

GLOBAL BUSINESS REPORTS

CHILE MINING 2025 © Pre-Release Edition



Chile Reclaims its Mining Might

A resilient industry rising to meet its challenges

After several years of challenges and uncer- ences of regulatory changes and an unsettainty, the resiliency of Chile's mining industry shines through in 2025. The path to as though the world's leading copper proforeign investment is more competitive than ducer is back to its brightest. Furthermore, ever, and companies across the value chain are trying to break the downward trend of decreasing production levels that have plagued Chile since 2019. The annual total for copper production in 2024 was 5.5 million Copper Commission) reported a monthly t, an increase of 4.9% from 2023's figure. As the country emerges from the recent experi-

tled political attitude toward mining, it feels with an election on the horizon in November 2025, companies remain cautiously optimistic about the future of mining in Chile.

In December 2024, Cochilco (the Chilean production of 563.4 thousand t of copper, the highest in Chile's history and 14.1% higher

than December 2023, which companies are hoping is a sign of things to come for 2025. "I think that the initial concerns have vanished over the years concerning the negative impact of the government through new regulations. Now, we are seeing an increase in investment in Chilean mining larger than in any other Latin American country. I believe that regardless of political affiliation, the new government will seek to speed up the environmental processes required to build and operate a mine without making the requirements any less stringent," remarked Juan Castaño, CEO of consultants Amphos21 Chile.

The first months of 2025 have seen a surge in demand for copper, and this has been reflected in a price hike of 11.44%. Analysts attribute this to a weakening US dollar, geopolitical tensions, rising industrial demand, and the tariffs imposed by the US government, as well as the ongoing global shift toward renewable energy and electric vehicles. "The energy transition is irreversible, and while short-term challenges may arise, including geopolitical ones, the long-term trajectory is clear: an electrified world with decreasing reliance on fossil fuels. Copper's fundamental role in electrification will drive significant copper demand, and with experts predicting a looming supply deficit, further investment is required," said Santiago Montt, CEO of Los Andes Copper.

> US President Trump has threatened a 25% tariff on all copper imports, sinking the price by up to 7.7% on the London Metals Exchange. This has made the outlook for future copper prices much less stable, with predictions previously estimated to be US\$4.25 per lb in February 2026 now sitting around US\$3.90. More uncertainty is affecting the short-term attitude of investors and buyers, however, in the long-term, hope remains a

solution will be found, and Chile's biggest export will remain an economic driver for the country.

Experts predict that demand for copper may grow by 27% before the end of the decade, with AI data centers, renewable solutions, and the EV market requiring 36.6 million t/v of the group 11 metal before 2031, according to McKinsey. "The demand for copper is forecast to remain strong thanks to mega-trends of electrification, economic development, and population growth. Net copper shortages will drive high prices needed to generate investment returns on the development of 120,000 t/y. "Proper planning and foresight are necessary to ensure the lower-grade, more inaccessible deposits that are currently being studied," explained Merlin Marr-Johnson, CEO of Fitzroy Minerals.

"One of our main initiatives is the National Geological Exploration Plan, in collaboration with the Association of Geologists. It aims to map Chile's mineral resources region by region. This project, with a dez, CEO of LEN Ingeniería. budget of US\$4 million and an estimated duration of 24 to 36 months.

will create jobs for geologists, engineers, environmental specialists, and archaeologists and will provide precise data on Chile's mineral wealth to guide future mining investments," said the Chilean Mining Chamber's president, Manuel Viera Flores.

Codelco

In 2023, Codelco, Chile's state-operated mining giant, recorded its lowest production figures in 25 years. Since then, all efforts have been directed at restoring the company's former strength. In this per projects in the coming decades. Having BHP as our partner in vein, Codelco acquired Enami's 10% stake in Quebrada Blanca for US\$520 million aiming at increasing production at the plant and foster collaboration between Teck and Codelco.

Vicuña takes center stage

Another landmark collaboration in 2025 was announced at the beginning of the year between Lundin Mining and BHP, which acquired a large land package in the Vicuña District that straddles the Argentina-Chile border. The acquisition includes the Filo del Sol and Josemaria projects, and both companies will control 50% ownership of the newly created Vicuña Corp.

"We expect the Vicuña project to become one of the largest copthis project is a strong validation of our confidence in copper and its future demand," outlined Juan Andrés Morel, vice president of operations for Lundin Mining.





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Furthermore, in February 2025, alongside Anglo American, Codelco announced a historic MoU to collaborate on the neighboring Andina and Los Bronces projects. According to Codelco, this will become the fourth largest mining district in the world, possessing about 8 million t of resources between the two deposits. The collaboration will help both companies avoid many of the problems other mining companies in Chile are facing, such as access to infrastructure and declining ore grades, increasing production by efficiency and continuity, even in the face of external disruptions. A concrete example is the merger between Codelco and Anglo American at Adina and Los Bronces, where strategic project geolocation and integration will drive future success," said Julián Alvear Fernán-

"There is a very strong mandate for new exploration in places like Chile and for metals such as copper. We need to come up with a new way of doing things to be successful, and use utlising

new technology to find valuable deposits that are under cover and have not been detected so far."

Matthew Grainger, VP Portfolio Management, VerAI Discoveries



"Even with heavy funding into other jurisdictions such as Argentina, Chile remains an attractive destination both for investors and operators, with the

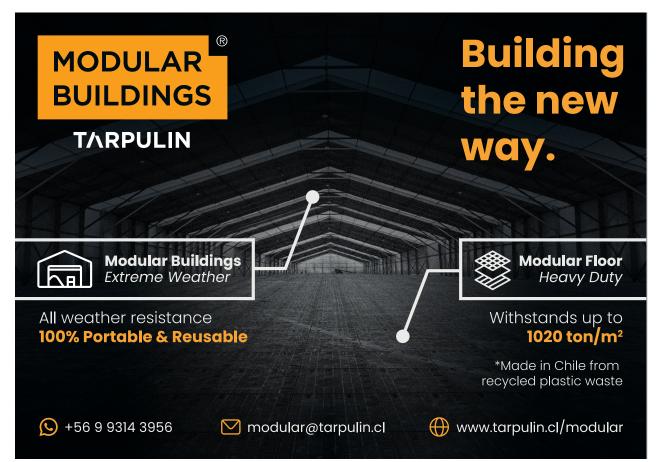
country's experience in mining being a prime reason for this.'

Ulises Poirrier, CEO. CBB Cales



NGEx Minerals is a junior company bullish on the future of the Vicuña district. In Chile, NGEx owns Los Helados, a project located about 17 km from the producing Caserones mine. The project is significant in size, with a 2 billion-t indicated resource base and another 1 billion t in inferred resources. Just across the border in Argentina, NGEx Minerals owns the Lunahuasi land package in San Juan, one of the most exciting copper-gold-silver projects currently being explored in the world, winning the PDAC Discovery of the Year award in 2024. Despite the relatively recent fame of the region, many years of effort have gone into developing what may be the next premier mining district in South America. "It's easy to think of the Vicuña district as

something that just sprung to life recently, when in fact it is the result of 20 years of investment through thick and thin. In a long-term business such as mining, you cannot let daily or even yearly metal prices influence your decisions. Much of the success we are enjoying today is because of investments made during tougher times decades ago," emphasized Wojtek Wodzicki, president and CEO of NGEx Minerals. It is yet to be seen what impact the rise of the Vicuña district will have on more historic mining regions in Chile, for example, Antofagasta. "Investment will continue coming into Chile, but emerging copper provinces will grab a bigger market share," said Brandon Craig, president Americas of BHP.



Copper and Lithium

The metals of the moment

spectively, in terms of production figures. Chile is responsible for 28% of the world's copper supply and 53% of the total mining investment of Latin America, as state-led and private companies are expected to invest US\$83 billion in the country between 2025 and 2033. "This would have a transformative socioeconomic impact across the coun- their Chilean properties to offset declining ore grades and meet try, just as a similar expansion in the 1990s and early 2000s played a the rising global demand for copper. Lundin Mining is leveragcrucial role in Chile's economic development," said Santiago Montt, ing its property packages to unlock further value in its projects. CEO of Los Andes Copper.

With Argentina, Peru and Ecuador beginning to contribute increasing amounts to global copper production, South America has the potential to become a mining superpower moving forward, spearheaded by its most southerly country.

Many of the announced investments are looking to extend mine life and take existing mines further underground, as seen with Collahuasi transitioning from an open pit mine to an underground one and the inauguration of Quebrada Blanca 2 by Teck lines due to lower-than-expected ore grades in the latter part of the Resources. "In Chile, we face the reality of aging mines, many of which are over a hundred years old, with declining ore grades. Operating in these conditions presents significant challenges," explained Carlos Carmona, vice president of Netmin, a company creating a technological ecosystem to allow greater connectivity Lomas Bayas. During 2025, Compañía Minera Lomas Bayas celebratin the mining industry.

Australian mining company BHP accounts for 27% of Chile's total copper production and has announced plans for between US\$10.7 and US\$14.7 billion of investment over the next decade, most of which is concentrated on one of the largest copper mines in the over its more than 20 years of operation, it has had to constantly world, Escondida. In 2024, the mine produced 1.25 million t, with a 2025 production guidance of between 1.18 and 1.3 million t of copper. The company is expecting output from its mines in Chile to ing how mines can thrive even when operating at lower grades. Glendrop by 300,000 t/y by 2030, which explains the need for such a large investment. "We have the expansion of the Laguna Seca concentra-

Despite the challenges of recent years and new competitors rising tors, the replacement of the Los Colorados concentrator, and we are on the global stage, Chile is still a world leader in the production of looking at a range of leaching expansions to produce more copper copper and lithium, maintaining the top spot and second place, re- using this technique because we have some idle electrowinning capacity at Escondida and Spence. This will allow us to more than offset the declines in ore grade," explained Brandon Craig, president Americas for BHP.

Mining companies are using different methods of investment in "Caserones has 70,000 hectares of exploration properties, and we are launching the most extensive exploration program there since its discovery. Although there have been changes to Chile's mining laws, we still view the country as a stable mining jurisdiction," outlined Juan Andrés Morel, the company's vice president of operations. Last year, Caserones achieved 125,000 t of production, with Lun-

din's other property, Candelaria, not meeting its production guideyear. Lundin Mining increased its ownership in the Caserones mine by 19% in an attempt to further aid in meeting production guidance in years to come. Lower grades are something Glencore is familiar with in Chile at

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ed 2 million hours without lost time accidents and managed a 13.1% increase in copper production to reach 74,000 t for the year. Andrés Souper, general manager of Glencore Chile, said: "Lomas Bayas operates with an ore grade of approximately 0.27%, which means that evolve to remain competitive."

The mine won the 2024 SONAMI National Mining Award, showcascore's complex in Altonorte also achieved impressive production figures of 1.1 million t/y of copper concentrate.

Struggles to Meet the Demand

"What most differentiates copper from other critical metals are the supplyside constraints. Whereas it used to take 2-5 years to bring a new deposit to production, today it can take 8-12 years."

John Mackenzie, CEO, Capstone Copper



"Supply limitations due to aging deposits, environmental regulations, and supply chain issues contribute to stressing inventories. Chile can boost production by promoting innovation and attracting foreign investment."

Andrés Souper, General Manager, **Glencore** Chile

"In production, the average copper resource is 400 meters underground, and most mining investment innovation has focused on open pit mining so far, so there is a lot of room for innovation."

Brandon Craig, President Americas, BHP

"Through operational discipline and other key factors, we can enhance our output. This will be a pivotal year for Codelco, as we are fully committed to contributing everything we can to mining."

Rubén Alvarado Vigar, CEO, Codelco

"While regulatory changes can create challenges, we believe that through optimization and efficiency improvements, we can mitigate any potential impacts on our business."

Juan Andrés Morel, VP Operations, Lundin Mining

with a record year of production in 2024 was Capstone Copper, which ramped up operations at both Mantoverde and Mantos Blancos. The Mantoverde Development Project drove most of the 12% growth in consolidated copper production at the mine, adding a 32,000 t/y sulfide concentrator and a tailings storage facility. Feasibility studies were submitted for Mantoverde Optimized, a low-cost project that will deliver around 20,000 t/y of copper and extend the mine life by 25 years. CEO John Mackenzie believes there are several reasons why large mining companies are looking at extensions rather than greenfield projects: "Existing mines are seeing significant grade declines, and new deposits face increasing complexities. In the long term, higher prices might incentivize additional copper mines, but it is not just economics that restrict new developments. Environmental, social, and infrastructural factors also play a significant role. Whereas it used to take 2-5 years to bring a new deposit to production, today it can take 8-12 years or more," he said.

Another multinational mining company

Amid these challenges, Capstone Copper is positive that it will thrive and reach its forecasted production of between 220,000 and 255,000 t/y of copper. "Firstly, we will be focused on operational execution across our portfolio through the implementation of our Asset Integrity Program across all our sites, delivering strong operational performance and benchmarking to drive production and cost efficiencies," highlighted Capstone's COO, Cashel Meagher.

Expansions have also been announced by Antofagasta Minerals, which announced that US\$3.5 billion of their total US\$7.57 billion investment will come into effect in 2025. These upgrades include a US\$2 billion desalination plant at Los Pelambres, a US\$1.2 billion Zaldívar mine extension to extend operations to 2051, and an investment of US\$4.4 billion in Nueva Centinela adding 144,000 t/y of copper equivalent as well as upgrading the molybdenum plant.

Furthermore, there will be US\$7.5 billion invested by Freeport-McMoRan in the El Abra operation, looking to introduce a new concentrator plant, water pipelines, and upgraded desalination facilities. In December, the company entered the environmental assessment stage for a US\$741 million expansion Sulfolix Leaching Pile Modification, the first step in the process that could take up to eight years due to permitting timelines.

Declining ore grades are a preoccupation for Chile's largest copper miners and being able to combat these will become key in coming years as companies try and remain profitable whilst servicing the growing demand.

Lithium

During the 1990s, Chile possessed 90% of the known global lithium reserves, a figure that has dropped to 40% in the years since, while Chile's share of global production has dropped from 50% to 25%. This has been driven by the faster pace of discoveries in other parts of the world such as Africa, spurred on by the increasing global importance of critical minerals and the corresponding rise in price. Exemplifying the heightened attractiveness of lithium was Rio Tinto's entry into the market through the purchase of Arcadium Lithium for US\$6.7 billion, giving Rio Tinto ownership of the Rincon project in Argentina. The move positions Rio Tinto as the world's third-largest lithium producer and involves it in one of the most technologically advanced lithium markets in the world, where direct lithium extraction (DLE) technologies are commonplace.

One company looking to bring DLE to Chile and other lithium producers is Summit Nanotech, which raised C\$50 million of funding in 2023 and recently added C\$25.5 million, most of which will be deployed at its demo project in northern Chile. "The adoption of new technologies in Chile has been slow but steadily progressing. We spent the first few years in Chile building trust with mining companies, proving that our technology was scientifically verifiable. Over time, this trust has allowed us to move forward, and today, most lithium miners in Chile are considering using DLE technology. In contrast, the US is more unpredictable, with frequent policy changes that create uncertainty," discussed Amanda Hall, Summit Nanotech's founder and CEO.

With DLE technologies enhancing the project economics of lithium mining, it seems like only a matter of time before the market returns a favorable evaluation of the critical mineral once again. Cochilco estimates lithium investments between 2023 and 2026 to total US\$2.1 billion, and with more Special Lithium Operation Contracts (CEOLs) announced as part of the National Lithium Strategy, Chile is set to retain and reinforce its position at the top of the regional lithium league table, despite fierce competition entering the race. ■







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Greenfield finds its footing

The brownfield expansion sweeping Chile over the next decade can be attributed to the investment and expansion of the large multinationals, for whom surging copper prices have provided more operating capital and, in turn, augmented investor confidence in producing mines to allow for such ambitious projects. Meanwhile, juniors dependent on financial markets face headwinds. High exploration costs, scarce viable deposits, and long permitting times have stalled Chile's greenfield pipeline and deterred Western investors.

Still, there is hope - Chile led global copper exploration in 2024, attracting 27.4% of global investment. Experts expect the US\$637.4 million to grow as investor confidence returns in early 2025.

Fitzroy Minerals owns three exploration projects in Chile, with plans to drill all of them in 2025. Merlin Marr-Johnson, CEO, commented: "I have worked across Latin America, and I can say that Chile is hands-down the most logical place to invest in mining in South America, if not the world. Argentina is moving in the right direction, but there is still not a mining culture, and there are similar problems acquire new projects," he elaborated. with community relations there as in Ecuador."

raised C\$3 million for 8 km of drilling.

Other junior companies, such as Altiplano Metals, are relying on other sources of income to help when markets look less favorably on exploration. Altiplano owns and operates the El Peñón Mill, which has generated sales from concentrates of gold, copper, and an iron byproduct. "Having an income source makes us unique, as most juniors rely on equity markets to survive. This has been the model of junior mining since its inception, and recently, this has come under scrutiny because if you cannot raise money, the future of the company can be in doubt," observed Alistair McIntyre, Altiplano Metals' CEO, continuing: "This source of income has helped us invest in projects, grow our company, and manage our business, paying wages, bills, and the fees associated with the capital-intensive industry that mining is."

Altiplano is also drilling Santa Beatriz and acquired two more projects in the past year. "With new mining concession laws in Chile, companies are looking harder at whether they want to keep a project or not. With project information increasingly in the public realm, it helps the right team explore them and helps the entire value chain become more involved in projects," added McIntyre.

These updates to Law 21.420, passed at the end of Sebastián Piñera's government, aim to raise mining revenue and prevent land hoarding. Whilst the law may result in larger companies offering up more deposits for purchase by juniors, it could price out the smaller companies as it raises their concession fees by 300-400%. "Rather than supporting the growth of the industry, this law endangers the survival of small-scale mining, a sector that not only creates jobs but also plays a fundamental role in discovering new mineral deposits," argued Manuel Viera Flores, president of the Chilean Mining Chamber. consolidate its global leadership.

One project that has already felt the impact of the law changes is the Avispa project owned by Montero Mining. Since purchasing the land in 2020, the company has reduced the land package from 500 to 220 km2, driven by the cost of holding licenses in Chile. "Many of the easily accessible deposits have already been developed, meaning exploration for more elusive deposits is both costly and time-consuming. With licensing fees now significantly higher, smaller companies struggle to sustain large land holdings. Previous exploration strategies of acquiring larger land packages initially and reducing them over time based on exploration results are not as easy anymore," explained Montero Mining CEO Anthony Harwood.

However, he sees the alterations more as an opportunity than a threat moving forward. "Companies of all sizes have been forced to relinquish property due to increased holding costs. This has prompted major mining firms to reassess their portfolios, leading to the sale of lower-priority assets—an opportunity for junior miners looking to

A great advantage of mining in Chile is the public trust it enjoys. Fitzroy purchased the Buen Retiro Copper project last year and The Brújula Minera Study Center found in a 2024 survey that 83% of respondents believed the Chilean mining industry had a positive impact on the country. "Mining companies care about communities, the environment, and technologies that will benefit society as a whole. I think what has been improved on most, however, is visibility. The benefits of mining reach every walk of life, with hospitals, schools, and roads built because of mining. Mining is an engine of development for Chile, and we have to make the most of it," stated David Alaluf, general manager Chile of technology company Endress+Hauser.

Los Andes Copper has focused on community relations through 2024 to advance its 183,000 t/y Vizcachitas project in Putaendo toward development. It launched extensive initiatives in 2024, including biodiversity conservation and compensation projects, hoping that when ready to start permitting, the Vizcachictas project will have widespread community support. "In many other jurisdictions, regional governments actively compete to attract investment, whereas Chile often sees local authorities opposing projects regardless of political orientation. The key to resolving this challenge is ensuring that economic benefits from mining projects reach regional and local governments more effectively and promptly. Looking at global examples, Brazil provides a compelling model where states and municipalities actively compete for investments," commented Santiago Montt, CEO of Los Andes Copper.

In the modern world of mining, there are many methods available for juniors and exploration companies to ease the path towards production. Companies exploring in Chile are looking to fully exploit all of these avenues to capitalize on record metal prices and provide the next generation of mining deposits for Chile to continue growing and

Energy and Renewables

Powering a greener future

Regardless of the location or operator of a mine, energy and electric- of years, the issue of variability may soon be a thing of the past. "Batity are vital to its smooth and productive operation, and more and more of this is being generated by renewable sources in the mining petitive and provide a response that helps mitigate this risk of variindustry. Chile is well-endowed with the resources vital to the green ability because they allow energy to be stored for when it is not being transition, and is leading by example, with an acute focus on renewable energies. There exists a symbiosis between the mining of copper and lithium and the usage of renewables, something which energy companies, mining companies, and the Chilean government are of the population. This was caused by a malfunction in electronic softall keen to promote. The National Mining Policy 2050 is the government's first step in providing clear guidelines for electrification and decarbonization of the mining industry, with aims to reduce GHG emissions by 50% by 2030 and ensure carbon neutrality in major mining operations by 2040, a decade earlier that the countrywide to cols implemented to ensure the safety of workers and operations. goal of decarbonization by 2050.

Schneider Electric has formed a strategic partnership with Glencore to improve energy efficiency, reduce equipment wear, and minimize material consumption. "Chile is a leader in sustainable mining. The challenge now is integrating emerging technologies - AI, automation, and energy optimization - to push the industry toward true net-zero operations," explained Orlando Lara, regional segment leader of mining, minerals, and metals at Schneider Electric.

Due to the increased demand for renewable energy, the market has seen a boom in Chile, with InvestChile reporting that 68% of the nation's power is generated by renewable methods, and solar generation is now double what it was in 2020. However, the mining industry cannot become over-reliant on certain renewable energy sources, as currently, 35% of Chile's energy comes from variable methods like wind and solar energy. These present issues with temperamental weather conditions that are ever-present in Chile, due to the fact the country is particularly prone to global warming and climate change altering its meteorological makeup.

Possessing a portfolio of 1.8 gigawatts of projects in different stages scattered across Chile, Statkraft is a global leader in energy generation, tiago. We also aim to increase adoption of our digital technologies including a hydroelectric power plant in Rucatayo. The company is and service contracts with remote monitoring," explained Mauricio currently looking into diversifying its generation, commissioning three new wind farms in Chile. "Renewable energies, as wonderful as they are because they allow us to address the main environmental challenge that the planet faces today, also have challenges. That challenge has to do with variability. They are energies that are not available 24/7. So, regulations and incentives must be focused on addressing that variability and providing flexibility to the system," commented María Teresa González Ramírez, country manager of Statkraft Chile.

To help solve this, hybrid approaches to renewable energy are gaining traction in Chile, with the co-location of wind and solar farms ferent technologies to inform their technology promotion decisions." being adopted by energy companies up and down the country. Energy company Aggreko focuses on hybrid energy solutions, combining renewables with backup power systems. Carlos Grez, general manager of Chile. Argentina, and Peru, stated: "Mines operate 24/7, and renewable energy alone isn't always a stable solution. That's why we're on a country already struggling. With the advent of smart grids and seeing increasing demand for hybrid solutions-combining solar, wind, and battery storage with thermal backup to ensure continuity." These provide a more diverse offering of energies, and with heavy

investment in energy infrastructure and storage over the last couple

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teries have dropped significantly in price, and today, they are comproduced," expanded González Ramírez.

On February 25, 2025, Chile's vulnerability to energy issues was exposed on a global scale, whereby a nationwide blackout affected 90% ware systems that triggered a disturbance in national power systems, causing President Boric to declare a state of emergency. The blackouts impacted many industries in Chile, and mining was no exception. Codelco reported impacts on all their operations, with emergency pro-

Carlos Grez of Aggreko believes more investment is needed in backup systems in mining when failures in national systems like this arise. The key to avoiding such problems is early planning, as energy companies can gain an understanding of the unique needs of each operation should grid access become unavailable. "Even as we move toward decarbonization, the reality is that mines still require diesel or gas backup. The challenge is balancing sustainability goals with operational demands," Grez continued.

Hitachi Energy provides digital solutions to the energy needs of many industries, including mining. 2024 was a challenging year for the company, with market conditions slowing due to environmental approval issues, leading to many projects not materializing. Despite these setbacks, Hitachi Energy was able to roll out several new technologies to aid in the remote monitoring of power and energy, including the Vegeta Manager platform, which observes issues with power lines, and Grid Span, a modular solution designed for the mining to provide pre-engineered power supply to operations in remote locations. "Our challenge is to provide robust and reliable interconnection solutions for mining and high consumption areas like San-Mazuela, general manager of Hitachi Energy.

With their remote observation technology located in their offices in Santiago, the company makes energy in Chilean mining safer and more sustainable whilst reducing costs for mining companies. The instability of renewable energy sources in their current form presents a great opportunity for the company, remarked Mazuela. He elaborated: "We have invested in expertise to support this issue, bringing a specialist from Sweden to address power electronics demands. Hitachi Energy is actively engaged with system operators, discussing and modeling dif-

Chile's mining sector is rapidly adopting renewable energy solutions to meet its ambitious goals for net zero and carbon reduction. Grid stability is, however, causing problems, and experts predict this to only increase as the effects of climate change tighten their grip Al-driven demand response gaining popularity and becoming ever more efficient, investment in energy transmission infrastructure and digital optimization will become key in ensuring the sustainable future of energy usage in mining.

Engineering, Construction and Consultants

The backbone of growth

Mounting pressure to boost efficiency, cut costs, and improve sustainability is reshaping the mining value chain. Engineering and construction companies must adapt, leveraging innovation to support clients of all sizes. In Chile's capital-intensive infrastructure sector, high labor and material costs drive up spending. Yet mining companies still expect savings without sacrificing quality or timelines.

LEN Ingenería reported a more subdued project environment in Chile, a symptom of the need for mining companies to save on capital whilst they wait to deploy the large expansions and investments announced for the next several years. LEN Ingenería has, therefore, adapted its business model, focusing on different areas to help mining companies lower their operating costs. "In copper mining, where transportation costs can be as high as 30% of extraction costs, LEN has focused on designing more efficient infrastructure, such as access roads, to reduce these expenses," revealed Julián Alvear Fernández, CEO.

Transport and civil works often exceed a mining company's capabilities, creating opportunities for engineering firms to fill the gap. One



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of the costliest factors for mining companies related to engineering and construction is overruns and delays. Recently, this was proven to cost millions of dollars when Teck's QB2 expansion came in at US\$600 million over budget due to construction delays. Paulo Bezanilla Saavedra, general manager of Besalco, commented: "The delays in obtaining permits for smaller-scale projects can hinder our ability to meet project timelines. There is a law under consideration to improve the permitting process, but the real challenge lies in incentivizing individuals involved. Proper planning and foresight are needed to ensure efficiency and continuity of operations on brownfield sites."

His colleague, Guillermo García Cano, executive director for Besalco, added: "As the demand for copper and lithium grows, ensuring that safety measures do not slow down production is key. The permitting issue, however, is a significant bottleneck and needs urgent attention to keep mining operations on track."

Innovations can help avoid delays. New tunneling techniques, ideal as Chilean mines reach unprecedented depths, are now being introduced. "The mining construction industry faces many challenges. One of these is improving efficiency and productivity through process innovation and the incorporation of technologies that have been adopted in other countries but are not yet in use in Chile," emphasized Caroline Vender, CEO of Sigdo Koppers, which spent 2024 preparing for the large expansions of mines still to come and organizing the company to be able to capitalize when the influx of investment starts arriving. "The upcoming mining boom presents a great opportunity for us, especially with the additional energy demand it will create," added Vender.

Modular construction and prefabricated components can accelerate projects, while new materials reduce transport and installation costs, enhancing safety and sustainability. This adaptation also makes construction in remote mine sites more feasible, great news for those Chilean mines lost in the Andes mountains. "Our approach to modular construction has reduced assembly times by up to 40%. Prefabricated components allow us to maintain high precision while minimizing time spent on-site," highlighted Mario Theurl, managing director for the Chilean office of Swiss construction firm Züblin Strabag.

Sustainable construction is also making mining operations more efficient. A prime example of this in Chile is the issue of renewable energy. "We are seeing a greater push toward renewable energy sources in mining construction, from solar-powered conveyor belts to hybrid energy systems that reduce reliance on fossil fuels," continued Theurl.

Engineers can become trusted partners if they can help an operation become more efficient. Metaproject works with majors like Codelco, Anglo American, Teck and Barrick. By proving itself with such large companies and projects, Metaproject now has opportunities to expand to mining markets abroad. "We participated in major projects in Chinalco, Peru, as well as a greenfield exploration project in the Chaco region of Paraguay. We continued our work in Turkey, where the mining sector is highly dynamic, and we also entered Morocco, which has proven to be a well-organized country with great opportunities," said Manuel Viera Flores, the company's president.

One big issue felt across engineering companies is the lack of skilled labor available. Today's engineers need both traditional and

digital expertise, making qualified candidates harder to find. Eduardo Cossio Chirinos, CEO of INCIMMET, a Peruvian-owned underground contractor explained: "The availability of skilled labor is a regional issue that demands a collaborative approach because mining must appeal to younger generations."

Chile's labor shortages may drive companies to seek foreign workers, risking broader job impacts in a mining-dependent economy.

The engineering and construction sector in Chile is undergoing a major transformation driven by the need for greater efficiency. With Chile at the forefront of mine engineering and technology on a regional and global level due to the size of mines and equipment in use, it is down to the companies leading the way to show the rest of the world what is possible.

Consulting

Mining contributes 14% to Chile's GDP. As the industry shifts toward sustainability and electrification, companies increasingly lack the internal expertise to operate without external support. This has transformed the role of the consultant into becoming a partner for mining operations, often being involved from initial planning through to closure and decommissioning.

Rio Indómito's core business is supporting project owners, specializing in project development, business services, permitting, and operation readiness and execution planning. Mario Baeza, founder and CEO noted: "Partnership-based relationships enhance project execution by fostering collaboration, transparency, and shared risk and reward. Moving away from purely transactional models encourages early contractor involvement, optimizing design and reducing rework. These partnerships promote long-term value over short-term cost-cutting, ensuring better alignment of project goals."

Another company securing more partnership-based work is Amphos21. "Over the last few years, we have been working with Codelco and Enami on Salar Maricunga, Salar Grande, Salar de la Isla and Salar Aguilar. We have several multi-year projects underway at Escondida and are also working with Capstone Copper, Lundin's Caserones mine, and on several of Codelco's projects," explained Juan Castaño, CEO of Amphos21 Chile. Amphos21 is also partnering with universities, leveraging fresh

thinking to tackle modern mining challenges.

In 2024, global engineering consultants Wood underwent a large global restructuring of its 36,000 global employees. One of the goals of this was to diversify their client base, allowing them to service smaller and midsize companies. "Our business has been mostly focused on design, engineering and project execution. We realized, however, that if we can identify projects in the initial stages of exploration and development, there is work to do in estimating resources, mine design, and conducting studies. These are the areas in which Wood offers the most value to juniors," said Willian Lilis, director of business development, minerals and metals, South America for Wood.

As well as diversifying its client base, Wood has also been adapting its geographical reach to new and emerging markets. Lilis commented: "Wood has also been expanding in the emerging market of Argentina with two offices in the country, and whilst up until now they have been focused on oil and gas, we are seeing an increase in interest surrounding lithium projects. Furthermore, we are looking into the Argentinian copper market with clients such as Rio Tinto, Glencore, and the BHP-Lundin Mining JV in Vicuña."

Chile is a global leader in services to the mining industry, using its centuries of expertise to help develop less mature jurisdictions like Colombia, Argentina and Ecuador.



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Equipment and Technology

Innovation in the Andes

The unique geography and geology of Chile provide both opportunities and challenges for equipment and technology companies. Large mines are often located in remote places and are deeper than in most other jurisdictions, offering scope ample scope for technology and machinery to optimize difficult operations.

Hilti manufactures professional-grade tools and systems for construction, anchoring and drilling, and ensures its solutions are easily and efficiently introduced "Companies understand that integrating new technologies must be done without disrupting their existing workforce. They seek solutions that enable seamless training and skill transfer so experienced workers can adapt to new tools without feeling threatened by job displacement," explained Jose Luis Villalón Spoerer, the general manager of Hilti.

Greenfield copper projects were few and far between in Chile during 2024, meaning companies had to look elsewhere. ANDRITZ turned to the lithium sector. Fernando Tobar, director of equipment and services, commented: "During the basic engineering phase, we work closely with customers to understand the unique characteristics of the minerals being processed and the overall process requirements. Our close relationship with Chilean customers creates an ideal environment for developing and refining these customized technologies."

Chile setting the global standard

With Chile proving its strength and stability, many large multinational companies are investing heavily to capitalize on the growing demand for its metals. BOSCH Rexroth is an example of this, whereby the company on a global level is adapting to the rigid and proven regulatory standards in Chile. "While these regulations require us to ensure that our products meet specific standards, we consider them necessary and are fully capable of complying. Chilean regulations, particularly in the areas of safety and environmental protection, are very robust, and in some instances, Bosch International learns from the regulations here in Chile," highlighted Marcelo Celis, general manager.

Another equipment company looking to Chile in these times is Komatsu: "Chile remains the largest mining market in Latin America, and we believe it will continue to be a leader for several years. The market is characterized by aging deposits, declining grades, and increasing extraction challenges. These factors are driving mining companies to adopt new technologies more rapidly to maintain and increase production levels," said Darko Louit Nevistic, CEO of Komatsu Chile.

Scania has five branches and five service points in the mining hub of northern Chile and further investment is to come. José Ignacio Urcelay, managing director revealed: "In Coquimbo, we have invested US\$2 million in a workshop that should open in Q2 of 2026. With more volumes being mined to combat declining ore grades, products like the Scania Super Heavy Tipper are proving their usefulness in Chile."

Scania also plans to invest US\$5 million in a plant in Antofagasta, expected to start operations at the beginning of 2026.

Comminution and material handling

Even with its global leadership, the mining industry in Chile is still pushing itself to higher standards. One way in which this is noticeable is the focus on sustainability within comminution and material handling companies.

Weir experienced a dip in new projects during 2024 but supplemented this with growth in aftermarket services and digitalized solutions. "Monitoring and diagnostic technology are becoming more important, as seen through the growing number of operations centers that are opening away from the mine site. Whilst these are not revolutionary technologies, Weir's ability to collect data on our products and enact changes to our products that optimize them will separate us from the rest of the industry," said Martin Brenner Knoch, regional managing director of Latam for Weir. Magotteaux

"Chile's demographic advantage lies in its strong cultural respect for mining, which remains integral to the national identity.

Mining continues to drive the economy of *Chile, contributing* significantly to its exports."

Sergio Zamorano, CEO, FAM



has focused on process optimization and impact applications as part of the Sigdo Koppers Group since 2013. In Chile, the company offers a full range of grinding media, and in 2024, it signed a five-year contract with Codelco for grinding balls that incorporates a 100% supply model from recovered material. Enrique Vargas, country manager in Chile and Peru, noted: "More than 80% of our raw materials come from recycled products. We invest in energy efficiency and renewable energies while applying an active reduction, recovery, and recycling strategy."

2024 was a positive year for Metso in Chile, positioning it to be part ceiving CLP\$3 billion in subsidies," described Phillip Hemmerdingof the new large-scale projects anticipated in the coming years. "A major milestone for us was the inauguration of our first large-scale recycling plant for mill linings in Chile. This facility can separate and recycle steel and rubber components, addressing sustainability challenges in mining equipment," said Eduardo Nilo. CEO of Metso in Chile. He continued: "We are also exploring advanced filtration technologies, such as economic tailings filtration, which allows for water optimization and more sustainable processing methods."

ME Elecmetal introduced its QuickScan technology in 2024, as "Last month, we reached a significant milestone by not only achievwell as completing acquisitions in Peru and South Africa to make its offerings more holistic. The company secured a CORFO subsidy to develop a solution for recycling grinding balls and recover environmental liabilities in the grinding process. "We focus on reducing the mining industry's carbon footprint by offering solutions that allow companies to repair components rather than purchase new ones when it is more environmentally sustainable," explained Jose Pablo Dominguez, general manager.

er, TTM's CEO.



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TTM partnered with ME Elecmetal to form the Footprint Alliance, which recovers contaminated mill balls for reuse. The material handling company traditionally focuses on conveyor components, dust control and maintenance of conveyor belts in open-pit and underground mines. TTM has invested almost US\$6 million in a pilot plant for the Footprint Alliance in Nogales. "Our process separates usable mill balls, metal scrap, and clean minerals. Previously, this work was done manually, but our automated plant requires only four people to operate. In October, we secured a CORFO award, re-

As part of the BEUMER Group, FAM experienced its largest order intake in Chile since entering the market in 2000. One of these orders from Codelco will be the largest spreader in the Southern Hemisphere and all of the Americas. Traditionally, systems used to process 900 t/hour, but nowadays, the number is closer to 15,000 t/ hour. To counter the increased environmental impact of this, FAM is focusing on generating renewable energy to sustain operations. ing carbon neutrality but also becoming financially neutral in terms of energy costs. The efficiency of our solar panels in La Negra, Antofagasta, has been exceptional, generating around 60% of installed capacity within 12 hours of sunlight," highlighted Sergio Zamorano, the company's CEO.

Also noticing increased capacity demands from clients was STM, which extended conveyor belts from 10,000 to 12,000 t/hour. Despite the environmental steps the industry is taking to offset the increased

amount of material mined, problems are still present at a bureaucratic level. Andrés Osorio, general manager of STM, outlined: "The key issue is permitting. It is important to ensure that projects comply with environmental norms and community interests, but processes need to be clearer. Many projects end up in judicial disputes, which delays the process."

Collaboration for a technological future

Landmark collaborations in the industry at the beginning of 2025 are not limited to major mining companies like BHP and Codelco. One of the great advantages of mining has been that it is an industry rich in data and technology, and AI and machine learning have the opportunity to harness this data and utilize it for the betterment of everyone. Tech companies are offering solutions that allow mining companies access to data and make this available across equipment manufacturers and suppliers.

Seequent, the company that created Leapfrog Geo, launched its Evo platform in 2024, which aims to standardize disparate data sources by creating its own ecosystem. The platform uses opensource coding to allow community development and further collaboration between the mining industry. "This collaboration needs to encompass mining companies, technology providers, OEMs, and governments to accelerate regulation and offer visibility to various mining stakeholders regarding the potential of mining projects," said Ignacio Torresi, executive vice president, Latin America, Seeguent.

In the technology division of ANDRITZ, collaboration at the early stages of projects is becoming key to their growth. Andrés Rojas, di-



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Tel: +56 2 2887 1000 - +56 9 39186099 E-Mail: stm@stmcorp.cl | Web: www.stmcorp.cl rector, automation and digitalization explained: "This involves collaborating with engineering firms and project management teams to develop accurate estimates of the equipment needed for water extraction, reinsertion, and tailings management."

ABB witnessed notable growth in automation and digitalization over the past 12 months. The company joined forces with Eprioc to support decarbonization efforts in mining technologies. "I think it is important that when challenges arise, we work together as an industry to find the best technical or economic solution. Whether it is an OEM product, an electrical product, or something else, automation and digitization should be linked not only to provide greater synergy within a project but also to monitor how an asset operates over time," highlighted Jorge Abraham, country local division manager, process Industries for ABB's office in Santiago.

Australian company Deswik specializes in developing mine planning software that allows users to connect to databases, collect meaningful information, process it, and return it with minimal additional work. After their acquisition by Sandvik in 2022, the company has focused on integration. As Cesar Machado, regional manager, Latin America, revealed: "Our current integration efforts are focused on ensuring that when a client invests in Sandvik equipment, they can maximize value through our integrated planning and operational tools."

Using digital twins and data analytics to optimize short-term planning, operational control and decision making, TIMining is noticing the impact of data silos and the lack of past collaboration in the mining tech space. "Data silos represent a significant challenge in the mining industry. We specialize in capturing and interpreting the dynamic geological landscape, tracking rock extraction and mine geometry evolution. This ability to collect and interpret complex geometric data is a capability that most large software suites struggle to accomplish," noted Phillip Whatmore, CEO of the start-up.

Endress+Hauser is a global leader in process optimization, instrumentation and measurement in the mining industry. The company is looking to construct a Customer Experience Center, where clients and universities will be able to test and evaluate new technologies. As well as this inter-company collaboration, Endress+Hauser is optimistic about the future of collaboration between countries in Latin America that will bolster technological adoption. "I think the best thing for mining in Chile is the growth of the industry in other Latin American countries like Ecuador and Argentina because it presents a new opportunity to expand for many Chilean companies," said David Alaluf, general manager of Chile's Endress+Hauser office.

Technology company Veracio witnessed a change in attitude towards technology in 2024, transitioning from curiosity to implementation. The company signed a strategic partnership with Bureau Veritas with projects at Codelco's Ministro Hales mine. "By integrating Veracio's technology into Bureau Veritas' existing services, mining companies can more readily adopt our solutions, benefiting from Bureau Veritas' industry credibility. This collaboration has the potential to drive faster and more widespread adoption of our technology in the mining sector," said Eduardo Molina, vice president, commercial, Latin America for Veracio.

Collaborations like this have the potential to help more technologies reach a wider variety of mines. Combined with Chile's worldrenowned expertise in mining and environmental management, equipment and technology companies are set to work together to improve the future of mining and work towards a net zero industry.

Services

Providing for the future of mining

One of the main problems faced by Chile's mining sector is the availability of skilled workers. With services companies across industries competing for the same talent pool, mining risks missing the personnel needed to meet copper and lithium demand.

Due to mining's tarnished image, companies must promote innovation and sustainability to inspire a new generation to enter Chile's most important industry. SGS, a global testing, inspection and certification specialist, views the deeper and older deposits currently being mined in Chile as risk-creators that could impact a person's decision to work in mining. "Modern mining increases treatment risks, quality risks, regulation risks, and carbon footprint concerns. Any increased movement, whether energy, water, or fuel consumption, generates risk, especially today. The sustainability of Chile's industry is particularly at risk compared to other countries due to the evolution in the collision avoidance through AI, showcasing how drilling and blasting country," warned Mauricio Rocha, managing director of SGS.

"The biggest challenges we face are related to the availability of skilled labor in different regions. For example, in the Calama region, there is a high demand for labor yet a scarcity of available workers, which can lead to absenteeism and excessive medical leave," ex- the deals, with the goal of having a multipurpose drill on-site by Q4 plained Nexxo's general manager Ignacio Perez.

local teams. Christian Diaz, CEO of Chile and LATAM, highlighted: "We ensure diversity is considered in all decision-making processes, and we prioritize local hiring in the regions where we operate, particularly in mining towns like Calama and Antofagasta. We aim to increase female participation in operations, not just in back-office roles but also in fieldwork."

BASF is securing future workers in extraction and leaching through a university lab in Antofagasta. "In our lab we host university students every year, including students working on graduate projects and for internships. We help them develop and get to know the world of chemistry and shape their future careers. We currently have two employees in our team who started as students in our lab and are now serving the mining industry with us," related Gulden Ergun, manager of mining business for BASF Chile.

BASF also gives lectures to encourage mining participation and keep the services sector competitive for talent.

Drilling and blasting

Drilling and blasting have long been associated with danger. Safety now defines operations and helps attract younger generations, with many companies using technology to support this.

General manager of blasting technology company Orica, Mark De Castro, believes safety concerns encourage faster technological adoption in Chilean mining: "Chile is at the forefront of mining technology adoption in Latin America, driven by several factors. Among Orica's regional markets, Chile has the highest growth and implementation rates for new technologies."

Also serving the drilling and blasting sectors is ENAEX, producing low-carbon products and green ammonia. "We are particularly addressing the critical issue of rock bursts in underground mining, which pose significant safety risks. Our goal is to eliminate human exposure during blasting operations. The UGI truck represents a breakthrough in this area, potentially revolutionizing safety protocols in underground mining environments," explained Pablo Wallach Beovic, VP of innovation and marketing.

Master Drilling's key project is Chuquicamata underground, requiring complex work to extend its lifespan. One of the key technologies facilitating such projects is the Mobile Tunnel Borer, which enables continuous mining operations while enhancing safety. However, despite the apparent advantages, barriers to entry exist for this technology that could ensure the safety of more mine workers. As Fernando Vivanco, general manager of Master Drilling, stated: "The main challenge is the high initial investment and the learning curve associated with adopting new machinery. Productivity may initially decline as workers adapt to the technology. Nevertheless, the long-term benefits far outweigh these challenges."





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Still, more can be done to ensure new technologies reach the Chilean market. Wallach Beovic continued: "Chile presents more regulatory challenges. Obtaining permits for technological trials, even for safety-improving robotics, can involve lengthy bureaucratic processes."

Master Drilling acquired Konec, a Chilean company specializing in companies are prioritizing safety in their Chilean operations.

Orbit Garant operates in Chile and Canada and signed new contracts with El Abra and Anglo American in 2024, allowing the company to engage in long-term planning due to the multi-year nature of 2025. "At El Teniente we are currently trialing an upgraded drill to im-Equans has a strong presence in northern Chile, focused on building prove capacity, performance and autonomy as it can be controlled with a joystick. Currently, we are working on developing a robotic arm that allows an operator to manipulate the drill more easily. This is not only a technological advancement but allows the drilling sector to be more inclusive and open," said Christian Barra Llano, general manager in Chile.

Infrastructure and logistics

Infrastructure and logistics companies face unique challenges in Chile, with mines high in the Andes at up to 4 km above sea level, and thousands of workers required to be on-site at any one time. Promet constructs camps for many of the major mining companies and deals in every aspect of camp life, including food, water and energy. "By offering modular services, we allow for flexibility and sustainability, making investments more efficient. Instead of clients investing heavily in infrastructure that they may not need later, we invest in scalable solutions, moving assets between projects as necessary," commented Cristobal Schneider the CEO.

Similarly, Tecno Fast built camps for mines like Centinela. Cristian Goldberg Aichele, general manager, said: "Tecno Fast is already fully prepared for increased demand in modular services, benefiting from years of steady work and strong internal talent that have allowed it to maintain skilled teams in essential roles. The company has significant installed factory capacity, with three factories in Chile and a fourth set to open in Puerto Varas in April, further enhancing its ability to meet high demand."

Tarpulin, which works with mining and logistics firms, has seen growth in recycled plastic modular floors in recent years. The company is looking to open an injection plant in Antofagasta both to help with sustainability and also to be closer to clients, making it easier to adapt to the conditions of each mine. "This will save us transporting plastic waste from projects in the region to Santiago for crushing, cleaning and injection. Tarpulin will be the only company in Chile with an injection plant in Antofagasta, and it will be able to carry out the entire recycling process from receiving waste to repurposing it for use either in mining or another industry," highlighted CEO Pablo Rosales.

Chile's mining sector relies on adaptable infrastructure for remote, high-altitude sites. Modular builds, local services, and logistics enable efficiency and support copper and lithium growth.



Chile Mining 2025

Pre-Release Edition

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