Desastres (CENEPRED) identified 277 districts at very high risk of water stress. Notably, most of these districts are key hubs for mineral production in Peru.

Considering a less optimistic future for water, mining companies are actively reducing water consumption, particularly in tailings, by shifting from traditional methods to drier alternatives to achieve enhanced risk management and decreased water usage.

Additionally, companies worldwide are aligning with the Global Industry Standard on Tailings Management (GISTM), introduced in 2020, and following recommendations from the Canadian Dam Association. Maria de Lourdes Bahia, the minerals & metals VP for Latin America at AtkinsRéalis, noted that following disasters worldwide, the awareness regarding the impacts of tailings on the environment and society has increased, and involves focused attention and innovative solutions: “Stringent legislation now focuses on concerns about water contamination and community welfare, leading to a global reevaluation of tailings management practices,” she commented.

AtkinsRéalis is researching the application of “geotubes”, a technology in which tailings are contained within geotextile tubes, allowing water to drain out and resulting in drier tailings suitable for stacking.

Mining companies must find a delicate equilibrium between profitability and maintaining impeccable environmental standards. This balance is essential for fostering positive relationships with local communities and ensuring access to capital allocation.

Gustavo Bravo, the mining director for Latin America and the Caribbean - WSP, highlighted that technological advancements have made new solutions more cost-effective and explained that WSP is introducing Hydraulic Dewatered Stacking (HDS) for tailings disposal, a technology that efficiently reduces water content by layering tailings and naturally generated sands in mining. “Beyond addressing reservoir volume reduction, this technology

positively impacts capital costs by leveraging existing mine material: sand. This approach provides a notable economic advantage compared to conventional technologies like press filters,” explained Bravo.


While many companies focus on maximizing space and minimizing tailings disposal, others take a different approach by exploring reprocessing methods to extract minerals. GEMIN Associates is one such company. Marco Zavala, the general manager, revealed to GBR that they are collaborating with Sierra Sun to develop new methods for reprocessing the tailings of Sumaq Rumi: “The initial process involves rigorous agitation and cleaning equipment, followed by chemical agents for mineral recovery and flotation or gravity-based equipment for mineral separation,” he explained.

On another note, but also related to water, Óscar Navas, the business development director of the Andean Region at Techint Engineering & Construction, mentioned the possibility of Peru following Chile’s example in the use of desalinated seawater and pumping systems for

mining projects in mountainous regions. “While the CapEx increases, the value lies in social and community engagement, enabling projects to progress. This embodies the concept of ESG applied to these initiatives. Rather than viewing it as an add-on, we should consider it an integral part of the business,” said Navas.

When will all these changes take place? The mining industry, on a broader scale, seems resistant to change. “The culture in the mining industry can be characterized by the phrase “I want to be first to be second.” The industry tends to avoid risk and remains somewhat resistant to unproven initiatives,” commented Paul Murphy, Mining Plus’ South American office manager.

Murphy noted, however, that this trend is gradually changing, and mining companies exhibit a growing appetite for research and development: “In some cases, there are signs of a more flexible contracts and procurement process that accommodates innovators who may not align perfectly with traditional procurement requirements,” he said.




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"Assessing air quality in the early stages, even before project development, is crucial for preventing pollution. Computational modeling can suggest adjustments to construction planning, minimizing environmental impacts."

Guillermo Barreda,
General Manager,
Knight Piésold Peru



While new solutions may offer cost-social-effective benefits in the long term, and there is an increasing appetite for research and development, are there specific barriers to overcome by the entire industry? At least in tailings management, Alberto Coya, Stantec's country manager for Peru and regional lead for Latin America, highlighted that there is still a technological gap to bridge: "The current production rates of dry tailings do not meet the treatment volumes required for a large mine in Peru or globally. The systems still operate at smaller scales than mines generating wet tailings due to space, tech-

"Above-expectation metal prices predict a promising year. However, challenges are expected in talent attraction and retention, as well as in developing new technologies for maximum positive impact on our clients."

Gustavo Bravo, Mining
Director Latin America
and the Caribbean;
Gonzalo Covarrubias,
Managing Director Peru
& Mexico, WSP



GB



GC

nology, and energy demand, making them economically unviable yet."

Harnessing technology for safety

In Peru, a significant portion of mineral extraction is mined through open-pit operations. However, there is an imminent transition towards underground mining, primarily driven by two key factors: declining ore grades and the environmental impact of open-pit operations. Society is increasingly scrutinizing mining activities, prompting a shift towards less invasive mining practices. For ex-



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Data-Driven Contractors: Transforming Safety



"Our goal is to automate data collection to better understand equipment performance and optimize its operation. This data gathering will allow us to develop metrics and analyze data to improve productivity and safety standards."

Guillermo San Miguel, CEO, AESA



"We are launching an open innovation program, allowing participants in the mining industry worldwide to collaborate with us to address safety and productivity gaps in the industry through technology."

Eduardo Cossio, CEO, INCIMMET



"Our action plans include regular training, enhancements to PPEs and technological advancements, like anti-drowsiness and anti-fatigue systems in our dump trucks and equipment. These measures enhance our safety controls and ensure an optimal level of operational alertness."

Luis Flores, General Manager, Mur

ample, Antamina, the leading silver and zinc producer and the second-largest copper producer in Peru, is poised to transition to underground mining in 2031, start production in 2036, and reach full capacity by 2039. On the other hand, current underground operations are going deeper; for instance, the case of Sierra Metals' Yauricocha mine, which now plans to mine below the 1120 level.

AESA, a Peruvian underground contractor, achieved a 15% revenue growth in 2023 compared to 2022 despite the intense competition in the segment. Guillermo San Miguel, AESA's new CEO, attributes this success to the company's close relationships with its clients, which enabled it to renew its contract with Chungar for another four years in July 2023.

When asked about the value of automation, San Miguel responded that while they are currently observing trends in this area, including remote operations, their primary focus is on automating the management of data generated by mining equipment: "Our goal, in the near future, is to automate data collection to better understand equipment performance and optimize its operation. Once this process is established, we can identify improvement opportunities and develop business cases with our clients," concluded San Miguel.

Another established underground contractor is INCIMMET. Eduardo Cossio, INCIMMET's CEO, informed GBR that in February 2023, it closed another contract to provide Compañía Minera Raura with comprehensive services for Cemented Rock Fill (CRF). Regarding safety, INCIMMET has won an acceleration process for the FreeRocks technology in Chile: "FreeRocks is a system that utilizes a drone, a thermal camera, and an advanced intelligent algorithm to predict and prevent rockfalls in underground mines. Our tech-

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nological developments, made in-house, are in the process of obtaining patents to make them available to the entire industry across various countries,” said Cossio.

JRC is another underground contractor that has established ties with a Chilean technology development firm to leverage technological disruptions within the mining industry. By integrating innovative technologies into its operations, JRC seeks to persuade clients to centralize or streamline their processes under a single contractor: “Every company must seek out unique differentiators to stay ahead in today’s competitive landscape, and technology has become indispensable,” commented Manuel Ruiz-Conejo, executive president, JRC Ingeniería y Construcción.

Raise boring

As the low-hanging fruit for open-pit operations and “not-so-deep” underground mines become depleted, a growing requirement exists to enhance technological adoption in the underground mining segment. Furthermore, these challenges are exacerbated by the current escalating costs within the industry.

In this context, Belisario Tijero, Peru’s general manager at Master Drilling, commented that automation is the elixir to the above-mentioned challenges: “Elevating automation levels is not just about technological advancement; it is a proactive measure to improve reliability and efficiency, providing robust support to cope with market fluctuations,” he explained.

In 2023, Master Drilling Peru introduced the LP 200, which utilizes the blind hole drilling method, capable of creating vertical ascending holes of 1.5 m in diameter: “The optimized layout of the LP 200 requires less mine infrastructure, resulting in reduced expenses for the mine in terms of the space it allocates. In every aspect, it contributes to minimizing costs for the mine,” he added.

For his part, Marc Blattner, CEO of Tumi Raise Boring, a company that transitioned from mere contractors to manufacturers of raise boring mining equipment, agrees with Tijero in the sense that there is no added value in automation just for the sake of technology development: “If these innovations fail to translate into drilling more meters, they serve no practical purpose despite their sophistication,” he cautioned.

"At Trafigura’s Catalina Huanca mine, we identified the opportunity to recover up to 2% of the mineral from the tailings. We could help accomplish this by enhancing comminution with a higher capacity mill, to process ultrafine particles more effectively."

Jordan Barja,
General Manager,
ByV IESEMIN



What does Peru have to offer?

Peru is a mature mining jurisdiction, boasting mines with years of operational history and a diverse array of local contractors capable of servicing large-scale projects such as Quellaveco, Las Bambas, Antamina, and Minsur. With few greenfield projects on the horizon, one might wonder why a company would establish itself in Peru. However, despite the competitiveness of the local market, a few companies still see potential in the Andean country.

Construplan, a Mexican contractor, placed its bet on Peru: “Construplan has made a long-term commitment to Peru, as re-

"We are evaluating projects requiring substantial investments. Should there be a demand for open-pit mining equipment, such as large trucks and machinery, we have the financial strength to make such acquisitions."

Rafael Ríos,
Country Manager,
Construplan



flected by our investment in our Peruvian branch. This commitment remains steadfast regardless of macroeconomic and political situations somewhat beyond our control,” commented Rafael Ríos, Construplan’s country manager.

The company secured its first contract in Peru in 2023 with Nexa Resources’ El Porvenir mining unit. Furthermore, Construplan obtained a contract for a 1.5 km crest channel in Atacocha as part of Nexa’s ‘Integración Project,’ which integrates both operations into one cohesive initiative. It proved the right call to bet on Peru, considering Construplan’s specialization in open-pit min-



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ing. In February 2024, Mexican President Andrés Manuel López Obrador introduced a series of constitutional reforms to the parliament, including a proposal to amend Article 27 to prohibit open-pit mining.

In 2022, Milicic, an Argentinian contractor, ventured into Peru. María de los Ángeles Milicic, the company’s general manager, told GBR that Milicic engaged in its first contract in Peru with the Besalco-Stracon consortium and the Authority for Reconstruction with Changes (ARCC). The contract is aimed to execute public works and fortify infrastructure against the impact of El Niño-induced weather anomalies. María de los Ángeles emphasized: “We aim to bolster our presence in Peru and prepare for forthcoming projects. Some of these may not be immediately executable but hold promise for the medium term, including greenfield projects requiring significant capabilities. This journey has been enlightening, revealing a more mature and developed market than its Argentine counterpart. The insights gained serve our Peruvian operations and enrich our approach in Argentina, leveraging differences to enhance efficiency.”

Milicic’s statement raises questions about what Peru has to offer. Undoubtedly, every company seeks growth through new bids and contracts. However, what if companies could harness the maturity of the Peruvian market to enhance their capabilities ‘back home’? Consider, for example, the statement from Rafael Ríos, Construplan’s country manager, regarding safety: “Safety legislation in Mexico may not be as stringent as in Peru.”

Indeed, Peru’s pipeline of projects presents opportunities for contractors to expand their portfolios and expertise and acquire valuable knowledge and skills that can be applied globally.

Local players focus on communities and diversification

Julio Cesar, general manager of JCI Ingeniería & Servicios Ambientales, highlighted the importance of fostering positive relationships between operators and local communities. This is particularly crucial, considering Peru’s experience of social disruptions. “Communities often see mines as an employment opportunity, while others face tensions due to contentious relationships driven by environmental concerns. It is crucial to balance the interests of communities and the needs of mining operations, closely involving communities in control processes and transparently disclosing environmental results,” explained Cesar.

Luis Flores, the general manager at MUR, a Peruvian contractor focused on open-pit operations, also acknowledged the substantial challenge in the industry concerning social responsibility. In response, MUR has implemented an outreach plan, integrating communities into its operations: “We strongly advocate for close collaboration between mining companies and contractors as a pragmatic and streamlined method to foster positive relationships with local communities. Contractors are now recognized as vital stakeholders committed to efficient operations and the sustainable development of impacted communities,” said Flores. Despite specializing in open-pit mining, Flores does not rule out venturing underground. ■

Mining Equipment and Technology

Going from “greener” to green

The Peruvian mining industry boasts a diverse range of local and international OEMs in the equipment segment. These OEMs, from smaller firms with regional footprints to multinational corporations, have been actively developing new technologies that align with global trends such as automation and electrification.

2023 proved to be transformative for the leading OEMs in Peru. With Alfredo Bertrand appointed the new general manager of the Andean region, Epiroc entered a period of reassessment: “Upon returning to Peru, I encountered a mining sector amid modernization, with a growing demand for cutting-edge equipment. Several mines are contemplating the automation of their hauling fleets. If this transition is successful, the potential for suppliers like us will double overnight,” he said.

Automation not only enhances safety but also has the potential to broaden access to the female talent pool. In Peru, females currently represent only 7.1% of the mining workforce. “Geotec and Las Bambas announced the creation of the first all-female drilling team, made possible by Epiroc’s equipment. Several exploration companies want to introduce new automated equipment to form female work teams,” commented Bertrand.

On the other hand, battery-powered equipment is a hot topic, primarily due to its notable benefits in energy efficiency and improving workers’ health conditions, particularly in underground operations. McKinsey & Company suggests that mining companies could reduce their energy costs by at least 40% by adopting electric vehicles and equipment.

However, Sandvik’s general manager, Armando Sugobono, noted that no Peruvian clients have adopted Sandvik’s battery-powered equipment. The smaller size of underground mines in Peru, around is cited as a critical factor: “There are only two mines in Peru — Cerro Lindo and El Brocal— that can fit this size of equipment. Sandvik is working to complement its technology and battery-powered equipment portfolio across the entire size range and market, but it is a gradual process,” he explained.

“Conversations once centered around production and costs now encompass energy transition, fleet automation and digitization, highlighting significant challenges for the Peruvian and global mining industry.”

Julio Molina, CEO, Komatsu-Mitsui Maquinarias del Perú



Like Epiroc, in 2023, Komatsu-Mitsui Maquinarias del Perú (KMMP) underwent a leadership change, with Julio Molina appointed the new CEO. The company achieved notable sales of US\$650 million, attributing a portion to a substantial contract with Antamina. Under this multi-million-dollar, year-long agreement, KMMP will supply 20 Komatsu 980E-5SE trucks with Cummins QSK95 engines. The initial order of 10 trucks will be delivered in Q1 2024, with the remaining eight scheduled for delivery in the second half of 2024.

Molina noted that brownfield projects drive demand, focusing on the energy transition, fleet automation, and digitalization: “The energy transition and mineral demand drive brownfield expansions. Key clients such as Cerro Verde, Southern Peru, and Las Bambas focus on increasing production and exploring new technologies. The current mining landscape is defining its future, addressing decarbonization goals, and meeting the global aim of carbon neutrality by 2050,” concluded Molina.

When GBR met with Erick Ruiz, Cummins Peru’s general manager, he commented that while the new QSK95 engines (like the ones used by KMPP in Antamina’s order) count now with the

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"A mine opting for an all-battery approach must be prepared for the considerable expenses of employing battery-powered equipment. It must be an exceptionally rich mine with high grades that justify the elevated costs associated."

James Valenzuela,
CEO, Resemin



Modular Common Rail System (MCRS), Cummins is focusing on progressively upgrading the HPI technology from the QSK60 and QSK78 engines with the MCRS: "The HPI technology operates via mechanical fuel injection, while the MCRS offers distinct advantages, including an extended engine lifespan of nearly 10% and reduced fuel consumption" he explained.

Specializing in hydraulics, Bosch Rexroth recognized a niche in electromobility with its eLION portfolio. General manager Kai Rothgiesser noted that Bosch Rexroth is collaborating with two Peruvian manufacturers on building two prototypes: "We remain hopeful of announcing the system's operation during Expomina if all plans proceed as expected," he commented.

In 2023, Bosch Rexroth acquired HydraForce, a global manufacturer of insertable cartridge valves. This acquisition enabled Bosch Rexroth to expand into a niche market where HydraForce previously lacked a national presence, a move that, according to Rothgiesser, is gaining momentum: "While mounted valves are standard, the compact and insertable versions have generated significant interest across a broad market," he concluded.

Narrow veins, narrow market

Resemin, a local OEM, exemplifies the maturity and innovation of the Peruvian mining industry, showcasing the country's capacity to export talent and technology. In 2023, Resemin expanded its horizons by exploring potential opportunities in Ankara, Turkey, to establish a manufacturing facility to produce equipment tailored for the African and Asian markets while maintaining Peru as a hub for the Americas: "A decision is anticipated in 2024, and if affirmative—given the required investment—we plan to execute the project in 2025," said James Valenzuela, Resemin's CEO. "The challenge stems from being the "new kid on the block" in a well-established and conservative segment. Although we measure up, convincing customers about this particular product proves to be an uphill task," he concluded.

Luis del Solar, the general manager of Overprime Manufacturing, another local manufacturer of narrow vein equipment, highlighted that major brands such as Epiroc or Sandvik often overlook this niche market because the demand for narrow vein equipment primarily concentrates in specific regions like Peru, Bolivia, and certain mines in Mexico and Chile, resulting in lower overall demand than larger-scale mining equipment. However, Overprime faces tough competition in Peru, particularly from Chinese equipment manufacturers. "The Chinese often enter the

"Several mines are contemplating the automation of their hauling fleets. If this transition is successful, the potential for suppliers like us will double overnight."

Alfredo Bertrand,
General Manager
Andean Region, Epiroc



market at considerably lower prices, possibly through dumping practices... Competing with them is challenging as their prices are typically one-third of ours, undermining fair competition."

Construction and Auxiliary Equipment

During separate interviews, both Scania's managing director, Eronildo Barros, and Volvo Peru's general manager, Jorge Masías, agreed that despite having electric alternative trucks in other Latin American countries, they could not introduce them in Peru due to operational parameters that do not align well with the conditions of Peruvian mining. In the meantime, both companies have been developing different configurations, demonstrating their commitment to supporting the mining industry in Peru despite the limitations posed by current technology constraints.

For instance, Scania's flagship truck is the Heavy Tipper, with 6X4, 8X4, and 10X4 configurations: "This model stands out for its 20% higher payload capacity than conventional ones. Among the options, the Heavy Tipper G540 8X4 leads to preferences due to its versatility, efficiency, and lower fuel consumption, making it the most sought-after choice. 59% of our sales of this model are destined for mining," commented Barros.

For its part, Volvo's growth in the mining sector was driven by the FMX Max: "Our FMX Max stands out as the heaviest mining dumper in our lineup, demonstrating exceptional performance and earning strong market recognition. The FMX Max, compared to the traditionally sold FMX, boasts an additional 6-ton load capacity and is utilized by clients with a 24m³ hopper instead of the standard 20m³," added Masías.

Lubricants for energy optimization

While the transition toward BEVs in large-mining Peruvian operations is still not feasible due to the operations' geographical and altitudinal nature, many solutions fall between BEVs and traditional diesel engines to reduce GHG emissions. "Well-lubricated equipment can profoundly impact energy efficiency, whether in terms of electricity or fuel. An adequately lubricated component consumes less energy, showcasing lubrication's pivotal role in energy optimization," commented Daniel Rochon, deputy general manager at TotalEnergies Peru.

Terpel, with ExxonMobil, developed the Mobil Delvac Modern line of lubricants, which is tailor-made for the Chilean and Peruvian mining industry. According to Luciano Macías, general man-

"By optimizing equipment for faster loading, and moving larger volumes in less time, there is a notable reduction in energy consumption during the mining process."

Daniel Bacigalupo,
Managing Director
Spanish Speaking
Latin America,
Weir ESCO



ager at Terpel Peru, with this line, there is no need for equipment downtime for oil changes, extending working periods up to 1,000 hours: "The significant impact will manifest in three to four years as equipment engines, typically maxing out at 20,000 hours, will exceed 25,000 hours," he claimed.

Material handling and flotation

Conveyors are crucial in carrying materials from the mine to the processing plant, and downtime can result in significant financial losses. In this context, conveyor belt providers are focusing on preventive and predictive maintenance. Fernando Barrio, general manager of Tecnomina, commented: "Clients recognize investment in predictive solutions as an effective means to avoid unplanned shutdowns, shifting the focus from corrective to predictive and preventive measures and anticipating potential issues in the medium and long term."

Tecnomina offers dynamic radiography for steel cable conveyor belts and electromagnetic scanning. Both methods eliminate the need for traditional inspections with operators near the belt. While the second option is more economical, it provides slightly less detail. "Clients can choose the machine based on their budget and schedule the scanning frequency, whether periodically or twice a week," explained Barrio.

Roxana Burgos, the general manager at Movitecnica, sees opportunity in the industry's growing receptiveness to such technologies. Although Movitecnica was initially renowned for its crane services, it has significantly expanded its presence in the conveyor belt segment over the past few years: "We have a presence in most mining units, including large-scale and medium-scale mining operations. The conveyor belt business units represent 35% of our business, and we represent top-tier brands such as Fenner-Dunlop and, more recently, Yokohama," said Burgos.

Unpredicted shutdowns are a mining company's worst nightmare, while energy consumption poses another concern. Javier Schmal, Latin America vice president for Martin Engineering, explained: "Material that escapes or adheres to the belt and begins to spill and stick to the idlers and pulleys results in increased energy consumption. Similarly, when chutes become filled with material due to moisture or special characteristics, failure to prevent material buildup at the transfer point can also result in excessive consumption, damage, or a plant shutdown."

After being transported via conveyor belts, the ore undergoes

"The industry's growing receptiveness to technology mirrors a paradigm driven by safety, efficiency, and smart decisions. Quick belt changes are crucial—every hour of plant shutdown can mean \$50,000 in losses."

Roxana Burgos,
General Manager,
Movitecnica



a milling process before the mineral is extracted using various recovery methods to get the mineral. Companies want to optimize mineral recovery to extract every last milligram of minerals and reduce tailings as much as possible.

For instance, Anglo American is constructing a Coarse Particle Recovery (CPR) plant at Quellaveco. This will allow the company to recover more copper without additional water since it would be recycled from the same tailings.

While CPR has garnered recognition for its efficacy, the flip side of this involves the intricate challenge posed by ultra-fine particles. Metso has been leading the way in this regard. One of the company's recent innovations is the Concorde Cell Technol-

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ogy, specifically designed for the flotation of fine particles: “Challenges arise with tiny clay minerals, such as those measuring 5 microns, which are difficult to float without applying fine and ultra-fine flotation. This becomes particularly valuable in recovering minerals previously lost in tailings, potentially resulting in a 3-4% increase in production with significant economic value,” explained Fernando Samanez, VP and head of minerals sales in South America at Metso.

Another strategy to enhance flotation efficiency involves implementing multiple flotation cells. This approach ensures efficiency and speed in the recovery process, facilitating almost instantaneous results. Jordan Barja, the general manager at ByV IESEMIN, noted that along with Minsur's San Rafael operation, they are currently conducting a feasibility study to install an SK-80 flotation cell: "This cell will allow for quick mineral recovery, eliminating the need to pass through multiple circuits and directing it straight to concentration," he concluded.

Digital tools for wear parts and customized service plans

Whether it is the shovels at the beginning of the process or the milling equipment at the end, all equipment requires durable wear parts to ensure an extended lifespan. In this segment, we find Weir ESCO, which is part of the global Weir Group. Daniel Bacigalupo, managing director – Spanish speaking Latin America at Weir ESCO, explained Motion Metrics, an AI system applied to machines for detecting operational issues: “The system provides granulometric metric profiles, boulder detections, volumes efficiencies and other applications in various areas like loader, trucks, conveyor belts, and blasting. This AI technology captures images, processes them through the CPU, and transmits alerts and information to the cloud, delivering essential real-time data on wear parts within other KPIs.”

On the compressor technology side, Atlas Copco has experienced increased demand for connectivity solutions in Peru, primarily influenced by the interest in remote operations. Julio Hernández, general manager of

"Clients see predictive solutions as a smart investment, preventing unplanned shutdowns by focusing on anticipation rather than correction, and addressing issues before they escalate in the medium to long term."

*Fernando Barrio, General
Manager, Tecnomina*



Compressor Technique - Atlas Copco Andean Region, highlighted a noticeable shift among clients. They are moving away from generic-market solutions and instead opting for a model that emphasizes customized service plans. This approach allows clients to concentrate on their core activities while benefitting from tailored and efficient service offerings: "Customized service plans are also highly sought after. We offer a variety of plans ranging from spare parts sales to comprehensive solutions, assuming full responsibility and risk for the machine," commented Hernández.

MS4M, a Peruvian company, debuted its C4M Underground system in 2022, marking its entry into the underground mining market with a fleet management solution. Richard Balboa, MS4M's general manager, emphasized that the company had to transition from a typical technology provider model to one where they could adjust to the fluctuations in their clients' cashflow situation: "Clients have two options: the traditional CapEx model of purchasing licenses and hardware to install on their equipment, or a more OpEx centric model of obtaining the system with minimal upfront cost followed by a fixed monthly fee on fleet size. Providing this sort of optionality enables smaller CapEx-sensitive operations to have a better ability to obtain the system and thus unlock the value of our mature and evolving technologies." ■



Photo courtesy of Explomin

Service Providers

Uptick in prices, a good omen for drilling

Peruvian drilling contractors demonstrated remarkable resilience throughout 2023. They actively embraced new technologies, expanded their equipment inventory, and dedicated resources to training new talent, all in anticipation of the new cycle in copper and gold.

Such is the case of Explomin, where Boris Quimper, Explomin's general manager, commented that the company observed a growing interest from companies eager to engage in exploration projects: "This shift does not involve the immediate initiation of greenfield projects but focuses on laying the groundwork and foundation for potential future greenfield projects."

In anticipation of such a scenario, in Peru Explomin is set to invest more than US\$6 million in 2024 in infrastructure and drilling equipment, surpassing the average investment of US\$5 million in the last three years, added Quimper.

MDH was awarded a contract from First Quantum Minerals to conduct a 50,000 m drilling campaign at the La Granja greenfield project. Daniel Santa María, MDH's general manager, commented: "2024 so far has seen significant growth in exploration activity, presenting the challenge of securing sufficient equipment and personnel to meet increasing demand. With our entire fleet assigned to projects, we have acquired two new long-range rigs from Boart Longyear to reinforce our operational capacity."

Reflecting on the competitiveness of the Peruvian market, Santa María exposed that while material costs and salaries have risen over the years, the prices of services have followed a contrasting trend. This disconnect has resulted in a consistent erosion of profit margins. “Local competition in Peru is intense, with numerous medium-sized and large companies, which has led global players to withdraw from the Peruvian market,” he added.

While MDH focuses on large-scale mining, the same applies to smaller companies focusing on junior exploration. Edgardo Laura, Energold Drilling Peru's general manager, echoed Santa María's observations and emphasized the importance of maintaining low prices when working with junior companies. "Even a slight increase in costs per meter drilled could have a considerable impact on

their operations. We work closely with juniors, negotiating prices and subsequent exploration phases, as drilling is divided into multiple stages that require progressive financing," he explained.

Jorge Granda, COO of AK Drilling, a company whose drilling share is around 70% in brownfield exploration, expressed regret over the decline in junior greenfield exploration in Peru due to



"We anticipate growing our market share in geotechnical drilling, which will solidify our position as a key player in the Peruvian market, while upholding our specialization in drilling services."

Miguel Ángel Arenas,
General Manager,
Geotec



capital migration towards industries such as technology: "This decrease in junior projects is unfortunate, as they can later grow into mining operations. Every mining operation has started with exploration, so it is crucial to maintain a pipeline of projects for the future".

For Granda, maturity in the Peruvian mining industry is evident in clients not seeking the lowest prices but rather a balance between safety and price: "This holistic approach has been pivotal in maintaining client trust and our operational continuity".

In the meantime, Miguel Ángel Arenas, Goetec's general manager, emphasized that the company distinguishes itself in

"The decrease in junior projects is unfortunate, as they can later grow into mining operations. Every mining operation has started with exploration, so it is crucial to maintain a pipeline of projects for the future."

Jorge Granda,
COO, AK Drilling



the market through its specialization in various services, such as deep hole drilling (>1,500m) and directional drilling. Despite the market and the company reaching a certain level of maturity, this does not hinder the pursuit of new markets and innovative approaches. Such flexibility shows in a case shared by Arenas, where they are leveraging oil and gas technologies to drill water wells within mining pits without disrupting ongoing operations, facilitating simultaneous mine dewatering and enhancing overall efficiency: "This is unprecedented in our region, and we aspire to pioneer its implementation," proclaimed Arenas.

Laboratories and chemicals

Peru is well known for its copper endowment, and its deposits are well mapped since the 50s. However, as Falchani's lithium story unfolds, the question arises: Has Peru been overlooking lithium?

According to Erika Gabriel, general manager of Bizalab, a laboratory specialized in mineralogy tests: "New opportunities are emerging in the Peruvian lithium sector. For example, Macusani Yellowcake recently received an exploration permit in an area with evidence of lithium resources. Historically, and due to the lack of legislation, lithium mining has been disregarded in Peru due to its association with rare earth and radioactive minerals".

The main presence of lithium in Peru differs from other countries in the region since it is hosted in micas such as zinnwaldite and lepidolite, as well as clay minerals (smectites) and zeolite. This will require the use of advanced technologies and extraction processes. Bizalab has been analyzing lithium samples for a junior company, and according to Gabriel, the samples are completely different from the minerals they usually analyze. "The study of lithium requires different approaches and concepts, leading our team to develop new skills and knowledge in this area," commented Gabriel.

Laboratories in Peru have been investing in new technologies to streamline assays. SGS Peru introduced a new X-ray diffraction (XRD) unit tailored for precise mineral characterization and a TESCAN TIMA-X (TIMA). According to Gianfranco Martinelli, natural resource business manager at SGS Peru, even though the use of these microscopes entails higher costs, market demand is increasingly leaning towards the

"We are experiencing a gradual decrease in the grade of copper deposits, and even with concentrations of around 0.2 - 0.3%, the deposits can remain profitable. However, this requires adjustments in extraction processes."

Erika Gabriel,
General Manager,
Bizalab



need for services like these: "The insights these technologies provide enable decisions that optimize reagents, energy, and other resources, resulting in substantial long-term savings," added Martinelli.

In the meantime, Certimin has been leveraging digital twins and formed partnerships with Glencore Technology to use the Jameson Cell and the IsaMill and Eriez Flotation to provide specialized services in coarse particle flotation (CPF). "As many deposits are depleting in grade, or are working with lower grades, the need for new technologies to recover them arises. We are currently testing this technology to process tailings from Codelco's

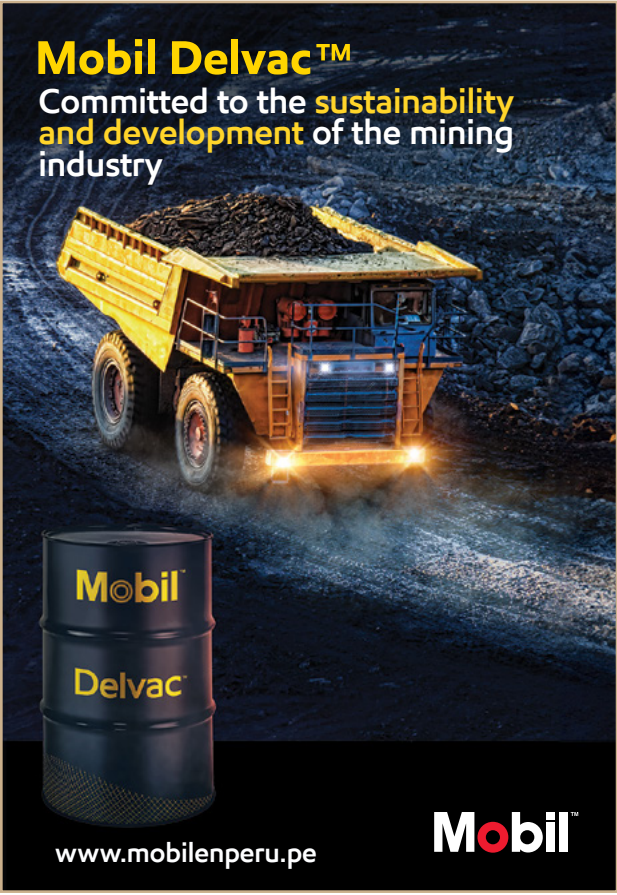
Chuquicamata, one of the largest open pit mines in the world. These tailings, once deemed low-grade, are now profitable. Similarly, we are conducting trials at a Peruvian mine to recover minerals from its landfills, facing challenges like Chuquicamata regarding mineral grades," commented Jonathan Campbell, deputy general manager of Certimin.

Just like laboratories are necessary to understand the characteristics of the ore, chemicals are crucial to process them. To optimize recovery in polymetallic mines, Quimtia has been exploring integrating pre-oxidation stages into the flotation process: "We employ advanced oxidation technologies, based on the use of hydrogen peroxide, to optimize these processes and, in the case of precious metal mines, reduce cyanide consumption, which cuts costs and mitigates environmental impacts," commented Eduardo Galdo, Quimtia's sales manager.

According to Galdo, this approach was not explored in the past, but increased mineral complexity and mine locations have propelled this type of research.

On the other hand, Mercantil has been leveraging its own metallurgical and water treatment laboratory in Lurin to help its clients find the exact dosage of flocculants for water treatment and get denser sludges and reduced tailings: "When we achieved a more compacted sludge, we offer significant benefits to clients by generating less solid waste that requires off-site disposal, thereby avoiding additional costs," commented Nicolás Scanarotti, Mercantil's commercial manager for mining.

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Third-party services

When thinking of a mine, the primary image that crosses one's mind is probably its core activity: mineral extraction and processing. However, numerous non-core activities, with their respective services, are necessary. In complex scenarios, outsourcing many of these services has become essential for the success of large industrial operations.

Confipetrol Andina's general manager, Wilson Miranda, shed some light on mining companies outsourcing their non-core business. This can take the form of "segmented" outsourcing, where clients issue tenders for specific maintenance tasks, or can take the form of a more comprehensive service: "Most companies are strongly inclined towards comprehensive management and maintenance, because having a single contractor responsible for all maintenance streamlines operations. With a single company handling responsibility, it is easier to address any issues without needing to identify the source of the problem," explained Miranda.

While Confipetrol focuses on plant maintenance services, specifically concentrators, processing plants, and equipment for underground mines, other labor-intensive jobs, such as fleet maintenance, are critical to a mine's day-to-day activities. In this context, Pedro del Rosario, deputy general manager at Techbrand, commented that the company saw an opportunity in the market by noticing specific equipment was frequently unavailable for maintenance, causing delays and financial losses: "For instance, the unavailability of critical assets such as an impact wrench can disrupt maintenance plans, resulting in costly rescheduling," said del Rosario.

Up in the value chain, SK Rental is another company whose added value lies in outsourcing, such as renting mining equipment. Despite the benefits of the business model, Edmund Egg, the company's general manager, revealed that SK Rental is struggling to enter into large-scale mining due to large-specialized equipment requirements like hydraulic shovels that are difficult to relocate after years of use: "The main limitation is establishing more extended renting periods for this type of machinery, as we are currently more attractive for shorter periods," concluded Egg.



Wilson Miranda,
General Manager,
Confipetrol Andina

Logistics, insurance, and security

According to the Peruvian Public-Use Transportation Infrastructure Investment Supervisor (OSITRAN), the investment in transportation infrastructure closed at US\$732.4 million in 2023.

Despite a 33.2% increase compared to 2022 figures, it does not seem enough. "Peru faces a persistent problem of insufficient infrastructure, particularly lacking comprehensive alternative routes, causing challenges and disruptions," commented Aurelio Palacios, general manager of the logistics company Acoinsa.

The lack of alternative routes is a problem especially considering that sometimes companies face route blockades, just as seen between 2022 and 2023 in the case of Las Bambas. In a context where companies do not have access to operations or cannot get the mineral out of the mine, there are specific insurances: "There exists a denial of access insurance, a product designed to cover miners' losses due to the inability to produce as a result of road or railway blockades. Unlike political violence insurance, which requires physical damage to be activated, this insurance kicks in without the need for physical damage to occur," commented César Kahatt, senior vice president & regional mining practice leader at Marsh McLennan.

According to Kahatt, because of Peru's social situation, the prices of this insurance increased in 2022, making it difficult for many miners to access it. However, those who already had it from previous years experienced reasonable increases in renewals.

Between logistics and insurance brokers, we find Hermes. This company provides transportation, custody, and processing services for money and valuables: "We offer mineral custody services at our facilities and manage vaults at mining production centers, ensuring the security of the final product. This process adds value to our clients because we take on the custody risk. Once the mineral enters the vault, it becomes our responsibility and is covered by our insurance policy and Hermes security protocols. Additionally, some clients may take advantage of this opportunity to place their production in the international market more quickly and efficiently," explained Marcos Arias, manager - value distribution and channels of the company. ■



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