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A Resilient Industry

Political uncertainty and social conflicts curb the growth of Peru's mining sector

In July 2021, socialist candidate Pedro Castillo emerged as the winner of Peru's presidential elections after an extremely tight and polarized contest against conservative rival Keiko Fujimori. The Peruvian mining industry was concerned by Castillo's accession to power as he had vowed to tear up Peru's decades-old constitution, take up to 70% of profits from mining companies operating in the country and introduce new royalties on mineral sales.

Castillo's election in Peru can be considered as part of broader Latin American trend whereby the political left is making a resurgence after the number of people living in poverty in the region rose by 22 million between 2019 and 2020, according to the Economic Commission for Latin America and the Caribbean (ECLAC). However, the return of the left is not surprising given the traditional left-right pendulum in Latin America's political landscape. "I believe that the current left-wing cycle will not be as severe as previous ones since Peru today is a more mature jurisdiction and has stronger institutions," argued Fernando Pickmann, partner at multinational law firm Dentons.

There is indeed a system of checks and balances in place today that limit the president's ability to keep his most radical promises, such as the expropriation of mining companies. Specifically, the Congress, which was elected during the first round of presidential elections in April 2021, is made up by a majority of parties that favor the market economy and private investment as the main drivers of the economy.

In the months that followed President Castillo's election the mining sector's alarms faded as many of his initial threats did not turn into reality. However, political instability has been a constant under the new administration. Castillo has already survived

two impeachment votes in Congress in less than a year, as the opposition accused him of moral incapacity and tolerating corruption in his inner circle. In the second impeachment attempt, which took place in March 2022, the votes of at least 87 of the 130 lawmakers in Congress were needed to remove the president; 55 voted in favor, 54 against and 19 abstained.

In addition, in April 2022, Peru's profound political crisis escalated when the government declared a one-month state of emergency to allow the armed forces to supervise its highways in an attempt to stem nationwide protests over rising prices of oil and wheat imports amid the conflict between Russia and Ukraine. The decree allowed for the army to be deployed to clear the blockades while also suspending certain constitutional rights such as freedom of movement and assembly. Castillo's government has faced growing public anger over the crisis, especially after he imposed a mandatory 24-hour lock-down in Lima and Callao, a neighboring port city, in a bid to "re-establish peace." The president backtracked on the measure after opposition politicians and human rights groups slammed it as a disproportionate infringement on freedom of movement.

Despite this state of tension, Peru experienced one of the world's fastest post-pandemic recoveries. 2021 turned out to be a year of unprecedented growth for many companies across the mining value chain. Mining producers started making up for lost time after the easing of restrictions and were encouraged by soaring metals prices. This has brought tremendous opportunities for service, equipment and technology providers. The Peruvian mining sector attracted investments of around US\$5.24 billion in 2021, representing a 21% increase with regards to the previous year.

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Social tensions deter mining investment

Protests and social conflicts have been a long-standing obstacle to mining operations in Peru, but there has been an uptick in their prevalence since the second half of 2021. These have been triggered by a recipe of greater inequality caused by the pandemic, perceived unfairness of substantial miners' profits amid high commodity prices, and the President's strong rhetoric in favor of a greater redistribution of revenues from natural resources and of holding miners accountable for environmental damage.

"Social conflicts in Peru are not new. However, blockades are currently affecting producing mines, whereas previously the main targets were projects under development," noted Marcial García, partner at multinational firm EY.

Undeniably, the frequency and severity of social unrest have increased significantly in Peru and, as a result, the country's copper output fell by 18% in February 2022 from December 2021. While in the past blockades used to mainly affect greenfield projects, like Tía María or Conga – two large copper projects in the country's pipeline - today they have expanded to producing mines.

One of the most prominent examples of the conflicts between producing mines and local communities is that of MMG's Las Bambas. The Chinese-owned copper mine has been particularly vulnerable to community protests in the last year and was forced to suspend operations in December 2021 and then again in February 2022 as discussions to remove a road blockade set up by the Chumbivilcas community were unsuccessful. Protestors demanded greater social spending on the development of communities around the mine and the classification of Chumbivilcas as an area of direct influence, as well as the addressing of the environmental impact of the dirt road used to transport copper. According to MMG, the restrictions to inbound and outbound logistics caused by the roadblocks resulted in the mine running out of critical consumables. "The production of Las Bambas in 2021 was 290,000 tons of copper concentrate, which is 7% less than in 2020 and approximately 25% less than before the pandemic," stated Edgardo Orderique, general manager of Las Bambas.

“I believe that we will continue seeing investments in brownfield exploration thanks to the favorable metals prices and the quality of Peru’s geological deposits. The country also has an excellent ecosystem of suppliers of goods and services, contractors, engineering and consulting firms that make investing in mining attractive despite the political noise.”

Víctor Gobitz,
Past President,
Peruvian Institute of Mining
Engineers (IIMP)



Las Bambas is certainly not the only example. Operating mines such as Glencore’s Antapaccay and Antamina (a BHP-Glencore-Teck-Mitsubishi joint venture) have also been experiencing major protests since communities are demanding greater social spending on the development of the communities around the mines or asking for compensation for alleged environmental and social damages.

As relationships with communities become increasingly complex, mining companies are becoming more aware that power in the country is not concentrated in the hands of the executive branch, but rather, it is shared with local stakeholders. “Today, complying with legal requirements is not enough to build a successful mining project; it is essential to develop strong relationships with small communal powers,” highlighted Fernando Pickmann from Dentons.

According to Pickmann, there are regions in Peru where the State is not able to cover the population’s basic needs, therefore, sometimes it does not suffice for mining companies to pay taxes, but they also have to “replace” the State and assist the population with development projects.

Following this logic, for several months Las Bambas has been exploring possible solutions for the South Road Corridor that has been targeted by community blockades and which is shared by other mines like Constancia and Antapaccay. Las Bambas has already agreed with several communities that they be identified as areas of Social and Environmental Interest. This means that the mining company will complement the government’s infrastructure works with produc-

tive projects related to the value chain. “In Chumbivilcas, for example, we have reached an agreement with 10 out of 14 communities so that they be part of the value chain for the concentrate transportation,” explained Edgardo Orderique.

The communities will be in charge of the maintenance and irrigation of the roads that cross the Chumbivilcas region, and a consortium company will be in charge of the transport of concentrate.

According to Orderique, the remaining four communities have preferred other types of agreement related to social projects, so they will carry them out jointly with the government.

Social inclusion: the pending task of the Peruvian mining industry

Today, the levels of contribution of the mining industry to the national economy speak for themselves. According to the Peruvian Ministry of Energy and Mines (MEM), the direct employment generated by the mining industry was 227,407 in 2021. In addition, mining accounted for 17% of the country’s total income in 2021, tripling its contribution with regards to 2020 and becoming one of Peru’s largest taxpayer. Proceeds from the mining canon, legal and contractual mining royalties, rights to operate and penalties together added up to US\$1.68 billion last year, up from the US\$1.059 billion registered in 2020.

If this is the case, why are communities and regions not seeing the benefits of mining revenues? For many years, the



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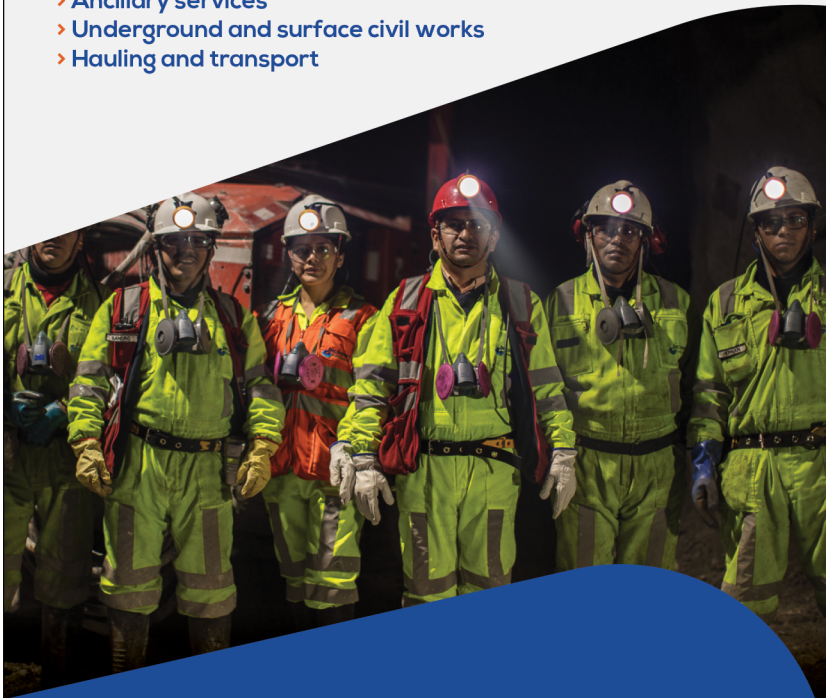
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industry has agreed that there is a need for a more effective distribution of mining royalties and the mining canon. “Today, the mining industry makes great contributions to the country via taxes to the State, and these funds are then transferred to the population via the mining canon. Due to the widespread uncertainty, little progress has been made on how to use these public funds more effectively,” summarized Víctor Gobitz, past president of the Peruvian Institute of Mining Engineers.

According to Marcial García from EY: “The lack of effectiveness of the mining canon is due to the fact that regional and local governments do not have enough management capacity. These funds often are misallocated or lost in corruption.”

Despite the large contributions of the sector to the State, Pedro Castillo’s government evaluated hiking taxes on mining companies as a way to fund new social programs. The government worked with the International Monetary Fund and the World Bank to come up with a proposal that would not affect the sector’s competitiveness. Specifically, the government did not intend to create a new mining tax but sought to increase rates on royalties and the so-called “special mining tax” that comes into effect when metals prices soar. Finally, Congress denied the Executive the power to reform the mining tax system, but this generated several months of uncertainty.

Advancing Peru’s project pipeline

Within Latin America, Peru has perhaps the greatest untapped potential for new discoveries and production, as well as a remarkable pipeline of projects. According to MEM, there is currently an estimated US\$53 billion of mining projects waiting to be developed in the country. MEM listed 43 main projects in different stages of development targeting a variety of metals and minerals.

Despite this massive pipeline and the thriving commodity prices, the future of these projects is uncertain. In 2021 MEM expected seven projects to begin the construction phase in 2022. Today this forecast seems quite optimistic. According to a recent Scotiabank report, just three of the seven projects will proceed in 2022 for a total investment of US\$845 million. These projects include Corani, a US\$579 million silver project owned by

Bear Creek, a US\$130 million investment for Chalcobamba phase I at the Las Bambas copper mine, and a US\$136 million Minera Ares' Inmaculada optimization.

In addition, the industry faces a worrying scenario in terms of new investments. Peru's Central Reserves Bank forecasted a lack of growth in private investment for new projects in 2022. However, the country is expected to see considerable opportunities arising from an 8% increase in investments to advance existing projects through different stages and to expand their capacity.

Once the construction of Anglo American's Quellaveco ends in 2022, the only mega-project in the horizon is Newmont's Yanacocha Sulfides project. Its development has been delayed due to the pandemic, but Newmont has US\$500 million to invest in the project located alongside Newmont's Yanacocha gold mine, which will extend the life of Yanacocha beyond 2040.

In conclusion, the political, social, and fiscal uncertainty that has prevailed in recent times has challenged Peru's un-

“Social conflicts have become the main disincentive for investment in Peru. Although these have not emerged with the new government, many blockades are currently affecting producing mines, whereas they previously targeted projects under development.”

Marcial García,
Partner,
EY



matched geological potential and has limited its ability to profit from booming commodity prices. In fact, the political volatility has already affected Peru's credit rating and institutions like Fitch Ratings have downgraded the country to BBB from BBB+. In this context, the resilience of the mining industry, which was made evident with the pandemic, will be tested once again.

If Peru is to take advantage of thriving commodity prices, it will need to navigate political uncertainties and over-

come social problems, focusing more than ever on establishing excellent relations with local stakeholders. Investors are following closely how Quellaveco manages to transition from the construction phase into production and how it is able to overcome all of these challenges. Similarly, Newmont's investment in Yanacocha Sulfides could improve the perception of Peru as a mining country, demonstrating confidence in the world's second-largest copper producer amid political instability. ■



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Mining Production

Navigating political and social complexities to take advantage of booming commodity prices

Peru experienced one of the world’s fastest post-pandemic recoveries as its economy grew by 13.3% in 2021, rebounding from an 11.4% contraction in 2020. A large part of this recovery was fueled by Peru’s mining industry, which emerged strongly after the severe lockdown was lifted and operations were allowed to restart with strict health protocols in place.

Peru’s production of all metals grew enormously between 2020 and 2021, encouraged by thriving metal prices and a looming deficit of copper. However, if a comparison is made between the levels of mining production in 2021 and pre-pandemic levels, there are some substantial variations across different commodities. The production of base metals including zinc, tin, molybdenum and iron grew significantly against 2019 levels, whereas the production of silver, copper and lead experienced moderate drops.

Gold was undoubtedly the most affected commodity, as its production decreased by nearly 25% between 2019 and 2021 according to MEM figures (the industry recorded 3.11 million troy ounces (oz) last year, which is higher than the 2.83 million oz from 2020 but is still well below 2019’s 4.13 million oz). The precious metal has already been struggling for almost two decades, as it reached peak production in

Peru in 2005 with 6.68 million oz/y and has not managed to return to those levels since.

To a certain extent, Peru is mimicking a global downward trend in gold production, as major gold companies worldwide are running out of reserves and grades are progressively becoming lower. Nevertheless, Peru used to rank consistently as the world’s sixth largest producer, and in 2021 it was only the world’s tenth largest gold producer according to USGS data.

Evolution in mining investments

Total mining investment in Peru has not changed drastically in the past two years, going from US\$5.9 billion in 2019 to US\$4.3 billion in 2020 and US\$5.2 billion last year. This can be mainly attributed to the fact that large mining companies are currently investing in the expansion and optimization of their projects.

However, there were two new major projects in 2021. One of them was Anglo American’s Quellaveco copper project, located in the Moquegua region, which represented 25% of all mining investment in Peru last year. Construction on all work fronts is currently reaching the final stages, and the project is well on track to achieve first pro-



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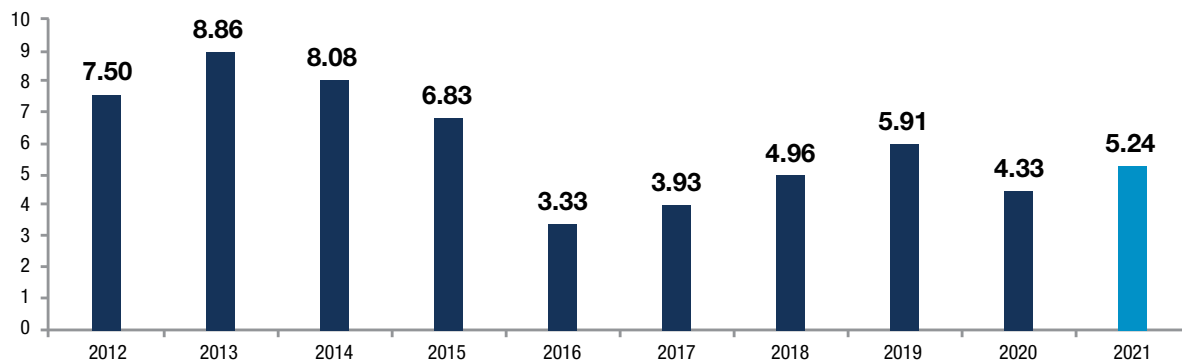
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Annual Evolution in Mining Investment (US\$ Billion)



Source: Ministry of Energy and Mines (MINEM)

duction in mid-2022, in line with the original project schedule despite the challenges presented by the Covid-19 pandemic to date.

Quellaveco will be an open pit mine and expects to deliver around 300,000 t/y Cu on average for the first 10 years of operations. Like other Anglo American operations around the world, it will function as a digital, automated mine and will be capable of generating an immense amount of data and using it to reduce uncertainties. Quellaveco will also be the first mine in Peru to use 100% renewable energy. Anglo American and ENGIE's Peru-based subsidiary have signed an agreement to convert the current contracted energy supply for the Quellaveco copper project to 100% renewable sources, in addition to agreeing on another eight years of energy supply for the mine, starting in 2029 from "green energy" inputs. "Quellaveco is setting a model for other large mining companies in Peru. The growing interest in renewable energy projects is excellent news for the electricity sector, and Peru has a fantastic role to play as it has one of the world's best wind and solar resources," commented Rik De Buyserie, country manager of ENGIE in Peru and CEO of ENGIE Energía Perú.

The other major project in 2021 was the expansion of Chinalco's Toromocho, a porphyry copper deposit located in the districts of Morococha and Yauli. Being one of the most important polymetallic deposits in Peru, it is currently working to expand the daily processing capacity of the mine from 117,000 t/d to 170,000 t/d. The expansion is expected to add 75,000 t/y of fine copper, in addition to creating 3,200 construction and 2,400 indirect operational jobs.

However, the stable trend in investments seems bound to change. There is already a shortage of new projects on Peru's horizon due the current political instability and abundant social conflicts in the country.

In the coming years, the only new large mining projects with a capex above US\$1 billion are Newmont's Yanacocha Sulfides, Zafranal, and Southern Copper Corporation's Los Chancas and Michiquillay projects. Nevertheless, realistically, Yanacocha Sulfides is the only project that is close to the construction stage.

Yanacocha Sulfides will be the result of Newmont's plans to transition the Yanacocha mine in Peru from oxides to underground sulfides. Newmont was

originally on a schedule moving towards seeking full funds for the project towards the end of 2021. However, since this venture required a construction workforce of 3,000 to be moved into Cajamarca and onto the mine site, the company deemed this a risk for employees and local communities. This led Newmont to delay the full funds decision until to the second half of 2022.

"We are still committing to spend approximately US\$500 million on the project through 2021 and the first half of 2022, on four key areas: Building the camp for the construction workforce; doing all of the detailed engineering to de-risk the project; committing to



Rik De Buyserie,
CEO,
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“In 2022 and 2023 we will develop the Ferrobamba and Chalcobamba projects to make our production more sustainable and to reach 400,000 t/y of copper in the coming years.”

Edgardo Orderique,
General Manager,
Las Bambas (MMG)



“We are looking for new assets to add to our portfolio, while we will keep working on the expansion project at Condestable and on the construction of Ariana.”

Adolfo Vera,
President and CEO,
Southern Peaks
Mining



long-lead items such as oxygen plants and specialist steel for auto-claves; and doing civil works with local contractors,” explained Tom Palmer, CEO of Newmont.


According to Palmer, there are two sources of ore that will feed the first 20-year wave of the Yanacocha Sulfides project. One is a layback of the Verde open pit – removing waste so the ore at depth moves out of the oxide into the sulfide ore; the other is the first underground mine, a decline which is already in place coming in off the Chaquicocha underground, high-grade sulfide deposit.

In Peru there is a persisting feeling that the country could produce a lot more than it currently does. Multiple large-scale projects remain undeveloped due to permitting complications and community conflicts, such as Conga or Tía María.

Copper production

In 2021, Antamina took Southern Copper Corporation’s spot as Peru’s top copper producer, increasing its output to nearly 460,700 t/y, a 16.3% year-on-year increase. Closely behind, Cerro Verde, the mine operated by Freeport McMoRan in Arequipa also increased its production by 7.9%, yielding 418,600 t/y in 2021. Southern Copper Corporation came in third with a combined 398,400 t/y from its Toquepala and Cuajone mines, a 6% year-on-year decrease.

Las Bambas, operated by MMG, remained as the fourth largest copper producer with 290,106 t/y. It suffered a 7.2% decrease compared to 2020 due to community roadblocks and the consequent shutdown of the mine in December 2021 and February 2022. Despite having gone through a difficult period, general manager Ed-




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gardo Orderique revealed that the pandemic has encouraged the optimization of their processes and the implementation of technology. The mine has designed a path to progressively become an intelligent mine by 2025.

Beyond the large-scale miners, booming copper prices have also encouraged mid-sized copper producers to expand their operations and enhance exploration activities around their mines. This is the case of Southern Peaks Mining (SPM), which has continued with expansion work at its Condestable mine in the Cañete province. The company recently finished testing a new mill and will soon start ramping up operations to reach the extended capacity of 8,400 t/d in the second quarter of 2022. "This will represent an increase of 12-15% in copper output compared to the previous year," explained president and CEO Adolfo Vera.

SPM has also undertaken actions to modify its Environmental Impact Statement and expects to request authorization to enter the second stage of the expansion to increase mill capacity to 10,000 – 12,000 t/d, depending on exploration results. "We are currently undergoing an initial stage of exploration and have obtained very positive results from several open-pit zones," Vera explained.

Meanwhile, SPM's Ariana project, located in the Yauli province, is still waiting to begin construction. The company has been analyzing environmental improvements that could help unlock the ongoing judicial process on the project, such as replacing wet tailings with last-generation dry tailings, as well as changing the location of the tailings facility moving it further away from the water infrastructure. "If this initiative is approved it will constitute a clear environmental improvement and could help us unlock the case," Vera stated.

Precious metals

While the production of gold and silver saw a rebound in Peru versus 2020 figures (+9.7% and +21.5%, respectively), both segments have failed to catch up with pre-pandemic production figures. Indeed, gold production in 2021 was still 24.8% lower than in 2019, while silver output was 14% lower.

The impact of Covid-19 on precious metals production in Peru was particularly harsh. This can be partially explained by the importance of underground operations in precious metals mining that were more severely impacted by Covid restrictions.

In this context, local company Minera Poderosa overtook Yanacocha as Peru's top gold producer in 2021. It recorded a gold output

of 298,500 oz, which represents a 13% increase compared with the previous year. However, despite the moderate improvement with regards to 2020, the company was not able to make the necessary investments to maintain its resources and reserves, and today, Poderosa has a three-year mine life.

"In 2022, we expect to invest approximately US\$120 million. 50% of this investment will be directed towards geology and exploration, while the remaining 50% will be directed to the areas of energy, maintenance, plant and mine," revealed Marcelo Santillana, general manager of Minera Poderosa.

Meanwhile, Yanacocha, once Latin America's gold producing powerhouse, only yielded 264,000 oz in 2021. Pan American Silver recorded a combined 246,000 oz gold from its La Arena and Shahuindo operations in northern Peru.

Another local producer, Aurífera Retamas, had a good 2021 with a 37% increase in gold production, yielding a total of 214,500 oz. Hochschild produced 178,700 oz, Horizonte recorded 168,600 oz, and Buenaventura presented a consolidated gold production of 160,200 oz in 2021, which excludes its former participation in Yanacocha.

On a smaller scale, local gold producer Minera IRL has the potential to put a new mine into production. The company has a relatively small mine called Corihuarmi which has been operating since 2008 and produced approximately 24,900 oz in 2019. The company is currently using this project as a way to support economically their efforts to develop the Ollachea project, which is currently in a financing stage. The company recently updated the PEA for Ollachea, reducing the capex almost 50% to US\$89 million. "We have an 18-million-ton resource, which, spread over the 11 years of the mine life results in a total production of approximately 876,000 oz Au," revealed Diego Benavides, CEO at Minera IRL.

Minera IRL started with the financing process of Ollachea in 2020-2021 but this was interrupted due to the electoral outcome which generated some insecurity at the international level. The company is currently considering new alternatives, such as selling the Ollachea project to another larger mining company or to form a joint venture to guarantee the development and construction of the project.

Base metals

Zinc production has experienced a fairly strong rebound in Peru, growing by 9.09% from 2019 to 2021. This coincided with a rise of over 20% in zinc prices in 2021, as they touched their highest

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“We have reached a 30-year agreement with the community at Ollachea on the use of surface rights and our main innovation proposal was to give them 5% of the shares of the operating company of the project (Kuri Kullu Mining Company).”

Diego Benavides,
CEO,
Minera IRL



level in 14 years in October 2021. A demand rebound after economies around the world lifted restrictions, paired with supply-side concerns over rising power costs, helped the base metal hit a yearly high of US\$3,794.50/t.

Antamina led zinc production in 2021 with 532,600 t/y, representing 34.8% of the country’s total, and managing to grow by 8.4% compared to 2020. The company attributed this improvement to the constant innovation in its production processes as it has implemented the use of machine learning technology to increase the production in the concentrator plant.

All the country’s other main zinc producers also recorded positive growth in 2021. Volcan produced over 200,000 t zinc in 2021, including 60,600 t from Chungar; while Nexa Resources yielded around 162,000 t and positions itself as the third largest zinc producer in the country.

A proliferation of M&A activity

The rapid onset and spread of Covid-19 resulted in an initial slowdown in M&A across the mining sector, yet activity picked up quite rapidly after the lockdown. “During the first months of 2021, many companies started looking to sell part of their assets or to

bring in new partners into their projects to dilute the risk associated with the elections,” noted Marcial García, partner at EY.

In Peru the most prominent example of M&A activity was Newmont’s acquisition of Buenaventura’s share at the producing Yanacocha gold-silver-copper mine. Buenaventura’s investment in Yanacocha started in the late 1980s and the company made the decision to sell this asset to lower its high levels of debt. The Denver-based miner Newmont offered US\$300 million upfront for Buenaventura’s 43.65% interest, plus up to US\$100 million more dependent on higher metal prices. “We believe the sale of this asset was the right decision, since we would have not been able to contribute the necessary capital for the construction of Yanacocha Sulfides, and this way we will be able to focus on our own projects,” commented Leandro García, general manager of Buenaventura.

As part of the deal, Newmont transferred its 47% interest in the La Zanja gold and silver joint venture with Buenaventura to its partner in exchange for royalties on any future production. Newmont will also contribute US\$45 million toward future closing costs at La Zanja in Peru.

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Meanwhile, Trevalli Mining sold its 100% interest in the Santander mine in Peru to Cerro de Pasco Resources. The Santander mine is located approximately 215 km east of Lima and comprises of an underground mine, a 2,000 t/d processing mill, a conventional sulfide flotation mill and associated infrastructure.

Cerro de Pasco Resources' core skills involve detailed management of late-stage mining operations and reprocessing of mineral stockpiles and tailings. This draws them towards assets near Cerro de Pasco with closure on the horizon but where they have identified an angle to extend life of mine, and this is the opportunity they have seen with the Santander mine.

"While our tailings work remains an integral part of Cerro de Pasco Resources' identity, we purchased the Santander mine from Trevalli Mining to help with our transition from a junior to a senior resource company," expressed Manuel Rodríguez-Mariátegui, executive director at Cerro de Pasco Resources.

In addition, a new player has entered the Peruvian gold space through the acquisition of the Lagunas Norte mine, which was operated by Barrick Gold between 2005 and 2019 and produced 10 million oz Au during that period. The newcomer is Boroo Lte, a multi-cultural mining company with assets in Central Asia and Latin America and whose strategy is mainly based on acquiring projects, including those in care and maintenance, and adding value to them by recovering the remaining ore.

While mining operations were placed on care and maintenance in 2019, Lagunas Norte's gold recovery plant has continued to produce gold from leach pad ore and Boroo expects to recover approximately in excess of 100,000 oz of gold inventory by 2023.

According to Jaime Zúñiga, general manager of Lagunas Norte, Boroo intends to commit significant energy and resources to developing operations to achieve growth objectives at the mine with the support of its experienced management team and significant existing infrastructure. The company is currently working to recover gold from carbonaceous oxide ore through the Carbonaceous Material Oxides Project (CMOP). It has already finished the basic engineering and is in process of developing the detailed engineering. "We expect this project to be in operation in Q4 2022," Zúñiga revealed.

The next phase will involve recovering sulfide ore through the Refractory Material Project (PMR). Through both projects, Boroo aims to increase the useful life of mine. ■



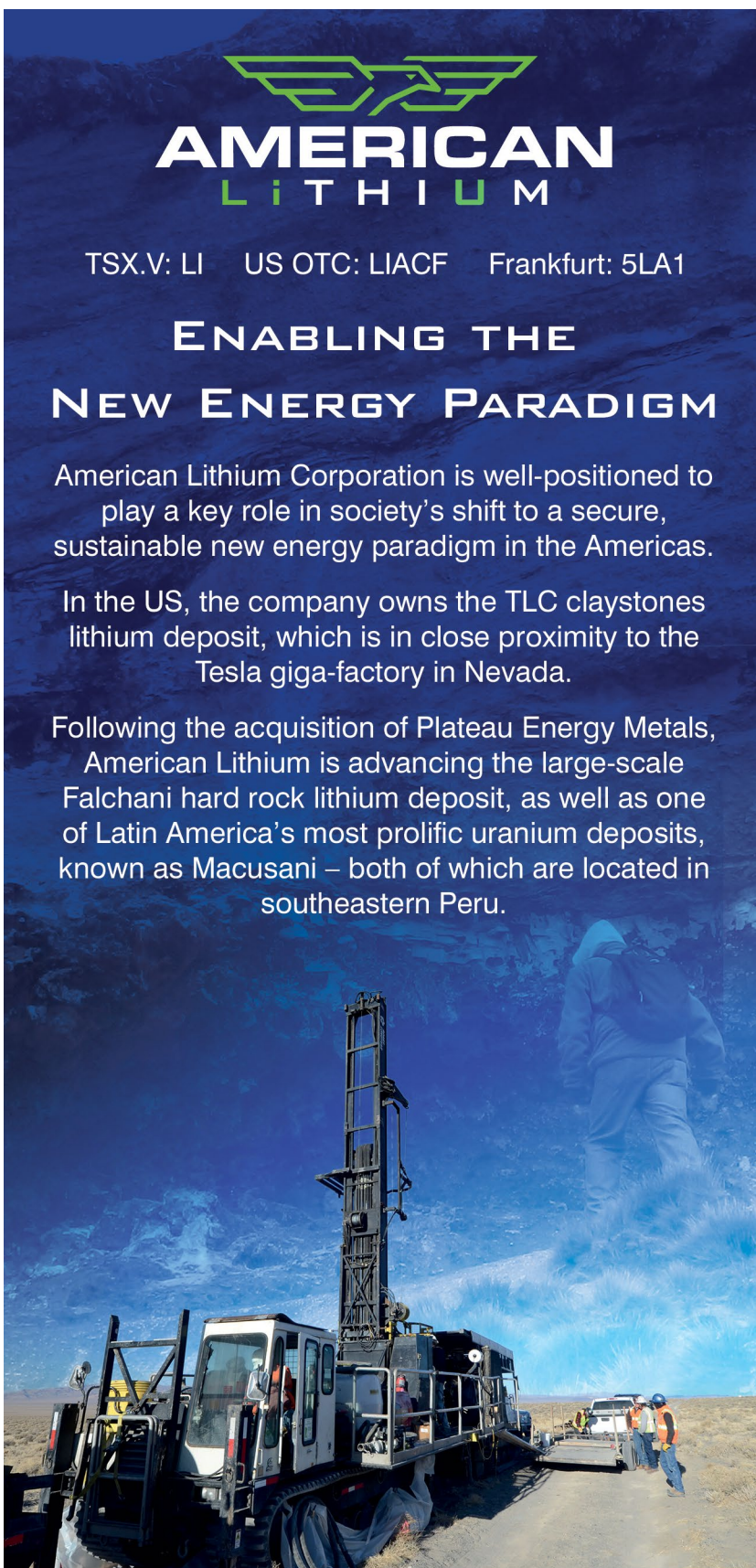
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ENABLING THE NEW ENERGY PARADIGM

American Lithium Corporation is well-positioned to play a key role in society's shift to a secure, sustainable new energy paradigm in the Americas.

In the US, the company owns the TLC claystones lithium deposit, which is in close proximity to the Tesla giga-factory in Nevada.

Following the acquisition of Plateau Energy Metals, American Lithium is advancing the large-scale Falchani hard rock lithium deposit, as well as one of Latin America's most prolific uranium deposits, known as Macusani – both of which are located in southeastern Peru.



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Executive Insights

Production and Development



“There are two sources of ore which will feed the first 20-year wave of the Yanacocha Sulfides project. One is a layback of the Verde open pit – removing waste so the ore at depth moves out of the oxide into the sulfide ore. We will also have our first underground mine, a decline which is already in place coming in off the Chaquicocha underground, high-grade sulfide deposit.”

Tom Palmer,
President and CEO,
Newmont

“We want to reach a processing capacity of 1,000 t/d at Santa María as soon as possible, and we hope to achieve a production of around 300,000 oz/y Au in the second half of 2022. We also want to enhance exploration, recovering lost time due to the pandemic, and thus grow in reserves.”

Marcelo Santillana,
General Manager,
Minera Poderosa



“In San Gabriel we have already finished the prior consultation process with the two communities in our area of influence. Now we are waiting to receive the construction authorization from the Ministry of Energy and Mines. This gold project will take approximately two years to build, it will have a 10-year mine life and it will produce 120,000-150,000 oz/y Au.”

Leandro García,
General Manager,
Buenaventura

“In 2022, we will invest approximately US\$25 million, which represents a 39% increase compared to 2021. These investments will be mainly directed towards exploration, development, a new pumping system and the tailings expansion that will allow the company to extend the mine life of San Vicente.”

Isabel Arias,
President of the Board,
Compañía Minera San Ignacio de Morococha (SIMSA)



“Lagunas Norte entered in care and maintenance in 2019, and Boroo saw the opportunity of continuing production through secondary leaching. There are significant reserves of carbonaceous ore in the stockpile as well as in refractory ore.”

Jaime Zúñiga,
General Manager of Lagunas Norte,
Boroo

José Augusto Palma

Director,
National Society of Mining, Petroleum and Energy (SNMPE);
President of the Organizing Committee,
International Gold, Silver and Copper Symposium



Could you highlight the SNMPE's most important initiatives of the last year?

We are following a proactive agenda instead of a reactive one. This means our goal is to anticipate problems such as social conflicts by working jointly with the government, civil society and mining companies. Some key aspects involve significantly improving the distribution of the mining canon and royalties, strengthening institutional capacities, and achieving greater transparency. In addition, we are working on speeding up the permitting process without neglecting environmental protections.

How do you see the potential for new investments in Peru?

Peru has enormous potential. Today, there is a pipeline of 48 mining projects, which account for an investment of over US\$57 billion. If these projects were to move forward, they would generate 2.3 million new direct and indirect jobs in the country and would contribute an extra PEN 349.9 billion to the State's treasury through taxes and contributions. This amount, according to the

National Infrastructure Plan for Competitiveness, is equivalent to all the resources that the State needs to close infrastructure gaps in health, education, transportation and electricity. Considering investments in mining projects are long term and imply taking high risks, it is important to have dialogue between the public and private sector if a change needs to be made.

How does Peru's tax regime compare to other mining countries in the world?

We need to become more competitive as a nation to attract investments. Peru is already one of the most burdensome places compared to other mining countries; we have eight tax burdens that constitute around 47% of mining companies' income, which are higher compared to some of our competitors such as Australia (44.3%), Chile (40.7%) and Canada (35.5%). That is why it is more important than ever to have legal stability and respect for the rule of law, as well as to improve the regulatory, environmental, infrastructure, and social aspects, among others.



14

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Exploration: The Cycle is Not Enough

Commodity prices present substantial opportunities for junior companies, but perceived risk by outside investors is limiting the sector's growth

For the exploration segment 2021 was defined by soaring copper prices. Covid-related supply chain disruptions and the green energy transition have been key drivers in the price of copper increasing from US\$3 per pound (US\$/lb) in 2020 to over US\$4/lb in 2021 and the beginning of 2022. Copper has been trading above the latter mark for over a year, and inventories are still at near record lows, presenting huge opportunities for Peru as one of the countries with most abundant copper reserves.

The situation was slightly more challenging for precious metals. Prices dropped throughout 2021, although during the fourth quarter gold managed to claw back some of the ground it lost earlier in the year as rising concerns over the impact of the new omicron variant on global economic growth provided a boost to safe-haven demand. Similarly, silver ended Q4 of 2021 in the black.

Despite these relatively favorable metals prices and Peru's richness in resources including gold, silver, copper, nickel, zinc, molybdenum, etc. investment in exploration has been progressively decreasing throughout the last decade, falling from approximately

US\$900 million in 2012 to US\$326 million in 2021. If we ignore 2020, this number is actually the lowest in a decade. A combination of reasons including the coronavirus outbreak, political turbulence, an uptick in social conflicts and excessive bureaucracy are hindering exploration activities, especially among juniors.

"Junior exploration in Peru has decreased, first, because environmental legislation has mistakenly lumped exploration and mining in the same category, even though the latter has a much larger operational footprint and environmental impact. This has also created a wrong social perception," argued Víctor Gobitz, past president of the Peruvian Mining Institute of Mining Engineers.

In addition, financing conditions for juniors have been challenging in the past few years. The broad markets like Nasdaq enjoying a spectacular run over the last four years has made it challenging for juniors and resource companies overall to attract capital as they compete with less risky businesses like Google or Apple.

However, it seems like this trend is starting to change. Events like the war in Eastern Europe and the supply chain disruptions with Covid-19 are making the world understand the importance of commodities such as oil, natural gas, copper, silver, nickel, etc. Now, the Nasdaq is rolling over and having one of its worst starts of the year, which means that if there are outflows of capital from the broad markets, it can be redistributed into sectors that are mostly healthy, but have not enjoyed a lot of attention, like the natural resource sector.

Reflecting on how financing conditions are changing for junior companies, Peter Dembiki, president and CEO of Tier One Silver argued: "In the last month and a half a lot more capital has been flying into the resource sector, from large cap producers to exploration companies. The situation has improved remarkably from a year ago and I believe it will keep getting better, because I think we are at the beginning of a substantial bull run in commodities."

A renewed interest in precious metals

The escalation of the Russia – Ukraine conflict, combined with a 40-year high in inflation worldwide, has led to a renewed flurry of interest in safe-haven assets such as precious metals. Recently investment bank Goldman Sachs raised its 2022 gold target to US\$2,500 per ounce citing a "perfect storm" of increased investor and central bank demand amid economic and geopolitical uncertainty, as well as resilient Asian retail demand.

In the silver, gold and base metal space, the Canadian exploration company Tier One Silver has been garnering a lot of interest from the investment community as well as majors. The company raised C\$13.5 million before listing in June 2021, and then immediately commenced the first ever drill program at its flagship project Curibaya in southern Peru. It hit multiple bonanza grade intercepts and intercepted plus kilo silver grade intercepts in an area that had never been drilled before. "We have also recognized the potential for a copper porphyry body below or nearby

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“In the last month and a half a lot more capital has been flying into the resource sector, from large cap producers to exploration companies. The situation has improved remarkably from a year ago and I believe it will keep getting better, because I think we are at the beginning of a substantial bull run in commodities.”

**Peter Dembicki,
President and CEO,
Tier One Silver**



the silver mineralization, which would be the ultimate dream for an exploration company,” commented Peter Dembicki, president and CEO at Tier One Silver.

In the next drill program, Tier One Silver will target the Camabaya corridor, which is higher in elevation and has returned the best channel samples to date, and test the opportunity for a copper porphyry system nearby. “What is remarkable about this project is that we have two stories in one, both of which on their own would be standalone for any public exploration company,” said Peter Dembicki.

The company expects to have the DIA drill permit in place in the spring of 2022, which will allow them to drill up to 200 holes and provide a lot of flexibility for this program. A total of 4,000 m - 5,000 m are planned in this second phase.

There is also a relatively new player in Peru’s silver space. Highlander Silver, a mineral exploration company formed from a merger between Lido Minerals and CAPPEX Mineral Ventures listed on the CSE in August 2021. The company is focused on the further exploration of the Alta Victoria silver-polymetallic project in central Peru, previously explored by CAPPEX.

The Alta Victoria property is located in the Central Cordillera Polymetallic Mineral Belt, which hosts some world-class silver-lead-zinc deposits and has produced over 1.5 billion ounces of silver historically. Over the course of four years, CAPPEX did all the groundwork to generate and build up the geological evidence of Highlander’s current targets. To date the company has completed ground geochemistry, IP geophysics, MAG geophysics and a gravity survey.

“Now, we have targets in the Pachas area to the north of Santa Teresita that we are very encouraged by. We are currently in the process of modifying our permit and expect to attain approval for our 5,000 m drill program at Alta Victoria in May, with drilling starting in June/July 2022,” stated Ronald Stewart, president and CEO at Highlander Silver.

Towards the end of 2021, Highlander Silver decided to incorporate an additional asset into its portfolio. It acquired the Poltunche project near Alta Victoria. The company still needs to sign a community agreement before advancing the project. “We hope to attain all approvals by mid-2022 and be in a position to start drilling as soon as we have finished our drill program at Alta Victoria,” Stewart explained.

“Although short term investor sentiment will ebb and flow with how the government operates and behaves, the mining industry in Peru will continue to attract investor interest based on the bounty of minerals the country has to offer as well as the mining culture Peruvians have.”

**Ronald Stewart,
President and CEO,
Highlander Silver
Corp**



Replenishing Peru’s copper pipeline

A lack of major development projects on the horizon after Anglo American’s Quellaveco comes into production in 2022 has sharpened the spotlight on Peru’s copper-focused juniors.

The Canadian junior Forte Minerals Corp went public in January 2022 after 10 years of being privately funded, engaging with Haywood Securities on the brokerage side. The company saw some renewed interest in the market as well as strong fundamentals for copper, which constitutes 80% of its focus. Forte initially listed on the CSE, and in April, it also started trading in

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Exploring New Copper Assets in Peru

- Two advanced copper projects in Peru: Elida and Flor de Cobre
- Well-mineralized intercepts from historical drilling
- Located at low elevations, near infrastructure and strong community support

2022 WORK PLAN:

Elida: Follow up on a Phase I drill program with a maiden resource estimate and Phase II drill program

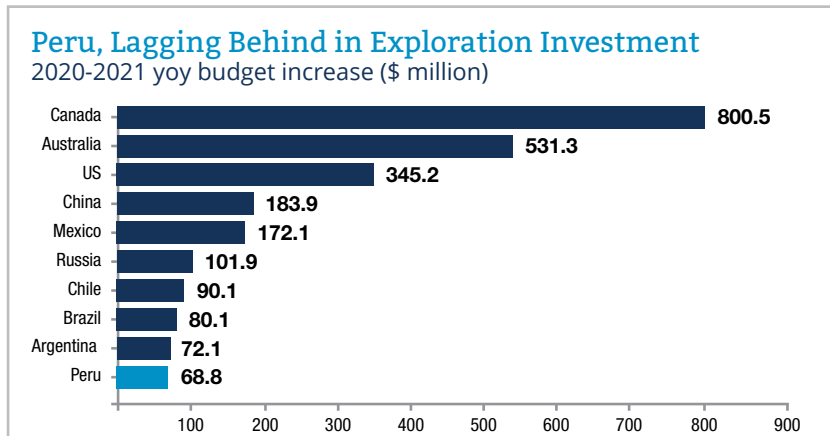
Flor de Cobre: 2022 drill program and updated resource estimate

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the United States OTCQB and became DTC eligible. “This additional listing was an important step forward to gain access to a broader investor market, as well as increase trading volume and liquidity for Forte Minerals’ common shares in the United States,” stated Patrick Elliot, president and CEO of Forte Minerals.

Forte Minerals is currently in the process of permitting its three properties, which, according to Elliot, can be a lengthy process in Peru. “For Pucarini, the CIRA Report, which is the first step in the permitting process, has been submitted and approval is expected shortly. The field studies and technical documents have been completed and the company is in the process of finalizing the DIA Report which will be submitted to MEM for approval of the drill permits,” Elliot revealed.

The company also started the permitting process for Esperanza, its second property, in the fall of 2021 and expects to acquire drill permits by Q1 of 2023. Meanwhile, Forte expects their property Don Gregorio to take more time given its sen-



Source: S&P Global

sitivity and the fact that the permitting process was started quite recently. This, according to Elliot, will work well with the timeline of drilling all three properties.

In the copper space, Latin Metals has been following the prospect generator model. The company rebranded in 2019 from Centenera, and today has a large copper-focused portfolio in Peru. The company’s strategy involves looking at multiple jurisdictions and commodities

before acquiring projects and beginning the low-cost surface exploration. From there, rather than spending money on drilling, it secures partners who finance the project moving forward. While the discovery is thus made by the partner, Latin Metals retains a minority interest. “This presents a clear benefit for our shareholders, as their stock in the company is not diluted as a result of multiple large financings,” explained CEO and president Keith Henderson.

Latin Metals has built some significant partnerships with some of the big mining names such as Hochschild Mining, Newmont and Yamana Gold. At the moment, one of Latin Metal’s main projects is the Lacsha property, where it made a deal to engage in early-stage work. In December 2021, Latin Metals signed a three-year deal with the community, enabling it to secure a drill permit. “We are confident that these activities will allow us to find a partner,” Henderson commented.

2021 has been an eventful year for exploration company Element 29. Since completing its IPO in December of 2020, it has been advancing its two assets, Elida and Flor de Cobre. The company completed its Phase 1 drill program at Elida in mid-December 2021 and achieved better-than-expected results. “For example, the last hole we drilled had a 909 m interval of 0.55% copper equivalent, including a 340 m interval of 0.67% copper equivalent,” revealed chairman and CEO Richard Osmond.

Simultaneously, Element 29 has been focusing on the Flor de Cobre project, a copper porphyry located near Arequipa, close to Chapi and Cerro Verde. Within that project the company started drilling



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“International perception has clearly changed for small cap investors, and they have reassessed risk in certain jurisdictions like Peru. This is unfortunate because we have seen many junior explorers completely relinquish their South American portfolio to move back into exploration in Canada or the US.”

**Patrick Elliot,
President and CEO,
Forte Minerals Corp.**



the Candelaria copper porphyry in early February 2022 to verify the results from the historical resource estimate and extend the drilling to depths of over 500 m to also test the primary copper sulfide potential in the hypogene mineralization below the enrichment blanket.

Element 29 has already begun the permitting process at the Atravezado target and hopes to complete it before the end of 2022. “The social licenses will take time as the nearby community has been designated an indigenous community, meaning there are additional processes involved,” Osmond explained, however, he does not anticipate any major complication in coming to an agreement with this community due to their familiarity with mining.

By the end of 2022 Element 29 expects to have initial resource estimates for both the Elida and Flor de Cobre projects. At Elida, it will undertake a Phase 2 drill program to expand the initial resource estimate by mid 2022. At Flor de Cobre, it plans to move the project towards a PEA to ultimately make a production decision.

Camino Corporation is another junior that has been taking advantage of the thriving copper prices. The company, which has been revisiting old projects, has three assets; the Maria Cecilia copper porphyry complex, the Los Chapitos copper IOCG district, and the Plata Dorada high-grade copper and silver project. President and CEO Jay Chmelauskas was drawn to Los Chapitos project because of previous drill results from 2017 that indicated the potential scale and grade for a copper mine. “The company has capped 2021 with a final drill program, the results of which supported our thesis that we have a major iron oxide mineralized system,” he explained.

The program consisted of five exploration holes located several kilometers outside of the holes they had historically drilled. “Each hole in the December 2021 drill program hit copper mineralization, with grades up to 1.05% copper,” Chmelauskas added.

In the gold-copper space, Kaizen Discovery holds the Pinaya gold/copper project, located between Moquegua and Puno in the same belt as productive and world-class porphyry and skarn systems, including Las Bambas, Tintaya, Constancia and Antapaccay. Kaizen Discovery completed a drilling program at Pinaya in February 2022 and released the results on 1st March,



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which confirmed the presence of shallow gold mineralization associated with base metal veins and scar. "The newly identified mineralization confirms that Pinaya is a large, multi-phase porphyry-related system with mineralization occurring over an area of at least 5 km by 2.5 km and with the potential for new concealed porphyry intrusions," revealed Mark Gibson, COO at Kaizen Discovery. The next step at Pinaya will involve a geophysical survey. "We think this is going to be one of the largest IP surveys ever done, and certainly the largest one in Peru as it will comprise nearly 130 km²," Gibson explained. Kaizen will use Typhoon IP-resistivity geophysical equipment from majority shareholder HPX (High Power Exploration) to explore the Pinaya system to depth, which, according to Gibson, brings several great advantages: "It can output a high current that is adjustable to the depth and scale of the exploration target. This is combined with high voltages that are also adjustable to overcome near-surface resistance. It also outputs an extremely clean signal, which yields

"The biggest challenge has been educating people that were previously unfamiliar with our activities as an exploration company and explaining the difference between miners and explorers."

**Ivan Bebek,
President and CEO,
Coppertino Metals**



a high signal to noise ratio in recorded data. Our partner company Computational Geosciences can then rapidly and accurately process the recorded data to make models for interpretation."

Another of the Canadian juniors active in Peru, Chakana Copper, recently published the first resource ever on its Soledad project in January 2022. "The initial resource has an average depth of approximately 330 m from surface and we have documented 191,000 oz gold, 11.7 million oz of silver, and 130 million pounds of copper contained within 6.7 million tonnes. Doing the math, the copper equiv-

alent grade is approximately 1.8%, or 2.87 grams per ton gold equivalent in the resource," revealed David Kelley, president and CEO of Chakana Copper.

Kelley noted that the initial resource is based on only seven breccia pipes out of the 41 that have been identified on the Soledad project. Based on the geophysical information, mapping and sampling they believe there are additional breccia pipes on this project, perhaps as many as 100.

The company's goal for the next two years is to explore the upside potential at Soledad. It will commence with a 10,000 m drilling program at the north side in June of 2022. Chakana is fully permitted to conduct drilling on the north side and is advancing the permit on the south side so as to conduct 10,000 m of drilling to test targets there in 2023. "At the end of 2023 we hope to be in a position where we can demonstrate a dramatic increase in the resource potential of the project through new discoveries that will be documented and published in 2022 and 2023," Kelley commented.

In the western half of the Andahuaylas-Yauri belt, where famous mines like Las Bambas, Tintaya and Antapaccay occur, lies Coppertino Metals' Sombrero project. Coppertino Metals recently rebranded from Sombrero resources after the acquisition of the Takana option. "The inspiration for Coppertino originated from the legendary explorer Copernicus. Coppertino is also a play on the combination of both copper and nickel which reflects two of the most sought-after metals globally which are critical to support a low carbon economy and the targets of our two projects, with Sombrero containing a great copper-gold target, and Takana hosting substantial copper and nickel targets," explained Ivan Bebek, co-founder, president and CEO of Coppertino Metals.

KAIZEN DISCOVERY

EXPLORING THE PINAYA COPPER-GOLD PROJECT IN PERU

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“Peru and Chile will always be mining countries, because it is where a large amount of the world’s copper is located, and if political changes discourage mining development, the effects on the population’s lifestyle would be dramatic. Therefore, a lot of the current concerns are viewed as short term, and in the longer-term these countries will remain as good investment destinations.”

**John Black,
CEO,
Regulus Resources**



To date, Coppernico Metals has achieved a DIA which is the environmental permit for communities in the southern portion of the Sombrero North claims. Coppernico also has made other steps including receiving the approval for the presence of Sombrero Minerales in the area on November 4th, 2021. "This agreement is subject to additional steps, including remuneration discussions and signatures by the community before access can be obtained," Bebek noted.

The challenges that Coppernico is facing with regards to community access reflects the importance of educating people that are unfamiliar with mining activities and explaining the difference between miners and explorers.

Overcoming political noise

The political noise currently generated by Peru’s government has increased the perceived risk by investors outside of Peru. The current administration’s initial announcements regarding possible constitutional changes and nationalization of mining interests, combined with plans to raise mining taxes, has not done the industry any favors.

Nevertheless, junior companies are finding ways to navigate these political complexities, which, according to Luquman Shaheen, president and CEO at the copper-focused exploration company Panoro Minerals, are by no means new. “We have to remind the industry that over the last 30 years there have been 11 different presidents and seven different political parties in power in Peru. Despite the partisan political turbulence, investment in the mining sector has remained strong,” he noted.

According to Shaheen, this is a clear indication that the mining sector is not immune to political issues, but to a certain degree, it does transcend a lot of the partisan political issues in the country. For Panoro Minerals the strategy to overcome the current political challenges and advance its flagship Cotabambas project has been to maintain strong local relationships.

The importance of prioritizing robust relationships with local communities was shared by Graham Carman, president and CEO of exploration and development company Tinka Resources. “Tinka operates more at the local level rather than the national level, and we have excellent relationships with our local communities and regional authorities,” he stated.

The company recently secured surface agreements with its key communities that will enable it to continue to advance its flagship Ayawilca zinc-silver-tin project for the next several years.

On a final note, Carman shared his prediction on the political future of the mining industry in Peru: “A possible change in the political constitution and possible nationalization of certain mining interests, as promoted by the incoming government in 2021, is no longer on their agenda. I remain confident that the political situation will change for the better once the pandemic is behind us.” ■

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Executive Insights

Exploration

“The political situation in South America resembles that of the rest of the world in the sense that companies need strong ESG strategies now more than ever. It is a strong part of our mission to educate people that mining is necessary for the energy transition and that it is imperative that these metals be developed in a responsible way.”

Jay Chmelauskas,
President and CEO,
Camino Corporation



“Chakana Copper is very bullish on Peru as a mining country as we know how important this sector is to the economy, ever more so now during recovery from the pandemic. We are far enough into the Administration of Pedro Castillo to know that there are not going to be dramatic changes in the industry and projects will continue to be advanced.”

David Kelley,
President and CEO,
Chakana Copper

“If mining companies operate in a way that all stakeholders benefit, we feel Peru offers an enormous opportunity for investment. For this reason, we still view the country as a low cost, low risk mining jurisdiction. Nonetheless, Peru seems to be lacking political stability as of late. If there is a perception of instability it makes it much harder for companies to attract foreign investment for mine development all the way down to early grassroots exploration.”

Richard Osmond, Chairman and Interim CEO, Element 29



“Peru has fantastic geology and hosts many giant deposits, such as our northern neighbor Tintaya and Cerro Verde in nearby Arequipa. For large-scale porphyry discoveries, which is what we are looking for at Pinaya, Peru is one of the places to be. It is also easier to obtain access to ground than in countries like Chile, where it is very difficult to acquire opportunities.”

Mark Gibson,
COO,
Kaizen Discovery

“The Peru mining industry is currently operating within a challenging political climate. That said, as a prospect generator, this does not concern me. Mining countries typically go through political cycles with the government. Because we are working on relatively early-stage exploration projects that will not transition into production for a while, we believe that the political environment will likely be more favorable by the time one of our properties advances to that stage.”

Keith Henderson, President and CEO, Latin Metals



Engineering, Construction and Consulting

A renewed focus on ESG issues

While the consulting segment was expecting a moderate uptick after the hardships of the pandemic, 2021 turned out to be one of the best years in many companies' history. Gustavo Bravo, mining director for Latin America at Canadian multinational services firm WSP, attributed the boost in the demand for its services to the sum of two elements: "Some projects that were planned for 2020 were postponed to 2021 due to the restrictions associated with the pandemic, and the price of metals increased substantially," he explained.

2021 was also a remarkable year for SRK Consulting in Peru, which, according to director Antonio Samaniego, had one of the best years of its history. "Geoengineering is currently SRK's most active department in Peru, which does work related to mine waste management and mine closure studies," he explained, also noting a moderate increase in the demand of optimization studies for mining operations.

Similarly, Paul Murphy from Australian mining engineering and consulting firm Mining Plus, noted a renewed emphasis on sustainability in 2021. "Companies now

"Thanks to the acquisition of Golder in 2021 we have strengthened our platform of integral services to the mining industry, where the social, environmental and sustainability areas are key."

Gonzalo Covarrubias,
General Manager Peru, WSP Golder



understand that in order to get projects permitted and financed they must put sustainability at the forefront of their studies."

Indeed, the days of working exclusively to deliver quarterly results are over. The Covid-19 pandemic and rising social conflicts

across the nation have focused attention on social inequalities, putting pressure on companies to go beyond their regulatory obligations and take responsibility for driving social equality in the regions in which they operate. "For Mining Plus it is not

"Waste management and mine closure studies are currently our most requested services in the Peruvian mining industry."

Antonio Samaniego,
Director,
SRK Consulting
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Cradle to Cradle



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José Luis Lara,
General Manager,
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Federico Schwalb,
General Manager, BISA
Ingeniería de Proyectos

about simply calculating the best economic return from an engineering mind-set (NPV, IRR, etc.), but it involves considerations including softer factors such as market perception or social license to operate,” Paul Murphy from Mining Plus continued.

According to Steve Botts, president at Santa Barbara Consultants, with the current political context companies are becoming increasingly focused on maintaining good relationships with communities and ensuring they have good support from local stakeholders. “Whether companies like it or not, and whether it is their legal responsibility to do so or not, it is obvious that mining companies have to play a bigger role in local and regional development, as the Peruvian government often is unable to provide sufficient support and services,” he expressed.

On the topic of sustainability, WSP has greatly strengthened its expertise in ESG matters since the acquisition of Golder in April 2021. Gonzalo Covarrubias, general


manager Peru at WSP Golder, highlighted the introduction of a new program that is especially popular among mining clients as it allows a comprehensive and transversal view of the challenges affecting their projects: “Our new global innovation program called Future Ready has the objective of analyzing future trends through four lenses, including climate, society, technology and resources, and can advise and design projects accordingly,” he explained.

Towards better tailings build, management and closure

Within the topic of sustainability, tailings management has become a major concern for mining companies. After the Brumadinho tragedy in Brazil in 2019, experts agree that tailings management has improved enormously across the globe, and Peru is no exception. Many businesses in Peru are already adapting their tailings management facilities to the recommendations of the

Canadian Dam Association (CDA) or to the International Council on Mining and Metals (ICMM) guidelines, which in 2020 published the Global Standard for Tailings Management and is mandatory for its members. The Canadian engineering, geoscience and environmental consulting firm Klohn Crippen Berger (KCB) is currently helping many mining companies in Peru to adhere to the CDA or ICMM guidelines and expects even more requests in the near future. “ESG standards are becoming increasingly important in tailings design and management,” noted Betty Celis, project manager at KCB’s South American office in Lima.


Denys Parra, general manager at environmental, construction and engineering consultancy Anddes, pointed to several improvements in the Peruvian mining sector’s approach to tailings: “The industry is starting to include the figure of the Engineer of Record, who can make significant contributions to tailings management, as well as the



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Independent Geotechnical Review Board, which is a group of experts that reviews the main components of critical facilities. It is also making substantial investments in the real-time monitoring of tailings facilities.”

Reflecting on the sector’s progress with regards to tailings management, Antonio Samaniego, director at SRK Consulting, also noted that Peru is advancing rapidly on the Global Action on Tailings (GAT), an initiative developed under the Global Mining Professionals Association (GMPA) sponsorship. The idea is to propose strategies for adequate tailings build, management and closure. The SME, a GMPA member, released a tailings handbook in 2021 to cover new topics that the industry will need to consider when looking at tailings management, such as climate change.

Going underground

The majority of Peru’s iconic mines in recent years have been open-pit operations, such as Antamina, Las Bambas, Cerro Verde and Toquepala. Because Peru’s mining sector had a period of inactivity in the 1980s, the country lost around 15 years of development opportunity. As such, Peru has not yet seen the transition to underground mining for some of the larger pits. Underground mining nevertheless represents a large portion of production in Peru, but that generally comes from medium-sized operations such as El Brocal, Cerro Lindo and Condestable. “The transition to underground mining for some of the larger pits is coming, and when it does, it will likely be on a grand scale,” said Paul Murphy from Mining Plus.

“We have created a joint venture with Redpath Mining and together we have won the tender for the comprehensive development of Newmont’s Yanacocha Sulfides project.”

Gianflavio Carozzi,
CEO,
AESA



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“In 2021 we won a tender to expand the mine development service for Nexa’s Cerro Lindo, which has allowed us to become one of the leading contractors of the operation.”

Eduardo Cossio Chirinos,
CEO,
INCIMMET



“In addition to automation, we are shifting towards electrification of our equipment to eliminate pollution caused by diesel motors. Moving forward, all of our crawlers will be battery powered.”

Marc Blattner,
General Manager,
Tumi Raise Boring



For that reason, companies such as Bynecut Mining, an international specialist underground mining contractor and part owner of Mining Plus, are actively setting up in Peru. “In Peru, we believe that services that help mining companies look at opportunities to transition from surface to underground mining will be highly demanded in the near future,” commented Greg Jackson, managing director of Bynecut.

As a reflection of this progressive shift towards underground mining, Newmont is planning to transition its Yanacocha mine in Peru from oxides to underground sulfides with the Yanacocha Sulfides project, providing substantial opportunities for underground contractors. Underground mining contractor AESA recently signed a joint venture with Redpath Mining with whom it won a tender for the integral development of the Yanacocha Sulfides project. “We are designing the operation of the project together with Newmont considering semi-autonomous scoops, drilling and support equip-

ment with remote operation, and real-time mapping of all our personnel and equipment. We are also planning a medium-term migration to electric equipment,” revealed Gianflavio Carozzi, CEO of AESA.

In recent years, AESA has worked with some of the country’s main mining companies including Minsur, Raura, Volcan, Cerro Lindo and Glencore. Lately the company has been focusing on improving its capabilities to offer more comprehensive services, adding shotcrete application and ore transportation to its portfolio. “In the last year mining companies have preferred to concentrate service contracting to fewer companies that have greater management capacity and a stronger ability to react to uncertainty,” Carozzi explained.

The past year has also been busy for Peruvian contractor INCIMMET. While the company has been diversifying towards the provision of open pit mining services, much of its business continues to be related with underground mining. “Our most requested

services continue to be horizontal excavation and mine development,” commented Eduardo Cossio, CEO of INCIMMET.

In 2021 the company won a tender to expand its mine development service for Nexa’s Cerro Lindo, becoming the leading contractor of the operation. “We have been working for Nexa for around eight years and this tender will extend our business relationship for an additional four years,” Cossio continued.

INCIMMET has been focused on developing new technologies, especially related to underground safety, including developing a drone that has a built-in thermal camera with software capable of interpreting the change in temperature of the rocks. This allows it to identify the places with potential risks of landslides. INCIMMET recently won an award for the development of a robotic arm to load drills for blasting. The sensors make the arm completely autonomous in placing the explosive and the detonator.

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Raise boring and shotcrete innovation

While there are numerous limitations for technological adoption in the underground segment, R&D is booming among raise boring contractors and shotcrete specialists. As mines get deeper and venture into more uncharted territories, underground machines must be able to drill deeper, faster and more accurately. Raise boring contractor Tumi Raise Boring and drilling specialist Master Drilling are pushing the adoption of new technologies, each one in their separate niche.

Tumi Raise Boring, for instance, began work on a fully remote-controlled raise boring machine in 2022, in line with a future which, Tumi predicts, will be fully remote controlled. "This technology will allow the operator to control the piece of equipment from Canada that drills a hole in Peru, for example," illustrated Tumi's general manager Marc Blattner.

According to Blattner there are currently no fully automated raise boring operations in Peru, and Tumi was in fact the first company to introduce semi-automation with its SR line of self-anchoring, self-leveling equipment. Tumi has traditionally worked as a contractor in the Peruvian market and has sold machines to other countries including Mexico. However, the current political instability has provided Tumi with the final push to expand operations to other countries. It has moved into Brazil and is also starting operations in Mexico and Canada. While the engineering and design is still based in Peru, much of the manufacturing has been moved to Texas (USA), and the company is also looking to expand the robotics and engineering team into Houston.



Enrique Sattler,
CEO,
Robocon



Greg Jackson,
Managing Director,
Byrnecut Offshore

In parallel, South African multinational Master Drilling has seen a resurgence in its raise boring services in Peru and has managed to win back several clients that it had lost over the past few years. The company is currently working with many of the main protagonists of underground mining in Peru, including Volcan, Condestable, Minsur, Buenaventura and Colquisiri. With a strong focus on innovation, Master Drilling was a pioneer of horizontal raise boring (HRB) technology, which is used to create horizontal excavation between two existing tunnels in an underground mine. It was developed to replace dangerous drill and blast activities, and, according to the company, is more cost effective and reliable than other systems.

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Master Drilling has been consolidating some new solutions in Peru. “Last year, we started to promote vertical shotcrete, which allows to construct chimneys in a way that was not possible before through raise boring. It provides a very safe and reliable technical solution to our clients where the ground conditions are unfavorable,” commented Belisario Tijero, general manager of Master Drilling Peru.

A new construction company enters Peru

The severe restrictions imposed in Peru due to the pandemic complicated construction projects and presented logistical headaches for contractors with large workforces. Some construction decisions were even delayed. For instance, Newmont required 3,000 people in a construction workforce to be moved onto the Yanacocha Sulfides mine site, but the company deemed this a risk for its workers and local communities. This led Newmont to postpone the construction decision and, in words of Tom Palmer, president and CEO of Newmont, “progress the project at the pace which the pandemic allows.”

In this context Argentinian construction and service company Milicic was planning to expand its services to Peru, but faced with Covid-related complications, decided to put its internationalization process on hold. In 2021, seeing renewed optimism in the market and mining companies’ willingness to make up for lost time after the pandemic, Milicic decided to take its first steps in Peru. “We have worked on almost all mining projects in Argentina, carrying out earthworks, civil works, and providing construction services, and we want to bring that experience to the Peruvian

“Milicic is an Argentinian construction and services company with almost 50 years of experience. Since our inception, we have worked on almost every mining project in Argentina, carrying out earthworks, civil works, and providing construction services.”



Marian Milicic,
General Manager,
Milicic

market” explained Marian Milicic, general manager of Milicic. The company has already expanded to Uruguay and Paraguay, which, according to Milicic, are smaller markets where they focus on specific projects. However, Milicic wants to follow a different strategy in Peru, creating a completely new structure in the market and following gradual steps to adequate the company’s business model to the country’s culture. “We already have a commercial manager and a project manager in Peru, who are assembling the structure of our company. We are also meeting with potential clients and expect to be working in at least one project in Peru by the end of 2022,” Milicic continued. ■

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Equipment and Technology

Innovation shapes the Peruvian mining industry

Mining tends to be regarded as a highly conservative industry with a low technology adoption rate. In fact, a study carried out by Boston Consulting Group that measured the digital adoption rate by industry at a global level revealed that in 2021, the mining industry was 30-40% behind compared with its peers like the automotive or petrochemical industries.

While the mining industry seems to have advanced in slow motion for years, key actors across the value chain agree that the pandemic and soaring metal prices have given the sector an irreversible push towards technological adoption. "In Peru we are observing that the mining industry is hungry for technology adoption, open to sharing its problems and willing to ask experts for help in building technological solutions," expressed Carlos Calderón, general manager at Sitech, a Ferreycorp group company specialized in introducing technology solutions to mining operations.

With a renewed interest in technologies that can improve productivity and safety at mining operations, equipment providers

"We are testing four 400-ton 980E-5SE trucks in Antamina, which are equipped with a Cummins QSK-95 engine that allows to move more material faster, thus increasing our customers' productivity."

Tomás Martínez,
CEO, Komatsu-Mitsui
Maquinarias
del Perú
(KMMP)



have a lot to bring to the table. For example, Ferreyros, a leader in heavy machinery, and its subsidiary Caterpillar put the first autonomous trucks in Peru into operation in the Quellaveco copper project. At least eight Cat 794 AC units have been introduced onsite, which are part of an autonomous fleet that will reach a total of 30 trucks of this model in the mine.

The trucks will ultimately be loaded by the mine's three 7495 Cat rope shovels as well as a Cat 6060 hydraulic shovel.

For Komatsu-Mitsui Maquinarias del Perú (KMMP), 2021 was a record year in terms



Gonzalo Díaz Pró,
General Manager,
Ferreyros

of sales and profitability, where the company grew 10% compared to pre-pandemic levels. At Antamina KMMP is currently testing four large 980E-5SE trucks with a payload capacity of 400 short tons (363 mt) and equipped with a Cummins QSK-9 engine, which allows moving more material faster, and thereby increasing productivity. "We are very pleased that

Antamina has decided to incorporate these four 980E-5SE trucks and hope that these will be the first of many more in the Peruvian market," commented Tomás Martínez, CEO of KMMP.

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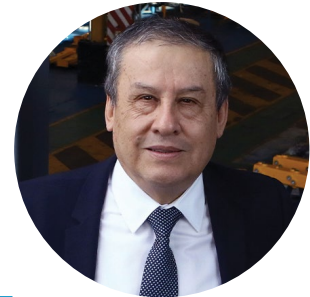


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“Full automation can make machines less reliable because it requires a lot of sensors, and narrow vein underground mining is the worst environment for this due to the corrosion, humidity and dust.”

James Valenzuela,
CEO,
Resemin



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Today, Martínez sees automatization as one of the most powerful trends shaping the Peruvian mining industry. “We are currently in negotiations with clients to introduce autonomous trucks in Peruvian mines. We hope that this will be a reality after 2023 as they can bring advantages related with productivity, efficiency and safety,” he shared.

2021 was also a record year for the John Deere and Wirten Group distributor IPESA, as it managed to grow around 40%. “The logistics crisis that we are going through has created a shortage of machinery. This has benefited companies like ours which hold good levels of inventory,” co-CEO Giorgio Mosoni explained.

At the end of 2021, IPESA also assumed the representation of Paccar (Kenworth and DAF trucks), as part of the company’s strategy to increase its presence in the mining industry and reach new clients. The first trucks were delivered at the end of January 2022. IPESA has also been introducing new technologies such as surface miners (Wirtgen), crushing equipment (Kleeman) and loading solutions (Morooka), which, Mosoni argues, other companies do not offer.

On the topic of technology, Mosoni revealed that the company has doubled the capacity of its monitoring center in Peru to provide clients with accurate information about the machinery, including fuel consumption, time-outs, machine efforts and operator efficiency. “Through this monitoring center we can constantly analyze the

“Within the mining industry we offer support machinery (John Deere), new technologies such as surface miners (Wirtgen), crushing equipment (Kleemann) or loading equipment (Morooka), which are solutions that other companies in the market do not have.”

Giorgio Mosoni,
Co-CEO,
IPESA



“We have seen a substantial increase in the demand for our products related to automation and digitization, for example, those aimed at providing access to equipment data for better decision making.”

Ángel Tobar,
General Manager
of Andean Region,
Epiroc



alarms generated by the monitoring systems of our equipment and therefore inform our clients about possible damages even before they occur,” he explained.

Overcoming technological limitations in underground equipment

It is widely known that the harsh conditions of underground mines present significant challenges for incorporating innovation. In particular, a big limitation for the introduction of technology in Peru’s underground segment is the existence of numerous narrow-vein operations. Local equipment manufacturer Resemin has managed to turn this challenge into an opportunity and has progressively gained international recognition for its specialist equipment suited to narrow-vein operations. “During 2021 we have managed to consolidate our Muki equipment, a line of small-sized jumbos suited for narrow-vein operations,” expressed James Valenzuela, CEO of Resemin.

According to Valenzuela, 2021 was the best year in Resemin’s history. The company’s roof bolters have been the best-selling machines. “The market has realized the benefits that these roof bolters bring in terms of reliability, productivity, ease-of-use, maintenance costs and the limited use of electronic sensors,” he explained.

Among the company’s latest innovations, Valenzuela highlighted Resemin’s creation of the narrowest explosive loaders on the market, with a width of 1.30-1.50 meters. The company is also waiting for the patent for its T-pointer system, used to perform scaling with a jumbo. In addition, Resemin is currently trying to consolidate its most disruptive machine, which, according to Valenzuela, is the Dual Jumbo, which performs both face drilling and roof bolting. Finally, Resemin also expects to offer battery powered equipment by July 2022.

Another limitation for the introduction of technology in the underground segment is the fact that mechanization is still a work in progress. However, Franklin Pease, general manager of Finnish OEM Normet, has observed a great acceleration in the mechanization of underground processes, especially since the pandemic, noting that mining clients have become aware of its notable contribution to safety and productivity. “We see significant growth opportunities related to the renewal of machines and to the mechanization of new processes,” Pease expressed.

In addition, Normet is observing an increasing interest in the adoption of electric vehicles and electric equipment underground. Pease noted that electrification is already part of many Peruvian

mining companies’ strategic plans. In this sense, Normet has already began working on a family of electric equipment for tunnel construction.

Like Normet and Resemin, the Bosch Rexroth group has identified a great market opportunity related with electrification in Peru and is currently working on a portfolio of products for the electrification of mobile equipment in underground mining called eLION. The eLION family covers a variety of components, including a full range of electric generators, inverters and accessories as well as tailored gearboxes, hydraulics and software. “We have already launched six prototypes worldwide, five of which are in Europe and one in Peru,” revealed Kai Rothgiesser, general manager of Bosch Rexroth Peru.

An advertisement for IPESA featuring a 3D cutaway illustration of a road and tunnel construction site. Various pieces of heavy machinery are shown in different stages of use: a blue truck on a road, a red truck on a bridge, a yellow excavator on a hill, a white Wirtgen surface miner, a blue DAF truck, and a green John Deere loader. The IPESA logo is prominently displayed at the top. Below the illustration, the text reads: "SOLUTIONS FOR TRANSPORTATION, CONSTRUCTION, ROAD MAINTENANCE AND MINING". At the bottom, contact information is provided: "Contact 966 254 742 or visit us at www.ipesa.com.pe". Logos for John Deere, Wirtgen Group, Kenworth, DAF, and Epiroc are also present.

To create this new line of products, Rexroth's know how of hydraulic systems and components has been combined with Bosch's expertise in the automotive industry and knowledge of electric systems. "We have managed to take advantage of the synergies between both companies to create a unique product in the industry," Rothgiesser continued.

The group sees great potential for this portfolio among machinery manufacturers in Peru, but also plans to offer it as retrofits for other machines. Mass production of this portfolio is expected for June 2022.

Enabling digital transformation

In recent years Peruvian mining companies have adopted a growing range of digital solutions. Many have mechanized their operations, moved from the physical to the digital realm by adding equipment sensors and adopted unified networks to transmit data. Despite this progress, in many ways these steps are only the beginning. The true power of digital transformation lies in a structured road map that extends changes from an individual asset level to the en-

tire organization and creates a platform for innovation and collaboration.

Two mines in Peru have been leading the way in terms of digital transformation. The first is Anglo American's Quellaveco. With the implementation of an integrated operations center (IOC), the Quellaveco project, which is expected to begin production by mid-2022, will become the first mine in Peru that will be 100% digital from its inception.

The IOC will allow to remotely manage all operations involved in the copper production chain, from extraction to shipment. It will integrate the data from different processes and interpret it, with the goal to optimize resources, increase safety, limit interruptions in the operation, and make decisions in real time.

Meanwhile, MMG's Las Bambas is making great efforts to become a digital mine. The mine was in fact recognized by the Peruvian National Mining Society as Peru's most innovative mine thanks to its technological roadmap to progressively become an intelligent mine by 2025. "In 2021 we implemented a digital operations center

(DOC) in Lima, which controls the entire value chain, from the mine to the port of Matarani," explained general manager Edgardo Orderique.

According to Orderique, the DOC already has control of the dispatch system (optimized truck dispatch), the drills with high-precision GPS, and auxiliary equipment. By 2023-2024, they will remotely control the drills from the DOC, allowing a single person to operate three production drills at the same time. The mine currently uses LTE 4G technology in its operations and plans to integrate this technology to have an automated data collection to help optimize decision making.

The Peruvian mining industry is increasingly understanding the benefits of using digital solutions and data analytics to optimize operations, asset performance and reduce risks, but many mines still need to overcome the legacy of their operations, which are often broken down into individual operating silos, with ineffective integration between mine, processing and transport.

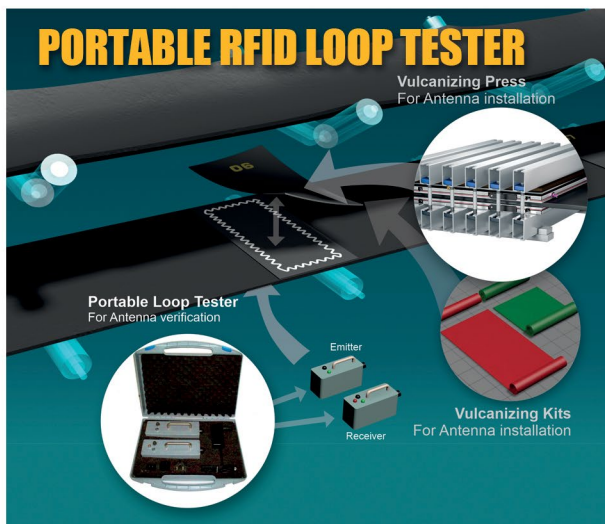
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“We are currently working on a portfolio of products for the electrification of mobile machinery in underground mining called eLION.”

Kai Rothgiesser,
General Manager
Peru,
Bosch Rexroth



“For the tender of Anglo American Quellaveco we have proposed as an added value to establish a training center in Moquegua with the objective of training the personnel in that area in the reparation, maintenance and regulation of scrapers.”

Fernando Barrio,
General Manager,
Tecnomina



provider Zyfra has created an industrial internet of things (IIoT) platform. Its aim is to integrate all the different islands of data that exist in the mines - related to the plant, fleet control or security, for example - and combine them in a centralized platform where advanced analytics can be applied to improve effectiveness, safety and profitability. “Our IIoT platform is creating great interest among tier one mines in Latin America,” commented Víctor Huaco, director at Zyfra.

Ángel Tobar, Epiroc’s general manager of the Andean Region, also noted a trend in the Peruvian mining industry towards the integration of different processes, including for drilling. In this sense, the company is offering a flexible and scalable tool called Mobius for Drills, which allows to plan and optimize the drilling process. Its goal is to allow fast and effective decision-making, both on a day-to-day basis and in the long term. Mobius for Drills provides a single, easy-to-use platform that allows all stakeholders to view information from drilling rigs of different technology levels and according to their needs, as well as to control, supervise and monitor equipment in operation in real time. “This translates into an increase in productivity and safety, through the generation of statistics, the monitoring of the status of consumables and the comparison of the planned results with the actual results obtained,” Tobar explained.

Material handling

With more mines and processing plants running around the clock, mining operators require material handling equipment that is reliable. In a country where permitting new projects is a growing challenge, and in a context of thriving metals prices, companies involved in the processing and handling of ore have become particularly valuable.

In the material handling space, the multinational company Weir Minerals has been working extensively with Quellaveco supporting its transition from the construction phase to operation. Weir Minerals currently is on track to open its sixth service center in Moquegua to support the Quellaveco project. The company has also seen a large demand for its services in expansion projects like Cerro Verde.

According to Karina Zevallos, general manager of Weir Minerals: “Clients understand best their operation, so it is necessary for us to invest time and resources with them to understand their bottlenecks and objectives in order to develop high-impact solutions that serve various stakeholders. This allows us to generate

a macro vision of the entire system and look for opportunities for improvement.”

Zevallos explained how sometimes these improvements can be achieved by simply changing the location of a piece of equipment, rather than buying a new one. “Our work method is based on seeking general solutions for the system and growing together with the client,” she stated.

Another of the Peruvian players in the material handling segment, Tecnomina, had the second-best year in the company’s history in 2021, with an 8% increase in sales compared to 2020, according to general manager Fernando Barrio. The company recently renewed a comprehensive maintenance contract with phosphate mine Miski

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“In the coming months, we will inaugurate our new service center in Moquegua to support the Quellaveco project.”

Karina Zevallos,
General Manager,
Weir Minerals



“Our aim is to strengthen our position in the grinding, classification, pulp transport, and fluid engineering sectors, as well as to increase our presence in large-scale mining”

Nilo Martínez Vargas,
General Manager,
Yahle



Mayo, where it takes care of activities including belt reparation, pulley coatings, idler replacement and belt scraper adjustment.

In addition, Tecnomina has achieved a two-fold commitment with Quellaveco. “On one hand, we are working on belt assembly and splicing at the Ilo port through the Belfi Cosapi consortium, as well as on belt splicing in the plant through Cumbra. On the other hand, we have won the tender to supply Quellaveco with Sempertrans conveyor belts and splice kits for the next three years,” Barrio explained.


As the whole industry turns towards new technologies to improve efficiency and safety, so are material handling companies. Maintenance in particular has become one of the key target areas for new investments. Tecnomina, for example, has been investing heavily in new technologies related with predictive maintenance. It has incorporated the latest equipment in dynamic radiographic inspection, which allows X-raying of the steel cable conveyor belts while they are in motion, without having to stop production.

Similarly, Martin Engineering, a company specialized in manufacturing conveyor accessories and flow aids, is also allocating significant amounts of money to remote monitoring and remote technical support, which has become especially important since Covid. The company’s remote monitoring solutions are currently available for their primary belt cleaner products, but they will soon be applied to other product lines. “We have developed a belt trace detector, which we have already implemented in Brazil. It allows us to detect very quickly and accurately if the conveyor belt suffers any damage and stop its movement only if necessary. This allows to minimize damage and maximize production,” explained Javier Schmal, vice president for Latin America at Martin Engineering.

To achieve this Martin Engineering uses two complementary technologies, one based on vibration and the other one based on a laser video analytics system, both of which minimize the possibility of false alarms.






Yahle (formerly YalePerú) has been serving the needs of Peruvian processing plants for over 10 years. The company has the capacity to manufacture rubber, polyurethane and ceramic products that solve problems of wear and tear due to abrasion, impact corrosion, and tearing faced by mining companies. It can also manufacture products such as linings, trommels or ball mills. Recently Yahle expanded its facilities to be able to offer metalworking services to its clients and to manufacture spools and metal components with rubber and polyurethane coatings.

“Gradually, large-scale mining has become our main niche. We are serving clients such as Hudbay, Chinalco, Antapaccay, Marcobre, Mina Justa and Anglo American,” revealed Nilo Martínez, general manager of Yahle. ■



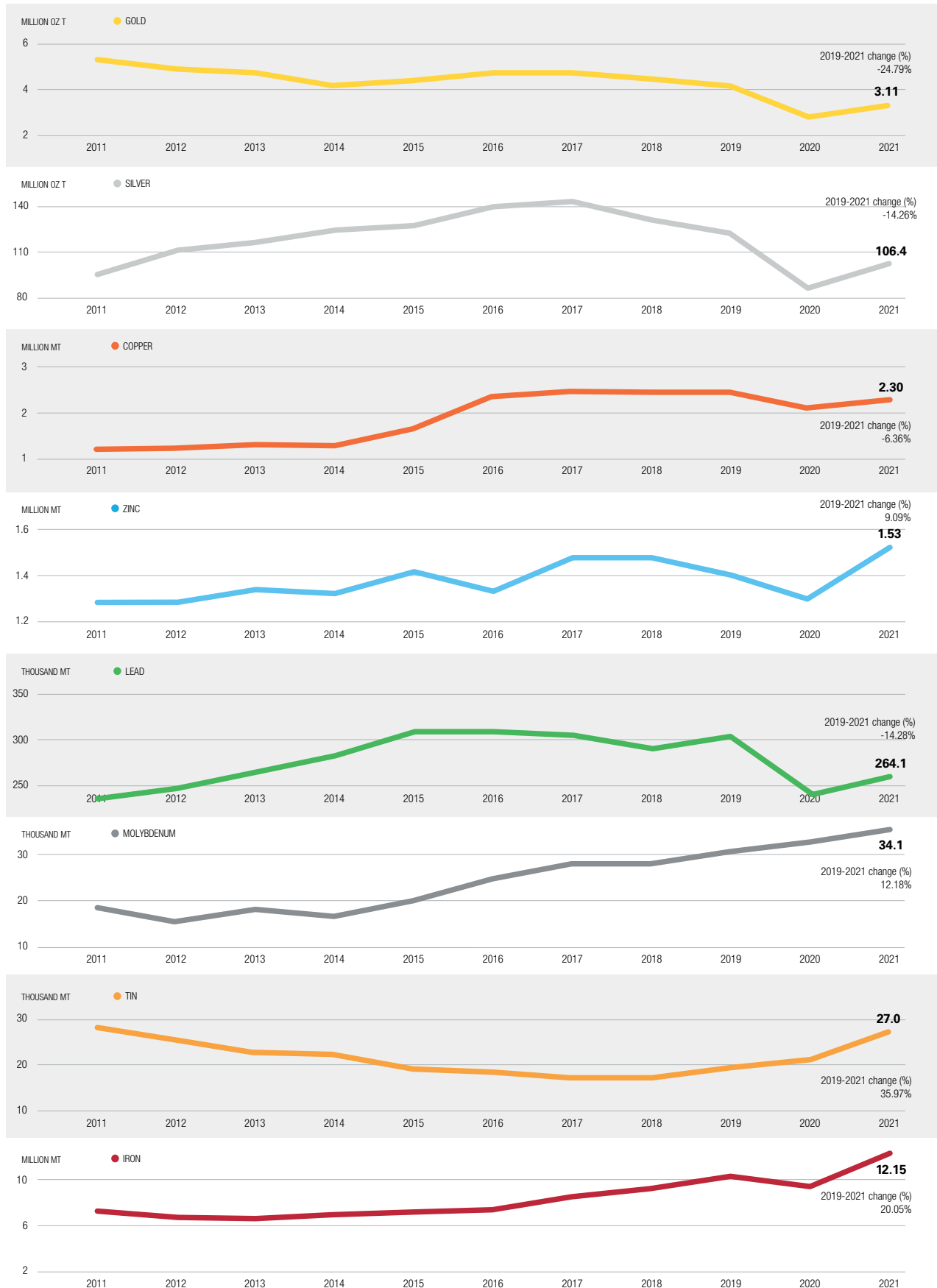
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Peru, a Diversified Metals Producer



Source: Ministry of Energy and Mines (MINEM) / GBR

Mining Services

Drilling companies experience a rebound after the pandemic

As the Peruvian mining industry emerged from the strict lockdown exploration activity increased dramatically, encouraged by soaring metals prices, particularly copper. According to MEM, investments in mining exploration in 2021 were US\$327 million, which represented a 51.5% increase with regards to 2020 (US\$216 million).

With more companies racing to join the exploration boom in Peru, the demand for drilling services has skyrocketed and today the activity and turnover of most drilling companies have returned to pre-pandemic levels.

Jorge Granda, general manager Peru at AK Drilling International (AKD), attributed the company's good results in 2021 mainly to the growth in the junior segment. "Despite difficulties in Peru related with permits and communities, most of our junior clients were able to overcome these challenges and move their projects forward," he explained, noting also that the company has consolidated itself in the large mining segment.

Meanwhile, Miguel Angel Arenas, general manager at Geotec, revealed that the company is not working with junior companies at the moment. Instead, its main market share is made up of large mining companies including Las Bambas, Antapaccay, Yanacocha and Quellaveco.

"Our good results in 2021 have been largely due to the growth in the junior segment. Despite difficulties in Peru related with permits and communities, most of our junior clients were able to overcome these challenges and move their projects forward."

Jorge Granda,
General Manager
Peru, AK Drilling
International



While the high levels of demand are providing ample opportunity for drilling contractors and equipment providers to grow their business, the industry is facing an important limitation. "The shortage of drillers is the drilling industry's main bottleneck. When there are high levels of exploration, many tend to go to countries like Suriname or Zambia to look for new opportunities," observed Miguel Angel Arenas from Geotec.

Considering the current difficulty of hiring and training people in the drilling business, companies like Geotec have been looking at ways to automate drills and their support equipment, making operations less complex and risky. Discussing the state of automation of the drilling sector, Miguel Angel Arenas argued that the automation of drilling equipment has evolved substantially in recent years, but there is still a long way to go. According to Arenas, drilling today should be 100% hands-free in all mines.

On the topic of automation, Jorge Granda from AKD counterargued that the human component will remain indispensable in order to provide effective drilling services that respond to the clients' needs and objectives. To maintain highly qualified crews amid a widespread worker shortage the company's strategy has been to reject all the projects that chase exclusively the services with the lowest price, and to charge fair prices that allow it to pay fair wages to the employees. This, according to Granda, has created much loyalty among employees towards the company.

Looking ahead, the outlook for drilling services providers is moderately optimistic. According to MEM predictions, investments in exploration could grow slightly in 2022 with regards to 2021, but it would still be far from the US\$541 million of 2019. The fact is that investments in exploration have been decreasing for the last decade.

This downward trend in exploration can be attributed to several factors. First, environmental regulations in Peru are severely hindering grassroots exploration, as obtaining drill permits currently can take up to two years. Second, it is becoming increasingly difficult to find large deposits. Despite Peru's remarkable geologic potential, all of the easy, low-hanging fruit has already been picked. New deposits are becoming increasingly costlier to discover be-



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“Considering the difficulties of recruiting and training people in the drilling business, we are looking at ways to automate drills and their support equipment.”

Miguel Angel Arenas,
General Manager,
Geotec



cause they are in remote or difficult locations, or in ore bodies that are technically very challenging. In this context, drilling technology is playing an increasingly vital role in overcoming technical difficulties.

Acknowledging the importance of technology for drilling operations, Geotec is currently renovating its fleet, taking advantage of the relatively healthy market conditions. “Last year we purchased from Canada the Foremost DR-24 XHD drill, the largest water drilling rig in the region,” Miguel Angel Arenas explained.

According to Arenas, the rig reaches a depth of 500 m with a diameter of 27.5 inches using the dual drilling system. The company is also purchasing Boart Longyear’s LM110 Smart machines with rod handlers.

Discussing plans for the near future, AKD aims to consolidate the three basic services it offers to the whole region: RC drilling, diamond drilling and water well drill, as well as all its subservices. “We will also focus on service planning, which means working together with our clients to be aware of their plans early on so that we are able to cover their needs. This way we will achieve immediate availability of assets and highly qualified personnel,” Granda said.

As a concluding thought, Miguel Angel Arenas from Geotec shared: “We hope that the mining industry and the communities will find space for dialogue, allowing our country to take advantage of the good metals prices and the investment opportunities that the metals super cycle brings.”



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Laboratories invest in their capabilities to face growing demand

The recovery of the mining sector and high metals prices in 2021 have encouraged exploration activities from both producers and juniors, significantly increasing the demand for laboratory services and metallurgical analysis. While this has brought enormous opportunities for geochemical analysts, it has also resulted in long delays for assay turnaround due to a lack of lab capacity.

Reflecting on the tremendous uptick in the demand for laboratory services, Miguel Caillaux, general manager at the Peruvian laboratory Certimin, commented: "In addition to all the clients we won in 2021, in 2022 we were able to incorporate two well-known mining companies focused on copper into our client base."

Similarly, Luis Vilchez, business development manager at SGS, described 2021 as a recovery year where the company saw a huge increase in demand for their mining services. The company has been working on projects such as Quellaveco, where they are ensuring the quality of the construction of the mining project and taking care of the chemical analysis of exploration samples and flotation testing in their metallurgical

laboratory. "We recently won a new contract with Quellaveco for the supervision and the administration of the chemical and metallurgical laboratory, which will allow us to accompany the project for the next five years," Vilchez related.

Faced with the great rise in demand, laboratories have been making large investments to expand their capacity, provide better service, and guarantee better response times. For example, Certimin has recently bought automated geochemical equipment which, according to deputy general manager Jonathan Campbell, generates faster and more reliable results. The company is also implementing IT tools in each area to improve results and reduce human error.

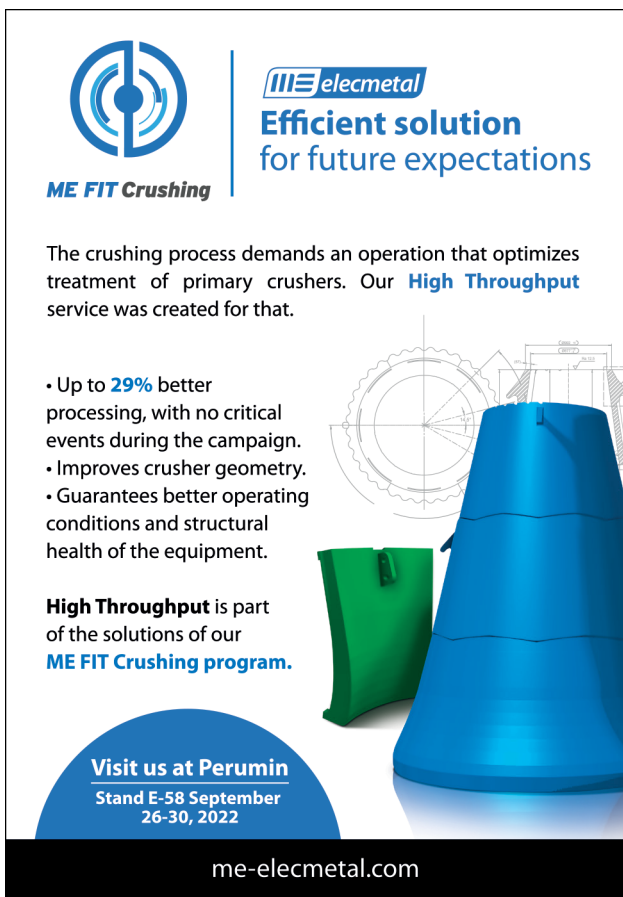
In addition, Certimin is strengthening its metallurgical services. The company has started a project with BGRIMM, one of the most important mining institutes in China, which will allow for Certimin's technical team to learn from Chinese metallurgists and to share different experiences regarding how to approach and carry out metallurgical tests. Certimin also recently achieved the Glencore Technology certification, and is the first and only laboratory in Peru where

laboratory tests can be carried out with the Isamill grinding mill and Jameson cells.

The great demand for laboratory services has also encouraged SGS to invest in their metallurgical laboratory, production capacity and in flotation tests. "In 2021, we doubled our operational capacity, working closely with Chile to deal with the enormous volume of samples," Vilchez said.

SGS is currently developing a mini pilot plant where an algorithm will simulate various processes, including flotation. Ultimately, it will replicate the metallurgical process that would take place at a large scale in the mine. According to Vilchez, the pilot plant will serve two types of clients; junior companies, letting them know if their project can go ahead or not, and mining projects, which already have production and wish to optimize their process. "We will take this mini pilot plant to PERUMIN to carry out simulations," Vilchez revealed.

As in the case of many other mining services, laboratories nowadays are facing fierce competition. In recent years, companies have raced to offer the lowest possible cost, often at the expense of providing a quality service. This is particularly the case with environmental tests that mining com-



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panies must do periodically to comply with regulations, and therefore are regarded as a necessary expense; however, this also occurs with exploration assays, where the service provided can have a great impact on the fundamentals of mining project.

Luz Blancas, business development manager at Certimin commented on the race within the laboratory segment towards lower prices: “Unfortunately, in recent years, services providers have established predatory rates that do not even cover the cost of a quality service.”

However, this paradigm could soon start to change. “After several years working with the laboratories that offer the lowest costs, two large copper companies in Peru have decided to request Certimin’s services, prioritizing a quality service over price,” she commented, hoping that this will be the beginning of a new trend in the mining industry.

Competition rises in the logistics sector

Large mining investments are closely correlated with the health of the logistics sector. Today many investments in Peru are being postponed due to political instability and social conflicts, or even moved to other countries such as Argentina and Mexico, causing significant alarm among the Peruvian logistics sector.

However, logistics was one of the few activities deemed essential during the pandemic by the Peruvian government, as well as governments abroad, so it did not stop domestically or internationally. This allowed logistics companies to maintain their activities as well as their contracts with mining clients.

Local logistics and construction company DCR Minería y Construcción has seen a rise in the demand for its services related with the transportation of hazardous material such as mercury, cyanide, peroxide and acid. The company currently has a fleet of 400 vehicles;

200 of them are dedicated to the transport of hazardous materials, mineral concentrates, and LPG, and the remaining 200 are trucks and machines dedicated to mining exploitation, earthworks and operations inside the mines.

“We have also expanded our line of business related to the development of underground tunnelling operations in the south of the country,” expressed general manager Ángela Corrales.

DCR Minería y Construcción has over 40 years of experience in the logistics sector and, during this time, according to Ángela Corrales, the roads in Peru have barely changed. “We would like to see the road network expanded, since we currently have the same roads as 40 years ago, but the number of vehicles using them has multiplied by 100,” he said.

The number of specialized logistics companies in Peru has indeed increased dramatically, and supply has surpassed demand. According to Corrales, while many new companies use similar technology to DCR such as antifatigue wristbands and have contingency plans, many do not have the necessary experience or skilled drivers to accomplish such dangerous tasks.

There are some new players joining the logistics segment, offering innovative transportation solutions to mines with difficult access due to their remote location. For example, Eolo Drones, a partner of the Canadian company Volatus Airspace, is putting their drones at the service of the mining industry. “We have a drone that can carry a load between 5 – 25 kg and travel 100 km in one hour,” revealed Luis Fontenoy, partner at the company.

Third party services

Every mining operation must take care of a long list of processes. There are still companies that prefer to have direct control over ac-



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tivities that are close to the heart of the operation (like mining activities), but it is common for many mining firms to hire service companies that have acquired high levels of specialization throughout the years to take care of ancillary tasks.

The maintenance of industrial plants and fleets is one of the main activities that mining companies chose to outsource. Mining operators must focus on their core business, which is mineral production, and they often need strategic partners that can assure the highest levels of availability of their plants and fleets. Confipetrol Andina is a large player in the industrial third party services space that can help mining companies with these activities. “Our third party services include the operation and maintenance of concentrator plants, open-pit equipment, fleet maintenance and underground mine equipment, and taking care of these concerns for mining companies means they can focus on their core business,” explained Wilson Miranda, general manager of Confipetrol Andina.

According to Miranda, Confipetrol is providing this type of services to all the main mines in Peru, including Southern Peru, Nexa, Marsa, Hudbay, Las Bambas and Yanacocha. Recently the company was able to add two new clients into its portfolio “The new mining projects in Peru, like Quellaveco and Marcobre, have allowed us to expand our operation and maintenance services,” he revealed.

In a context of improving conditions after the pandemic, Confipetrol managed to grow 20% in 2021 compared to the previous year, which encouraged it to make some significant investments. For instance, the company has been undergoing a process of digital transformation to improve its processes and become more efficient. Confipetrol is also putting great emphasis on the concept of predictive maintenance for early fault identification. ■

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Lucrezia Falcidia (lfalcidia@gbreports.com) and/or
Susana Isotupa (sisotupa@gbreports.com)

www.gbreports.com

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Senior Project Director: Lucrezia Falcidia
Business Analysts: Susana Isotupa, Kolby Kaller
Project Coordinator: Marta Armengod García-Valdecasas
Executive Editor: Mungo Smith
Graphic Design & Artworks: Özgür Ergüney
Operations Director: Miguel Pérez-Solero
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