

Chile's grassroots copper exploration lacking

More incentives needed

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Governments worldwide increasingly recognise copper as a critical metal due to industrial metals' lynchpin role in the energy transition. It is on the US Department of Energy (DOE) list of critical materials, it is part of the Canadian Critical Minerals Strategy and included in the European Union's Critical Raw Materials Act.

In Chile, the world's largest producer, mining represented 13.6% of GDP in 2022, and 58% of exports, and the government is worried about its declining production profile. Chile produced 5.25Mt of copper in 2023, a 1% decline from 2022, according to state copper agency Cochilco figures and its lowest total for several decades.

Copper is a significant component of wind farms, hydroelectric turbines, electric vehicles and their charging stations, and the electrical grid upgrades required to support the increased electricity flow. A lack of copper will limit the rate at which the energy transition can occur.

Energy transition demand is forecast to grow copper demand from about 25Mtpa now up towards 40Mtpa by 2040, with many analysts predicting a market deficit this year as a supply gap opens and widens to 5-10Mtpy by 2035, or 20-40% of current supply.

While copper is not overly rare in the Earth's crust, the time required to explore, delineate and bring a deposit to development means there can only be a muted supply response to this forecast shortfall. The massive and increasing cost of building new mines (RBC Capital Markets estimates some US\$200 billion of investment is needed), adds to a growing list of risk factors miners must balance to greenlight a development.

The copper price has been historically high for the past two years, including several months at more than US\$4.50/lb in 2022. Today's \$3.70/lb is still above the \$3.50 level many analysts use as a long-term price forecast. But this pricing is not incentivising new mine builds. As an industrial metal, copper prices are cyclical, and downward price cycles can be devastating, as lithium and nickel investors are currently experiencing, and copper investors remember from as recently as 2016.

The positive set-up for copper has major gold companies such as Newmont and Barrick Gold looking to increase their participation in the business, yet despite the perfect storm of circumstances, explorers in Chile are experiencing headwinds.

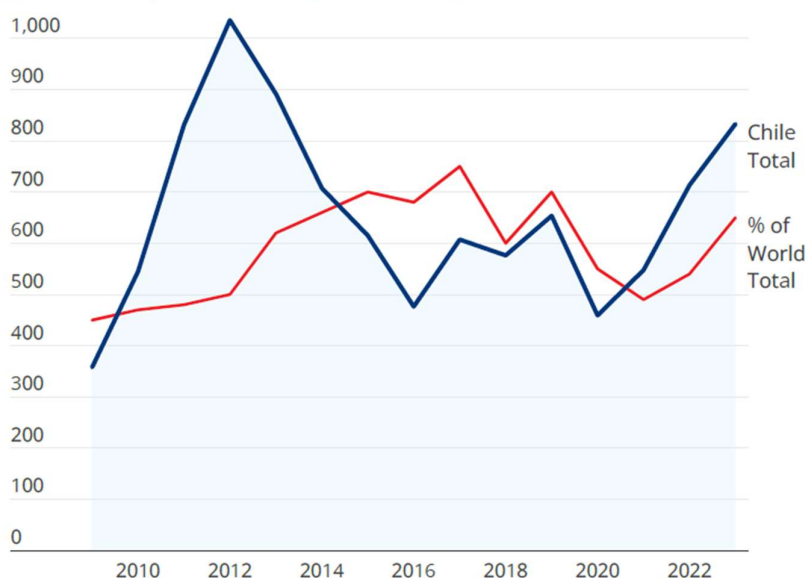
Funding

Investment has resumed flows into copper in recent years, increasing its share of Canadian financings from 12.9% in 2020 to 15.1% in 2023, according to data from [PrivatePlacements.com](#). Funds raised have increased from 9.3% of the total to 24.6% in 2023, some C\$1.7 billion of the C\$7.1 billion raised, copper's best year since 2019, although still 80% less than the C\$8.7 billion raised for copper in 2019.

Copper exploration spending in Chile continued to tick upward, reaching US\$832.7 million in 2023, the third year of growth since the 2020 low, according to S&P Global.

Mine exploration accounted for 44.2% of the total, followed by advanced exploration (31.1%) and early-stage exploration (24.7%). While the spending on base metal exploration grew its share of the total exploration spending in Chile to 82.2% in 2023 from 74% in 2022, the participation of juniors fell to 17.4% from 18% in 2022. This was a sizable recovery from 5-6% in 2018 through 2020, although below the 20.8% high in 2012. Data shows 101 exploration companies in 2023, although only 51 declared an exploration budget. Of these 51, 82.4% were junior explorers. Early-stage exploration accounted for \$205.5 million of exploration spending in 2023, 24.7% of Chile's \$832.7 million exploration budget, well below the \$350 million they spent in 2012.

[Chile Exploration Spend US\$]



Source: S&P Global

Minjng Journal

Copper investment numbers are buoyed by a sprinkling of outsize deals like [Capstone Mining's C\\$431.3 million February bought deal](#), Solaris Resources' [C\\$130 million strategic investment](#) by Zijin Mining in January and the [C\\$130 million Filo raised in August 2023](#), which paint a rosier picture of the reality in the copper space. It is increasingly tough for the smaller junior explorers to raise money to explore for new copper deposits, despite high copper prices and the predictions for the market being in deficit.

"Overall, there is a real lack of capital for this kind of work, and much of the available capital is going to companies like Filo, with headline-generating projects. Projects in Canada that can access flow-through funding to advance large copper porphyry projects in British Columbia may mean exploration dollars are not allocated purely on a project's relative geological merit," Tribeca Resources' president Thomas Schmidt told Mining Journal.

Atacama Copper's C\$12.9 million February raise in concurrent financing with its reverse takeover of TCP1 reiterates the importance of having friends with deep pockets. Its funding was helped by high-profile investors, which include Ross Beaty, Pierre Lassonde and Agnico Eagle Mines.

"It's always hard getting an elite order in, and once that happens, it gives other people comfort that this is a real deal. It is so critical in this environment because you see that with the companies that are succeeding, there are well-known investors behind them. ... We have a series of backers that almost any company would kill for," Atacama Copper chief executive Tim Warman told Mining Journal.

Even Torq Resources C\$5.3 million raise in January (which included ongoing support from strategic investor Gold Fields) is an outlier. More common are raises like Tribeca Resources' C\$3.3 million in August 2023, Fitzroy Minerals' C\$1.3 million in January or Culpeo Mineral's A\$1.71 million in February. As the days of being able to raise \$20 million seem to have disappeared, the amounts juniors can raise mean many have insufficient funds to be meaningful work on their projects.

New to the party is CopperEx, which completed a reverse takeover transaction and its qualifying transaction to debut on the TSXV in February, including a C\$3 million financing. With exploration targets rubbing shoulders with Escondida and CODECO in Chile's prime copper districts, the drive for its public launch financing was the Exploradora Norte gold target. "Since February 2020 we have raised C\$15 million privately. It is absolutely tough," CopperEx chief executive David Prins told Mining Journal.

Tough equity markets are forcing juniors to be creative. Golden Arrow Resources struck a deal with local drilling services company SSA, allowing it to earn 25% of the San Pietro project for \$5 million in cash and services. ATEX Resources has taken debt, entering into a two-year credit agreement for a \$15 million unsecured credit facility in July 2023 to fund ongoing work at its Valeriano porphyry copper-gold deposit in the Atacama Region.

"It is hat in hand for juniors right now. We have had two successful drill programme and we have a cornerstone investor. That would usually allow us to finance easily, but we were grasping at straws. The market is risk-off for risk on stories. ... The size of the financings we are doing are not doing our projects justice. Santa Cecilia needs three drills and a \$20 million budget for a sustained campaign to flush out the targets. We have done the preparation and have beautiful targets, but have we to do benefit versus dilution analyses," said Shawn Wallace.

"People are bullish on copper, and people understand that in the long term, there is a lot of upside, but they are concerned about the short term. They don't see the urge to invest as they think they can buy shares in a company for the same or less a year from now. Anything speculative is suffering," said Schmidt.

The evidence suggests exploration drilling is slowing. World Copper (Escalones) has not announced a drilling programme for 2024. The last raise by Interra Copper was flow-through and can only be spent in Canada, which means it lacks funds for its Tres Marias project in Chile.

And, of course, exploration does not always deliver. Nobel 29 Resources withdrew from its agreement to acquire the Pircas Verdes project, which it optioned in November 2022. Nobel said its sampling efforts did not find the major Miocene mineralising event that characterises major deposits in the area. It also withdrew from its option to acquire the Algarrobo project after initial drilling, as it saw the potential for a porphyry is too deep and unlikely to be an economically viable target. Nobel is currently evaluating opportunities to reactivate its business.

Holding costs

The funding shortage will soon bite harder as Chile implements rules to increase land holding costs. Under amendments to the Mining Code enacted in December 2023 that took effect in January, exploration concession fees are increasing. In US dollar terms, they are increasing from \$1.35 per hectare in 2023 to \$4.04 this year and going forward. For a 5000-hectare concession, that amounts to \$20,197/y. For exploitation concessions, the fee progressively increases the longer it is held, from \$6.73 per hectare now to \$26.93 through year five and on to a maximum of \$807.88 in year 31.

The positive of Chile's desire to capture more rent from the mining sector is that these increases should stimulate companies and speculators to drop ground they are not working and make ground available in prime exploration districts without the significant balloon payments they often have to negotiate.

It is noticeable from looking at the map accompanying this article that the majority of junior explorers are active in the Atacama and Coquimbo regions and hardly any in the Antofagasta region, where many of Chile's massive copper mines are. In large part, this is because large miners have tied-up all available ground, and until the recent increases in land holding costs, had little if any incentive to release it.

Earn-in agreements in Chile have tended to be expensive, with vendors often looking to cash in faster than an explorer can advance a project. Hot Chili paid \$32 million between February 2019 and September 2021 to acquire the Cortadera deposit of its Costa Fuego copper-gold development in Region II. Torq's October 2021 Santa Cecilia option includes payments of \$25 million over seven years. In February 2020, Marimaca Copper acquired the remaining 49% interest in the 1-23 claims that comprise the core of its Marimaca copper project in Region II for \$12 million.

Other positives for explorers are that the Mining Code amendments increase the term of exploration concessions from two years to four, extendable for a further four. Companies must also submit their exploration data to the state, growing the knowledge base associated with a concession. Previously, explorers had to track down and negotiate with the owners of geological information.

Other indications suggest the government is getting behind exploration and development, such as Rio2 obtaining an environmental permit to develop its Fenix gold project in the Maricunga at the end of 2023. "We may have come through the trough of [poor] sentiment recently; Rio2 obtained their permits, and the government has been backing away from harsher changes to the mining law," said Atacama Copper's Warman.

Junior exploration

Who are the junior explorers looking to make copper discoveries in Chile? This summary will not cover juniors with development stage projects, such as Marimaca Copper's Marimaca, Hot Chili's Costa Fuego, World Copper's Escalones or NGEx Minerals' Los Helados.

Fitzroy Minerals: Polimet

The newest is Fitzroy Minerals (formerly Norseman Silver), which in February, secured an option to acquire the Polimet gold-copper-silver project in the Valparaiso Region, which previously had direct shipping ore sales of 117t grading 33.5gpt gold, 55gpt silver and 6.9% copper from a low-sulphidation epithermal and a vein system with a ~5km strike. The project is close to the company's Caballos project, where 3000m of drilling is planned for the second semester.

Torq Resources: Santa Cecilia

Torq Resources began 2024 with a C\$5.3 million raise, including C\$1.3 million from Gold Fields, to boost its ownership position to 15.48%. This will fund exploration at the Santa Cecilia gold-copper project adjacent to Newmont-Barrick's Norte Abierto project in the Maricunga belt. In 2023, Torq's inaugural drilling at Santa Cecilia intercepted 557m grading 0.38gpt gold, 0.23% copper and 56ppm molybdenum. Torq plans a 2000m drilling programme for Santa Cecilia, with drilling to then resume at the second project, the Margarita iron-oxide-copper-gold project. "Santa Cecilia has the potential to move the needle for a major miner. We need to consider what is accretive and if there is a chance of giving some real joy. We haven't outlined a mineral body. So, from a market perspective, the best moves are to drill exploration holes and step-outs to add or expand discoveries. This time, what the market wants, and what the science on the project tells us are the next logical steps align," said Wallace.

Tribeca Resources: La Higuera

At the La Higuera IOCG project, Tribeca completed a phase I drilling programme of 2,800m in 2023 on the Gaby target with highlights of 268m grading 0.66% copper

and 0.14gpt gold and 264m grading 0.31% copper and 0.06gpt gold in a 500m step-out hole. A 4000m, 10-hole phase II programme began in October 2023. Initial results published in February included 30m grading 0.58% copper and 0.14gpt gold within 172m grading 0.23% copper and 0.05gpt gold from 70m downhole. Drilling several geophysical targets adjacent to the Gaby trend has commenced to test whether the mineralising system is represented in more than one structural trend.

ATEX Resources: Valeriano

In September 2023, ATEX Resources reported an updated inferred resource of 1.4Bt grading 0.5% copper, 0.2gpt gold, 0.96gpt silver and 63.8gpt molybdenum for a 0.67% copper equivalent. The resource includes a higher-grade core of 200Mt grading 0.84% copper equivalent. In 2022, phase II drilling confirmed proof of concept for the potential of a higher-grade core of $\geq 0.8\%$ copper equivalent. The subsequent 12,513m phase III programme included directional drilling to expand the mineralised corridor, extended the high-grade core and discovered a third porphyry trend. Phase IV drilling of 15,000 to 20,000m has returned initial results of 1122m grading 0.37% copper, 0.14gpt gold, 0.97gpt silver and 57ppm molybdenum for a 0.48% copper equivalent within the Western Trend from 864m downhole.

Interra Copper: Tres Marias

Interra Copper, which completed a combination with Alto Verde Copper in March 2023, completed phase I drilling at its Tres Marias project in the Antofagasta region in June 2023, with six reverse circulation (RC) holes for 1896m. The initial drilling did not intersect substantial economic copper mineralisation. Historical drilling included 2.4m grading 3.1% copper and 19ppm silver. Follow-up work is dependent on the ability to secure funding. Interra has 2.5 years remaining on the Tres Marias acquisition terms and up to 8000m of drilling if warranted as per the initial exploration plan for the project. Freeport McMoran has a 49% interest in the project with a back-in right for 51% after \$5 million of exploration expenses.

Atacama Copper: Placeton/Caballo Muerto

While at first glance Atacama Copper is pivoting to Mexico with a reverse takeover transaction and a plan to start drilling at the Cristina project in Chihuahua, which has an indicated resource, chief executive Tim Warman believes the company has a potentially big prize to discover at its never drilled Placeton-Caballo Muerto project in the Atacama region, as soon as it can obtain access to drill. Atacama sees similarities to the El Morro deposit that forms part of the Newmont-Teck Resources NuevaUnion joint venture, with Placeton-Caballo Muerto located between the El Morro and Relincho deposits that comprise NuevaUnion. "Caballo Muerto is the most obvious drill target, but the biggest issue is getting access. There is a lawsuit over who owns the land sold to Teck. We are also talking with an indigenous group whose land would provide easier access, but those discussions take time. We hope to have access to drill by year-end," said Warman.

Culpeo Minerals: Vaca Muerta

Maiden drilling at the El Quillay prospect at its Fortuna project confirmed the presence of shallow wide copper mineralisation, with a highlight of 5.8m grading 0.78% copper equivalent from 15.2m. Having recently raised A\$2.7 million, a 1000m drilling programme in progress at Fortuna targeting broad zones of outcropping high-grade copper mineralisation. Recent results have included highlights of 16.4m grading 1.38% copper equivalent.

Southern Hemisphere Mining: Llahuin

Southern Hemisphere aims to produce a resource update at its Llahuin copper-gold project in the Coastal Range between capital Santiago and La Serena, which has a 2013 measured and indicated resource of 149Mt grading 0.41% copper equivalent. Drilling at the project, some 10km from Pucobre's El Espino mine, is linking the Cerro and Ferro zones into what may be a single mineralised system spanning at least a 1.9km strike length, and where it reported results in February of 76m grading 0.44% copper equivalent from surface.

Mirasol Resources: Sobek

Mirasol Resources resumed exploration at the Sobek copper-gold project in the Vicuña copper-gold-silver district in late 2023 in preparation for the continuation of the maiden drill programme that was suspended due to the onset of winter weather. Drilling is scheduled to start at Sobek Central during the March quarter with 3000m planned. The project is on the same trend and 7km west of the Filo del Sol deposit and 3km southwest of NGE's Mineral's discovery at Lunahuasi. A maiden drill programme at the Vania prospects on the Inca copper-gold project was designed to test for potential concealed porphyry intrusive bodies under transported alluvial/colluvial gravel cover. Two drill holes were completed intersecting anomalous copper and peripheral 'green rock' distal alteration.

Golden Arrow Resources: San Pietro

Golden Arrow completed 4000m of diamond drilling in 13 holes on the San Pietro IOCG-cobalt project near Copiapo in 2023, to add to ~34,000m of historical drilling. The company is fine-tuning its geological model to finalise the drill spacing and programme to support a mineral resource estimate. The project is between Capstone's Mantoverde and Santo Domingo deposits. Its main focus is the Rincones target, a 2.6km by 1.6km area with 46 historical drill holes.

Great Southern: Especularita

Great Southern Copper completed scout drilling at the Abundante prospect and commenced at the Teresita prospect within the Especularita project in the coastal metallogenic belt of northern Chile. Six scout RC holes for 484m were completed at Abundante, targeting breccia-hosted high-grade copper mineralisation. Scout drilling at Teresita targets high-grade Au-Cu vein breccias with a cumulative strike length over 5km.

Halcones Precious Metals: Carachapampa

Halcones Precious Metals is drilling the Carachapampa project in the Maricunga belt near Copiapó. Drilling in 2023 included 1456m in five holes with results of 8m grading 3.91% copper and 0.21gpt gold from 151m downhole at the Northwest target. Below this was a 100m core interval with highly anomalous pathfinder elements, which can be indicative of potential proximity to a high sulphidation epithermal deposit. In 2024, the company plans to focus on the Northwest target where the highest-grade and most geologically significant results to date have been returned.