COPPER OUTLOOK

Supply set to lag climbing demand

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Copper boom
as project deficit bites hard

The copper price is booming again as a new cycle continues to gather pace following the COVID-19 demand set-back

Prior to the pandemic, market analysts were forecasting a looming structural deficit in the market due to ever-increasing demand and ever-shrinking supply.

This compares with similar conversations almost 20 years ago, when analysts began talking of an emerging supercycle for copper and other commodities as China industrialised and urbanised.

With decarbonisation and electrification now top of the agenda for governments across the world, the outlook for copper demand is even rosier, as the red metal plays a fundamental role in any action to advance such things: from hydro, wind or solar-power generation capacity; to transmission lines; to battery storage devices; to electric vehicles.

Analysts predict that decarbonisation and electrification will propel copper into a superdupercycle or stellarcycle as the whole world is involved this time, not just China.

But where will the copper come from? The outlook is not pretty given copper exploration has been underfunded for much of the past decade, projects take 15-20 years at least to advance into production, and new projects tend to be smaller, lower grade and more expensive than in the past.

This report aims to discuss the outlook for copper exploration and development projects with leading industry figures and the exploration protagonists seeking to advance projects to fill the supply gap, with a look at some of the jurisdictions where we can expect future new supply to come from

Got copper?

"Decarbonisation and electrification will propel copper into a superdupercycle or stellarcycle"

Mining Journal, Paul Harris

Copper bulls in charge with Scotch mist in the pipeline

Demand is increasing but there's a lack of projects in the pipeline

The copper price rose above US$4/lb in February for the first time in nine years as fears of future supply tightness combined with expectations of an infrastructure-fuelled global recovery.

The steady price rise seen since March 2020 has played out against a prevailing backdrop of depleting copper deposits, falling grades and a chronic lack of exploration investment since the heady days of the super cycle ended in 2011. From its $4.58/lb all-time high in January 2011, the copper price lost more than 50% of its value.

Most copper analysts forecast a supply shortage, and only differ over its timing. Supply and demand forecasts show a base case supply gap of about 7 million tonnes per year developing by 2030, which is roughly equivalent to the current annual production of Chile and Peru.

The COVID-19 slowdown may have pushed the coming deficit out a year or two, but it continues to linger on the horizon. London Metal Exchange stocks are at their lowest levels in five years, despite running-up in early 2020 as the COVID-19 impact was felt. Producers have been pulling out all the stops to benefit from higher pricing. Remarkably, despite COVID-19, Chile, the world's largest producer, saw only a 1% fall in output in 2020 at 5.73Mt.

The bigger picture has not fundamentally changed since a year ago: copper deposits are still getting older, lower grade and more expensive to operate, and the discovery rate is benign.

However, the COVID-19 pandemic has made many people and governments realise that human activity and its impact on environmental factors cannot continue as before. Less traffic allowed the air to clear, and people both noticed and liked the change.

Combined with greater investor preoccupation with ESG aspects when evaluating investments, decarbonisation of the energy system is now at the top of government and corporate agendas, with the corollary of even greater demand for the red metal – the most efficient and affordable electrical conductor metal. Copper is required for electrification and the extension of power grids, for the turbines of renewable energy sources from windmills to hydroelectric dams and is a key component in the electric vehicles, which are replacing internal-combustion-engine vehicles. The copper sector has received a shot of adrenaline and is on the brink of a golden age.

"We are at the beginning of a life-changing copper-boom – even bigger than when China modernised in the last cycle, as it is not just China this time but the whole world.

"Copper is the new oil, but you can't just turn it on like oil in a well that starts shooting out of the ground. It takes more than 20 years from discovery to build a big mine," Ian Slater, executive chair of Libero Copper told *Mining Journal*.

Or does it?

A January 2021 Deutsche Bank copper outlook report detailed 21 approved development projects worldwide – of which seven are brownfield projects – and 36 unapproved projects, of which coincidentally seven are also brownfield.

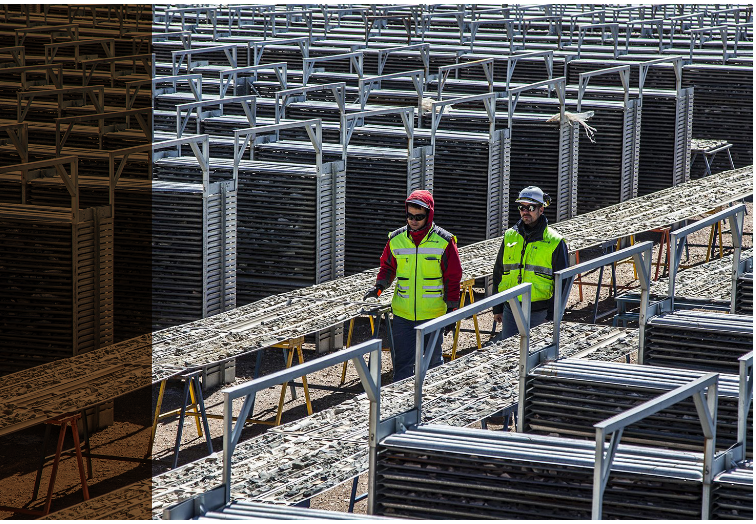
A closer look at the data shows that the development projects are almost entirely in the hands of existing, multiple-asset producers, while roughly 80% of the approved projects are also under their charge, leaving just 20% of unapproved projects in the hands of juniors.

What can we conclude from this? Few juniors take the step to become a producer and many major players already have projects on the go or waiting to go.

The data also shows that the majority of development-stage projects have a grade of less than 0.6% copper, with most clustered in the 0.3-0.4% band, and the result is similar for exploration-stage projects.

Unlike the gold space, where a number of smaller junior producers have emerged, the financial requirements of developing copper projects mean that even names with a lot of market resonance will struggle to finance the development of smaller projects with capex of around $1 billion. Majors continue to dominate copper exploration, accounting for 69% of spend, while Latin America remains the main destination, although Australia's star is rising as Canada's wanes.

"Australia is a good news story, as there is nothing like a major discovery like Winu to reinvigorate interest in a country. Plus, the government [is] encouraging grassroots exploration through the junior mineral's exploration incentive, modelled on the Canadian flow-through financing mechanism," S&P Global Market Intelligence analyst Kevin Murphy told *Mining Journal*. Winu is generally recognised as the last major discovery, and the only



"Majors continue to dominate copper exploration, accounting for 69% of spend"

significant one during the past 10 years, with little genuinely grassroots exploration going on.

One of the rare exceptions in Latin America is Marimaca Copper, with its namesake project just outside Antofagasta in Chile, which has sulphide potential underneath the oxide project on which it has a PEA, which could turn a modest oxide project into something much more desirable for large copper miners.

"We are looking to prove there is potential for a large-scale sulphide extension to the Marimaca project at depth that could potentially yield a much larger single project. Sulphide projects have to be relatively large and we have a large target in mind," president Hayden Locke told *Mining Journal*.

Daniel Earle, president and CEO of Solaris Resources, pointed to the key issues that have plagued the copper sector in recent times. "The financial markets react to problems that have developed, rather than preparing in anticipation of future problems. There has been a dearth of capital made available to copper explorers and we see just one discovery in the last six years.

"We had a lot of the price incentives and market dynamic in place in the past cycle, with copper rallying from a 2008 bottom of $1.29/lb, but we didn't see the discoveries get put on the board so what projects out there that are publicly investible?" Earle said. Murphy highlighted "really poor" discovery rates over the past decade.

"Historically speaking, Winu is really quite small, so far. There is a lot of recycling of projects that were abandoned years ago, which doesn't add to the industry and is a bit of a detriment. Deposits typically didn't go anywhere for a good reason and money is probably better off being spent looking for new deposits rather than revisiting old ones," he said. Earle said the lack of exploration success means for a big copper company or an investor looking for exposure to the supply crunch "there is just nothing there".

"The pipeline is basically empty. There aren't things to transact. Everyone has the same view of the copper price across this cycle. But price isn't the driving factor: you need

Continued on page 8

Rex ready to roll

Drilling at Hillside, South Australia, on Rex Minerals' 100%-owned property

Hillside, on Australia's Yorke Peninsula, is poised to blast into copper's supercycle

The stars have aligned and shine brightly over a certain hillside on South Australia's Copper Coast – just a couple of hours drive from the capital city of Adelaide.

It's there, on the Yorke Peninsula, where Rex Minerals' Hillside copper-gold project resides. It's shovel ready – it has 2 million tonnes of relatively easy-to-develop copper – and is well positioned to be swept up in the commodity's highly-touted supercycle. The project has an expected average annual production of 35,000 tonnes of copper and 24,000 ounces of gold over the first 12 years of production.

Rex's chief executive officer, Richard Laufmann, said not only is Hillside well positioned, but it is potentially in pole position among undeveloped opportunities lining up to take advantage of the market conditions.

"Good luck finding another copper project that's ready to go – it's hard to do," he said. We – a small Australian company – discovered this big project in our own backyard in 2008. We got the mineral lease approved in 2014 and then got the final environmental approval in July 2020. That's 12 years from discovery to get the project to the go-bay. This, in itself, is unique. Usually, it takes up to 20 years to get a project to this stage."

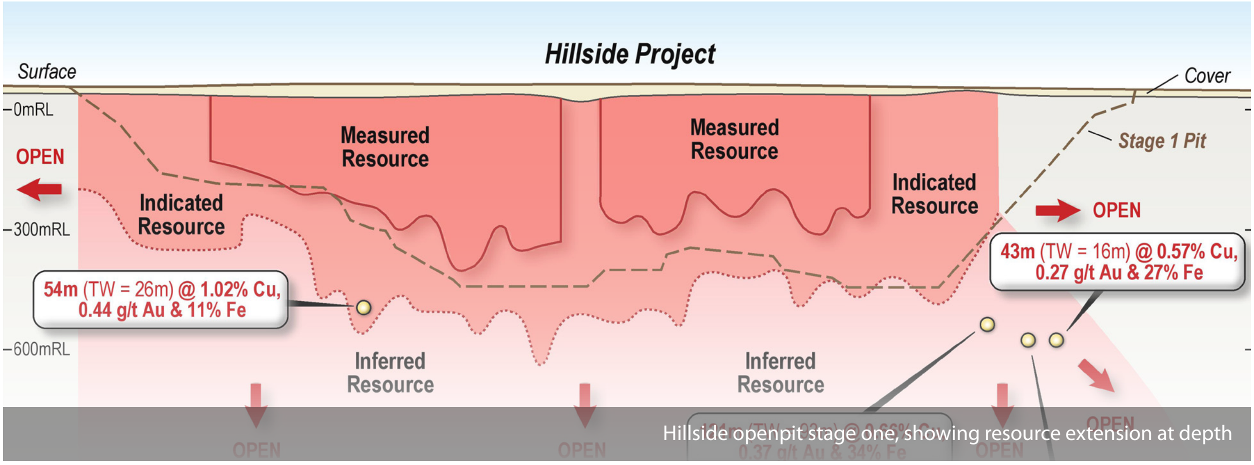
In those short six months since final approval – and the passing of some key state legislation in January this year – the recent boom in copper prices has dramatically improved the project's fortunes.

"The value of the project is A$1 billion using current spot prices. If it was operating today, it would be spinning off about a million dollars a day," Laufmann said.

Impressive when compared to Rex's published base case for Hillside, which has a copper price of US$3.00/lb, a post-tax NPV of A$501 million, a post-tax IRR of 16.2%, and C1 cash costs of US$1.38/lb. It's not only the project's earning potential that is attractive – it's also relatively cheap to set up given the project's strategic location. When you think mining in Australia, you think the barren outback in Queensland or Western Australia, thousands of kilometres from anywhere – not the Yorke Peninsula. The Hillside project has an upfront capital cost of US$410 million including pre-strip, mining fleet and contingency.

"You don't have to build a town – there's a town there," Laufmann said. "So we can draw from a local population for workforce. We've got a highway that's already there to Port Adelaide, where we can ship our concentrate from. We've got grid power available, with less than 12km needed to extend the high voltage line to the mine site. And we've got water. So, we've got all of the infrastructure requirements built.

"We've got a project that's cost over A$150 million to discover, drill out, study, permit, and get it ready to go. It sits in the bottom half of the cost curve. It sits in the bottom half in terms of capital intensity.



Hillside openpit stage one, showing resource extension at depth

"It's not an expensive project to build. And why? Because it's on the coast of the Yorke Peninsula in South Australia. It's a fantastic location."

Rex says Hillside is one of only six copper projects across Australia and the Americas with initial capex of less than US$500 million, and is the only one with all major permits approved for mining. And, following on from the first 12 years of 35,000t annual copper production, there's the option for a phase-two openpit expansion – which Laufmann says could be developed with little effort – that could add an additional 500,000t of copper and double the mine life. For a bit of context, Australia's Office of the Chief Economist in December forecast the country's entire mined copper output in fiscal 2021-2022 (July-June) would be 912,000t. If Hillside production was incorporated into that, it would make up around 4% of the total. There is also the option for phase-three underground extensions at Hillside and a final phase that offers the end-of-life bonus of iron ore and a perfect location for pumped hydropower.

"The ore body that we'll be mining actually has a lot of hematite and magnetite in it. In fact, an early plan for the mine was actually to produce that as we went. And then with the iron ore pricing starting to come off, we changed plans to focus on the copper," Laufmann said. "But the iron ore is all ending up in the tailings dam. So it's still there. By the end of stage one, we've got 12Mt of iron ore sitting in the tailings dam. By the end of stage two, we'll have 30Mt. All we have to do is sluice it into a magnetic separator and you can put the tailings back in the hole."

Rex says the hole left from the mine would also be of significant value to the state of South Australia and the national energy grid for the opportunity it presents for pumped hydro.

"You could never build batteries big enough to replace what could be a pumped hydro facility. And it's already at the doorstep of a lot of renewable power, which is what makes pumped hydro so valuable," Laufmann said.

The Office of the Chief Economist's forecasts for world production and consumption, meanwhile, highlight the need for copper development. Mine production in the current fiscal year is tipped to total 22.86Mt, while consumption outstrips that at 25.69Mt. Laufmann said once development started at Hillside, the company could have ore to market in three years, which makes it well placed for what is expected to be a decades-long supercycle.

"There's an inevitability about the fact that we're going to use more copper in the next 10 years than the world has used since copper was discovered," he said. "I think we're going to see US$7 per pound copper for sure. You're seeing a lot of smart money trying to get into copper now, and we are keen not only to develop Hillside, but to look for a partner who shares our bullish vision of future demand for near-term copper."

Rex Minerals – at a glance

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Continued from page 5

"Financial markets react to problems that have developed rather than preparing in anticipation of future problems"

to give people something to buy, that they can develop, that has scale and decent economics and no potential fatal flaws such as a lack of water or intractable social issues.

Twenty-five percent of the existing production base is from the top-10 mega mines in the world. There is nothing like these discovered in the past 20 years," he added.

Earle said even the very best of the new generation of projects are "a fraction of the size of the existing base of supply".

"Mirador, the biggest mine in Ecuador, which is world-class by modern standards, is 1Bt grading 0.6% copper equivalent and it produces 95,000tpy. Those are the new mines, so it will take a lot of projects like that or smaller to make up that deficit," said Solaris' Earle.

In its 2018 report, Copper M&A: The Cupboard is Nearly Bare, RFC Ambrian concluded that of 55 development projects around the world only 21 had the potential to involve a third party and just five had a high possibility of being subject to a transaction. A year ago the bank published an update and observed that there were now 64 development projects, yet still just five with a high possibility of being subject to a transaction.

The five are: Cascabel, Los Helados, Vizcachitas, Casino and Santo Tomas. In the months between the reports: Hudbay Mining snapped up Mason Resources for C$31 million to obtain the Ann Mason project in Nevada, USA; and Taseko Mining acquired Yellowhead Mining for C$15 million to obtain the Yellowhead project in British Columbia, Canada, which has proven and probable reserves of 817Mt grading 0.29% copper equivalent and could produce in excess of 4.4Mlb of copper, 440,000oz of gold and 19Moz of silver.

Money coming in

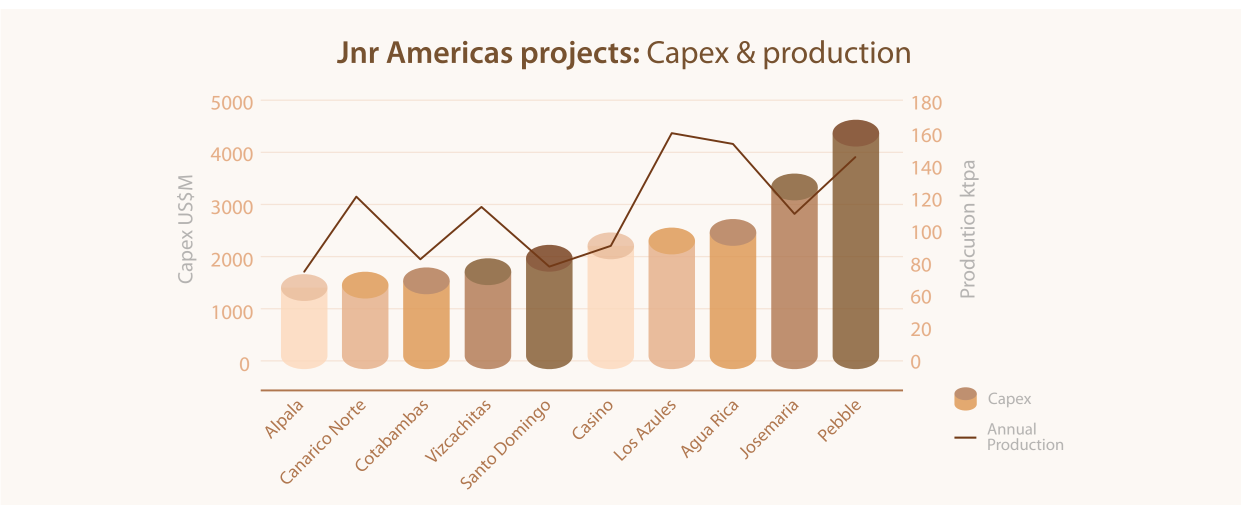
But for evidence that money is interested in copper again, look no further than Solaris Resources, which followed a C$20 million raise prior to going public in July 2020 with a C$80.6 million raise in December. And the company currently has some $90 million in in-the-money warrants it could tap. Other juniors have also seen the money tap turned on and other IPOs have followed.

"We were due a financing 18 months ago and called around to funds that held positions in us and they said they love the story but didn't have the cash … Now financing has really switched on. Once the gold price started coming up we saw an influx of money coming into the sector, which put new energy into the market," John Black, president and CEO of Regulus Resources, told *Mining Journal*.

Libero's Slater tells a similar story.

"A year ago we couldn't raise any money for copper exploration, but it completely changed in April last year after COVID-19 broke. It was night and day, like someone turned on a switch," he said.

Jamie Beck, president and CEO of Filo Mining, told Mining Journal there had been "a decade of under-investment in



Source : Company data, Deutsche Bank estimates copper exploration in which it was tough to gain traction as a junior explorer. The global electrification push has taken hold and people see a potential supply gap growing over the next decade, so we are starting to see more interest around exploration stories," he said.

The market is now reacting and making capital available to explorers, but rather than going into genuine generative exploration, a raft of new juniors are resuscitating old marginal projects that didn't make it in the prior cycle, and that stand little chance of addressing the supply challenge coming over the next decade or beyond given the timelines to drill out, complete feasibility, permitting and construction. Realistically, new projects cannot enter production until the 2030s in the most optimistic scenario. The data backs this up, with copper exploration spend starting to build off a 10-year low in 2020 of $1.8 billion, some 62% less than the $4.7 billion high in 2012, according to S&P Global, and rapidly gaining pace after the stop-start of the COVID-19 impacted 2020.

"Last year was really a weird year for copper because in March it looked like it would fall off a cliff with the COVID-19 demand shock that hit prices hard. Exploration budgets were down 24% due to lockdowns, which meant companies couldn't get into the field, and the price decline that saw caution enter into budgets as majors didn't want to get caught overspending. Most people expected a longer recovery, but the copper price shot-up like crazy," said S&P's Murphy.

Stimulus is also coming from an unexpected direction in the shape of gold producers since Barrick Gold president and CEO Mark Bristow spoke about the company needing to increase its exposure to copper. Black at Regulus Resources, for one, has received increasing interest from gold companies.

"Antakori is a large resource in a brownfield setting. Interest from gold companies could be as a hedge on gold because people fundamentally believe copper is going to have a good price run, and because it is an acceptable base metal for the 'green metal' aspect so you don't get dinged on ESG. It's hard for big gold companies to replace their mined resource every year as a lot of gold projects tend to have short mine lives. If you have a piece of a large copper-gold operation with a multi-decade life, you can build an investment platform around it," said Black.

M&A solution

Exploration deficit and a lack of discoveries theoretically sets the table for M&A activity to increase, but there is scant indication that it is picking up, unlike in the gold space. The notable recent exception is Kaz Minerals' £3.7 billion

Continued on page 14

Capella to bring new life to Norway's historic copper sector

Company plans to cash in on electrification revolution through Løkken and Kjøli projects

Capella Minerals is breathing new life into Norway's oft-forgotten, yet historically important, copper mining sector – which has supplied the metal to Europe since the Age of Enlightenment. The Toronto Stock Exchange-listed company acquired the Central Norwegian Løkken and Kjøli copper-zinc (-silver-gold) projects in August last year from EMX Royalty Corp. Capella is undertaking drill-target generation activities to position itself to help supply Europe's shift to widespread electrification and Norway's transition from oil to commodities required for green energies.

"These were extensive mining districts – both of them. They're high-grade copper deposits, they're massive sulfide-type deposits. These districts lie along the extensions to some very important copper – producing regions in northeastern Canada, such as Bathurst and Buchans. Geologically they're part of the same trend," Capella's chief executive officer and director, Eric Roth, said.

"Most people think of Norway as an oil producing country- and something that is forgotten is that Norway had a long history of copper mining. A lot of these districts started mining in the mid-1600s and they continued until the mid-1980s," Roth said. Løkken, having been in production until its closure in 1987 on the back of low metal prices, had an estimated production of 24 million tonnes at 2.3% Cu and 1.8% Zn. Kjøli has the two principal mines of Killingdal and Kjøli, and numerous smaller mines and mineral occurrences along 15 kilometres of strike. Both are district-scale projects and include silver and gold credits.

The country's reputation for producing copper may have faded from minds across the globe, but it remains close to the hearts of many in Norway. So much is copper in the DNA of Røros - the district where Kjøli resides – that the old copper symbol and two crossed mining tools adorn its coat of arms. And copper mining gave birth to the village of Løkken in 1654. And this history brings more than just curiosity – there are modern, real – world benefits.

"There's a lot of brilliant infrastructure in place – especially at Løkken, because it was so big. It was actually the largest known massive sulfide deposit of its type by tonnage," the Capella chief said, noting that the underground mine ran a significant 4km in length. At the eastern end, there was daylight – the western end was about a kilometre underground. There's a lot of infrastructure around Løkken – a lot of the old shafts, some old mining and processing infrastructure, and an electric railway that runs down to the deep-water port at Orkanger, which is only about 25 kilometres away.

"The country itself has fantastic infrastructure, and with the mining infrastructure on top of that – it's a great opportunity. The former mines were very compact operations as they were mostly underground and the final product was a copper-rich concentrate produced on-site using flotation cells. And in terms of processing, even throughout Norway and Sweden, there are plenty of places you can process copper concentrate. So it's the full package, really: from exploration potential to really good infrastructure – from project level all the way up to producing the final copper for European markets," he said.

But even more so than that – the history brings with it the crucial aspects of local knowledge and overall public support.

"A lot of people who live in these areas had family – fathers or grandfathers – who worked in the mines. So they understand mining in these districts. And people certainly understand that they need copper for electric vehicles, energy transmission, and batteries. So far we've had a lot of support at the local level – and permitting in Norway is fairly straight forward," he said. "And clearly one of our goals will be to ensure that the local communities and all stakeholders also benefit from our presence – whilst we also adhere to international best practices in terms of taking care of the environment."

It was weak copper prices and Norway's ingenuity being redirected towards the booming oil market that led to mines being shuttered throughout the 80's. And the Nordic nation's industrial credentials certainly shone in recent times, with the country becoming the world's largest oil and gas producer on a per-capita basis outside of the Middle East.

But 30-something years later, it's a much different world – which requires another pivot in focus and Capella is laying the groundwork for Norway to advance in a new direction.

"Norway can be self-sufficient in copper because it's obviously a key commodity going forward and their dependence on oil will wane as time goes on. So, we see this as a valuable addition to their economy. I think in the future, copper will mean a lot to them. In both of these projects, you've got the former underground mines, but you've also got 10-15 kilometres of prospective stratigraphy where we see good potential for the discovery of new massive sulfide occurrences – and these could grow into significant resources," Roth said.

And Capella is working away to find out exactly what's there. Once the company has identified the priority targets, it'll begin drilling – most likely this year. Given the high-grade aspects of the copper, the mining operations could be relatively small, which reduces both cost and environmental impacts.

"These deposit types are very attractive for small companies because they are relatively small Capex to build and their environmental footprint is relatively small and easy to


Copper-rich outcrop from Kjoli

manage. As they are high-grade deposits they also have the potential to generate very good cashflows – and be so-called "company makers" – whilst also generating significant income for local communities through direct employment and the supporting of local service providers. Basically, the minimum target size we're looking for is about 10 million tonnes of high-grade ore for each," he said.

Along with the Norwegian assets, Capella's portfolio also includes the three high-grade Canadian gold projects of Doman, Manitoba, and Savant Lake, NW Ontario, as well as the Swedish Southern Gold Line project. Roth has extensive experience, having been chief executive officer of Extorre Gold Mines and chief operating officer of Mariana Resources, which were acquired for C$440 million in 2012 and $175 million in 2017, respectively. He also had experience at AngloGold Ashanti and Aur Resources.

Capella has a market capitalisation of C$10 million. Its major shareholders include Austria-based Fruchtexpress Grabher, Canada-based Sandstorm Gold, Management and Insiders, and US-based EMX Royalty.

Capella Minerals – at a glance

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Copper Fox: Building a pipeline of North American porphyry copper projects

Resurgence in copper demand lifts prospects for acquisitions

Amid a continuing resurgence in copper demand, producers will undoubtedly be scrutinising the exploration and development project pipeline for potential acquisitions. One company hoping to appear on their radar is Copper Fox Metals, which is pursuing a strategy of generating North American porphyry copper projects for large and mid-tier producers.

TSX-V-listed Copper Fox already has a joint venture – Schaft Creek in northwestern British Columbia – with one major copper producer at the advanced stage of development. At Schaft Creek, Copper Fox has a 25% interest and Teck Resources owns the other 75%.

Copper Fox owns 100% of a second development project: Van Dyke, which is an in-situ copper recovery project in the Laramide copper province in Arizona. It also has complete ownership of two exploration-stage projects in Arizona, Sombrero Butte and Mineral Mountain, and is in the process of completing the purchase of the Eaglehead project in northwestern British Columbia.

Van Dyke reflective of Copper Fox's strategy

Copper Fox's strategy is to: acquire polymetallic porphyry copper exploration projects, which it believes have the potential to contain more than half a billion tonnes; transition these projects from the exploration stage to the advanced stage; and complete a feasibility study and "monetise that asset", says Elmer Stewart, the company's chairman, president, and CEO.

The Van Dyke project is reflective of this strategy. Copper Fox acquired Van Dyke in 2012 for US$1.5 million, then invested a further US$5 million-$6 million in various activities – confirmation drilling, in-situ leach testing of metallurgical recovery, and geotechnical and hydrogeological work – to validate historical information and deliver a maiden resource estimate in 2014. Unfortunately for Copper Fox, copper prices began to plummet soon after the resource estimate, and it was not until 2017 that prices had recovered to a point where work resumed. Since then, Van Dyke has delivered a stream of good news, starting with geological modelling and an expanded analytical programme of the sample pulps collected by the project's previous operator, Occidental Minerals, in the 1970s.

"The project was originally considered an exotic deposit where the metals were transported in solution on surface and deposited in open spaces. As work progressed in 2018-2019, it became clear that Van Dyke was not an exotic deposit; but instead, a primary in-situ porphyry copper deposit that had been subjected to several cycles of weathering oxidation and supergene enrichment," Stewart recalls. The 2015 metallurgical work returned higher copper recoveries from a sample of chalcocite (a cyanide-soluble copper species) than would have been expected based on the literature. This suggested that the copper recovery rate could be higher."

These observations, combined with the analytical programme and geological modelling, gave Copper Fox the confidence to update the resource estimate that resulted in a significant increase in soluble copper content, increased tonnes and both indicated and inferred resource classifications. The positive results of the resource estimate was the basis for completing a Preliminary Economic Assessment (PEA). The 2020 PEA showed a post-tax net present value (NPV) of US$644.7 million, an internal rate of return (IRR) of 43.4% and copper production of 1.1 billion pounds over a 17 year-mine life based on the 2020 mineral resource estimate of 97.6 million tonnes of indicated resources at 0.33% Cu and 168.0Mt inferred resources at 0.27% Cu.

"This is an indication of what the potential of the Van Dyke project could be, and it demonstrates that with good geological work and experienced contractors, you can significantly increase the value of the project," Stewart says.

Copper Fox already working with a major producer at Schaft Creek

Schaft Creek shows that Copper Fox can attract large producers. When Copper Fox optioned the property from Teck in 2002, Teck retained a back-in right for up to 75%. Teck triggered this back-in right for the maximum amount in 2013, after Copper Fox delivered a feasibility study showing a pre-tax NPV of C$528 million and an IRR of 10%.

After Teck assumed operatorship, the joint venture reviewed the feasibility study, conducted a limited amount of drilling, metallurgical testwork, and completed optimisation studies before the commodities downturn slowed work on the project. As commodity prices recovered, Teck published an updated resource model showing 1,293Mt of measured and indicated resources at 0.26% Cu, 0.16 g/t Au, 0.017% Mo, 1.2 g/t Ag. Copper Fox likes polymetallic porphyry copper deposits, Stewart says. As an example, it is estimated that approximately 34% of Schaft Creek's revenue will be generated from byproduct credits of gold, silver, and molybdenum. This was a major reason Copper Fox chose to acquire Sombrero Butte and Mineral Mountain, both of

which have copper as the primary metal along with low but significant molybdenum-gold-silver concentrations in outcrop.

Next steps

Looking forward, Copper Fox is busy on all fronts. Together with the support of Teck, it commissioned an NI 43-101 technical report for Schaft Creek, which it expects to be completed by mid-2021. The recent Van Dyke PEA is being used to determine the next steps for that project. The company is continuing to explore at Sombrero Butte and Mineral Mountain in Arizona, and finalising the Eaglehead acquisition, which excites Stewart because "it's re-establishing Copper Fox as an explorer in northern British Columbia" close to the Schaft Creek project. Stewart is under no illusions about the low probability of taking the three early-stage projects to the feasibility stage. But he hopes that by following the same strategies employed at Schaft Creek and Van Dyke – stopping after each stage to assess results and objectives and partnering only with contractors that specialise in porphyry deposits – these projects can deliver similar results.

Copper Fox Metals – at a glance

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Ernesto Echavarria

Continued from page 9

attempted buyout by chair Oleg Novachuk and director Vladimir Kim, both of who want to take the company private. Capital discipline among majors remains firmly in place despite the pending supply crunch and declining head grades. However, at some point, as these factors transpire into even higher copper prices, it may mean that even the mediocre projects in the pipeline will eventually see M&A break out.

"The last time around there was some M&A that wasn't as well received by the market as it happened at the height of prices. I think the majors are sitting back, being prudent and taking stock, but it is only a matter time of sustained prices in the $3.50-4/lb range to incentivise some of these projects to come online," said Filo's Beck.

Black, who in the last copper cycle sold the Haquira project in Peru to First Quantum Minerals – which has yet to be developed – thinks a new wave of copper M&A is approaching, although he thinks corporate boardrooms do not want to authorise the first cheque.

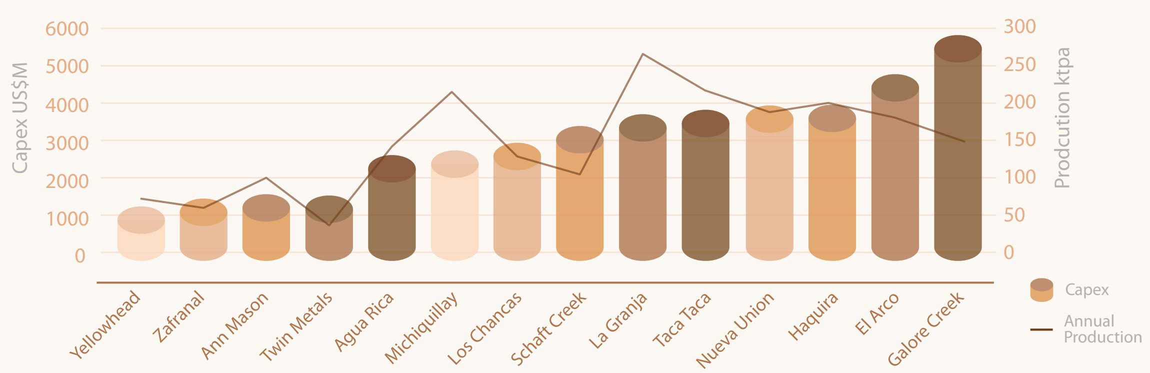
"The 2005-2011 super cycle flushed out a lot of projects and 12 to 15 got snapped-up. We are entering into a setting with companies watching the opportunities out there, but nobody wants to go first and be criticised for making a big purchase. But the opportunities out there that are drilled out and ready to go are few and far between, so if someone suddenly picks one off it puts pressure on the other players. First movers often do pretty well because they have a better selection," he said. Trying to get shareholder approval for such large capex projects can also be challenging, said Murphy.

"There is more talk now of companies wanting quality production rather than growth for the sake of growth, and companies are not so willing to pull the trigger unless a project really ticks a lot of boxes," Murphy said.

Adam Lundin, president and CEO of Josemaria Resources, believes that a few more months of copper being around the $3.50/lb incentive price will give the market the confidence it needs to transact.

"I see many copper companies hitting 52-week highs [in their share prices] but I don't see the space moving to develop projects yet. It will happen. We see companies doing share buy backs and increasing dividends, and eventually they will build projects. If there had been a gradual climb to $3.50/lb, we might have seen movements now, but it happened so quickly that it needs to be sustained for another six months. Then we will see producing assets changing hands or companies looking to build projects. People now want to be closer to copper and more banks have been knocking on my door," he told *Mining Journal*.

Sr Copper Study Stage Projects Americas - Excluding Expansions



Source : Company data, Deutsche Bank estimates

Latin America offers most copper potential

A review of up and coming developments uncovers the greatest concentration of future producers

Latin America has been a global centre for copper production for decades – a situation that is not going to change any time soon, although the attractiveness of individual countries will. We take a look at the project pipeline, along with potential development and M&A candidates.

Argentina

Argentina looks a strong candidate to be the big winner from this developing copper cycle.

The number of large projects it has – such as Taca Taca, Agua Rica, Pachon, Los Azules, Altair, Josemaria and Filo del Sol – might outweigh its ever-oscillating political and economic conditions.

Argentina may be a bold call for those who view its political and economic history as risky, but it has untapped geology similar to that so extensively exploited across the Andes in Chile. With all jurisdictions around the world presenting challenges – even Chile – mine builders and investors will need to focus on how to reduce uncertainty via tax-stability agreements.

The Lundin Group is certainly comfortable in Argentina. It has a long history of operating in the country and has two separate juniors advancing projects there. In San Juan, the feasibility-stage Josemaria project, which is owned by Josemaria Resources, is looking a good bet for being the next sizeable project in development anywhere in the world. The likely production start-date is in 2026.

"The focus this year is submitting the environmental impact assessment, which is a huge milestone for us, Argentina and San Juan to see a big project moving forward. We will follow that up with discussions to have a tax-stability agreement, which I anticipate agreeing this year and which would mean we have a meaningful, ready to go copper project that will take us to the top of the table of undeveloped projects globally," president and CEO Adam Lundin told Mining Journal. For Lundin, San Juan is the province to be in for copper development.

"San Juan has been a fantastic place to work and the family has been there for 30 years. They understand the benefit to mining when it's done right. It is incredible having Mark Bristow and Barrick Gold leading the charge with Veladero [whose mine life has been extended to at least 10 years], which shows San Juan that mining can be great when it's done right," said Lundin.

"Argentina can be the shining light for the future of mining in South America. I believe they see that and want to execute on that."

The other Lundin company is Filo Mining, which is rapidly advancing the bigger Filo del Sol project.

Filo's president and CEO Jamie Beck said Argentina was "in a great position in terms of projects sitting in the pipeline", even if its development to date pales in comparison with that of Chile, despite having similar geological endowment.

"The country has come through its debt restructure; the government is trying to improve economic conditions and mining is recognised as a real opportunity to drive economic growth and secure jobs. The timelines required to develop a copper project are often misunderstood," Beck told *Mining Journal*.

"Filo is well advanced and has an oxide cap, which provides for a more moderate capital-intensive project than some of the giant porphyries out there. We have the opportunity to start and use the cash flow of the first 10 years of mining to develop the next 50 or 60 years."

Filo del Sol will ultimately require a deeper-pocketed funding partner to develop the sulphides, but the prize looks to be getting bigger. The company has five drill rigs on site in order to tighten the drill spacing between the 1km-long intercepts – which grade about 0.95% copper equivalent – it hit in 2020. The company hopes to potentially be able to publish a resource in July or August.

The potential gamechanger, however, is the geological evidence suggesting mineralisation continues to the north.

"We have surface alteration, geochemical anomalies, IP work and historical reverse circulation drilling. We plan to step out up to 2km to the north, and if we can extend mineralisation 1km or 2km it opens a potential volume of sulphide material in the multiple billions of tonnes. It would be a huge deposit," said Beck.

"The country has come through its debt restructure; the government is trying to improve economic conditions; and mining is recognised as a real opportunity to drive economic growth and secure jobs"

The biggest 2020 Argentine copper news was the integration of Yamana Gold's Agua Rica project with Glencore and Newmont's Alumbrera plant and infrastructure in Catamarca, in what is now known as the MARA copper, gold, silver and molybdenum project. It hosts proven and probable reserves of about 7.4Moz of gold and 11.8Blb of copper, with average annual production slated at 236,000t of copper equivalent with a 25-year mine life.

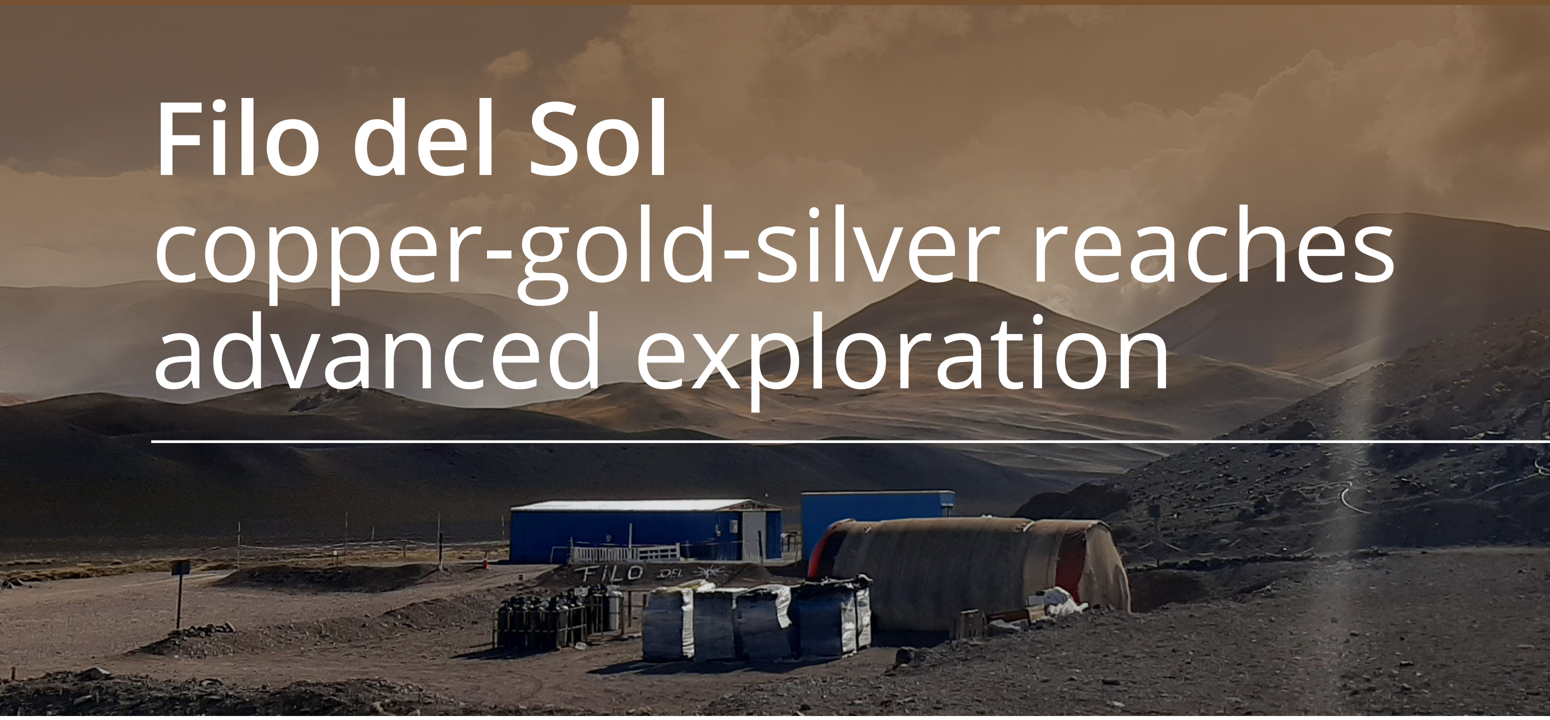
Other big actors also boast big projects. Having brought Cobre Panama on stream in 2019, First Quantum is advancing Taca Taca in Salta towards a production decision. The company declared reserves in 2020 with an openpit mine design of up to 60 million tonnes per year, production of 275,000t within the first 10 years of operations and a 32-year mine life. The proven and probable reserves are estimated at 1.8Bt grading 0.44% copper for 7.7Mt of contained copper, 213,500t of molybdenum and 5.1Moz of gold. A build decision is not expected until in 2023 or 2024.

Glencore's Pachon project in San Juan is essentially ready to go, but the company is not really seen as a mine builder, so it may look to sell it or find a development partner. McEwen Mining is facing a similar decision for its Los Azules project. The company has had challenging recent years with its gold projects in the USA and Canada, placing it under financial strain. McEwen is considering finding a joint-venture partner or even spinning the asset out into a newco.

In a clear sign that the copper market is heating up, explorers in Argentina are reactivating. Sable Resources, Aldebran Resources and Libero Copper have projects they are looking to drill.

Continued on page 20

Filo del Sol copper-gold-silver reaches advanced exploration



Filo Mining set for bumper season

Filo Mining, an up-and-coming junior copper explorer, hopes to take a big leap forward with infill and step-out drilling during this season's programme at its Filo del Sol copper-gold-silver exploration project in San Juan, Argentina.

The company raised C$41.7 million in July 2020 and has $38 million in its treasury, of which some $25 million is earmarked for this exploration season. Filo has five drill rigs on site on order to tighten the drill spacing around some of the 1km-long mouth-watering intercepts, such as the 1,009m grading 0.95% copper-equivalent it hit in a 200m step-out hole in 2020. The 2020 holes were drilled about 500m apart and Filo now plans some infill so it can publish an initial inferred mineral resource for the sulphide mineralisation in July or August.

Filo del Sol currently has an indicated resource of 4.4 million ounces of gold, 147 million ounces of silver and 3.1 billion pounds of copper. It also has a January 2019 pre-feasibility study that outlined annual production of 67,000 tonnes of copper, 159,000oz of gold and 8.6Moz of silver for 14 years following a US$1.27 billion initial capital cost.

The pre-feasibility study only accounted for the upper oxide portion of the deposit and yielded an after tax net present value (NPV) using an 8% discount rate of US$2.06 billion and an internal rate of return (IRR) of 30% at a $3.60 per pound copper price, $1,560 per ounce gold price and $24 per ounce silver price.

The company is also looking at growing the size of the deposit, as the potential gamechanger is that the geological evidence suggests mineralisation may well continue to the north and hold the promise of a significant increase to the size of the project. The evidence includes surface alteration, geochemical anomalies, IP anomalies and the results of previous reverse circulation drilling that didn't have the ability to get deep enough into what is now the sulphide target horizon.

"If we can extend the mineralisation 1km or 2km to the north it opens a potential volume of sulphide material in the multiple billions of tonnes. Filo del Sol would be a huge deposit," said president and CEO Jamie Beck.

Filo del Sol is a high-sulphidation epithermal deposit associated with a large porphyry copper-gold system, into which Filo Mining has drilled more than 60,000m. The 'Filo' in the project's name refers to the sharp mountain ridgeline where it is located, which also serves as the frontier between Chile and Argentina. Although an estimated 10% of the known deposit at Filo del Sol is in Chile, the project will ultimately be configured in Argentina.

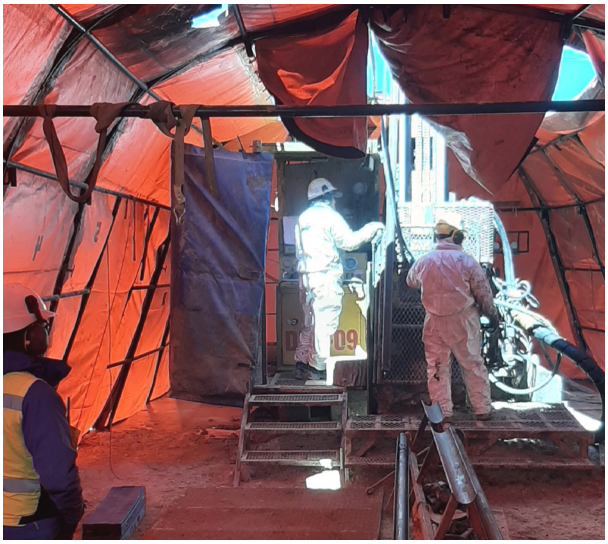
The basket of advanced copper development projects around the world contains relatively few options, and with demand for copper set to take off as the world pushes ahead with decarbonisation and electrification, having a growing resource base and an idea of project economics puts the Filo del Sol deposit within a select group of projects, and it may well be subject to the perceived next wave of copper mergers and acquisitions.

"Filo del Sol is well advanced on the project development timeline because we have a resource defined and a PFS. The other big advantage we have is that we have the oxide cap at the top of the deposit, which provides a more modest capital project to start with than some of the giant porphyries out there. We have an opportunity to start smaller and use the cash flow of the first 10 years of mining to develop the next 50 or 60 years," said Beck.

Filo Mining may also benefit from the likely earlier development of the nearby Josemaria deposit held by sister company Josemaria Resources. Both explorers are under the umbrella of the Lundin Group.

"It is not hard to see Josemaria start up, which would allow Filo to get its oxide project going with synergies of roads, power and other infrastructure. Ultimately, the case for processing the Filo del Sol sulphide could be made, perhaps through a Josemaria facility that would already be built and up-and-running," said Beck.

The Lundin family sees great opportunity in Argentina and has done for decades, as shown by its long-established history of exploring for the red metal in the country. Lukas Lundin found both the Alumbrera and Veladero deposits through his companies International Musto and Argentina Gold. Filo Mining and Josemaria Resources will both benefit from the long-term understanding of the country and its political economic situation that the Lundin Group has acquired in addition to the long-term relationships it has developed at the provincial and federal level. And with the government actively promoting mining investment as it seeks to strengthen its economy, and a rising copper



market, there is no better time to advance Filo del Sol towards production.

"Argentina is in a great position right now in terms of projects sitting in the pipeline. Its development over the years pales in comparison to that over the border in Chile, despite having similar geology and a similar mineral endowment.

There is a willingness on the part of the government to help get investment and help these projects move forward. The country came through its debt restructure and the government is trying to improve economic conditions with mining recognised as a real opportunity to drive economic growth," said Beck.

Filo Mining – at a glance

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Major Shareholders
Lundin family

Continued from page 17

> "With Peru faltering, Ecuador has increasingly taken the copper exploration spotlight in recent years"

Peru

Peru was perhaps the country that gained most during the last copper cycle, as its annual production rate grew to about 2Mtpa.

After two years in which no new mine builds started, Peru will see construction of the $140 million Marcona tailings copper and iron ore project in 2021.

The country has Anglo American's $5.3 billion Quellaveco project and Minsur's Mina Justa under development, but apart from these its pipeline has dried up considerably.

Southern Copper's Tia Maria project in Moquegua is ready to go, but stalled due to unresolved social conflict.

Teck's Zafranal project in Arequipa is shelved while the owner looks to sell, viewing its QB2 and QB3 projects in Chile as more attractive.

Candente Copper's Canariaco Norte project has been at feasibility stage for almost a decade, but has struggled to fund ongoing work – even though Fortescue Metals Group now has a 19.9% stake.

Having become a copper powerhouse, exploration fizzled out in the country as the supercycle ended. Explorers pushing into more remote areas faced increasing resistance from communities unfamiliar with mining, and this was compounded by the bear market cutting the purse strings.

Now, companies are picking-up the pace. Regulus Resources has the promising Ankakori copper-gold project, although the deposit is split between two different companies – one of whom has three partners, adding a layer of complexity to any future development or sale.

Between Regulus and its neighbour, Coimalache, Antakori hosts at least 1.4Bt of mineral resources. Regulus expects to restart drilling the area to the north in March in order to complete a 25,000-30,000m resource expansion programme.

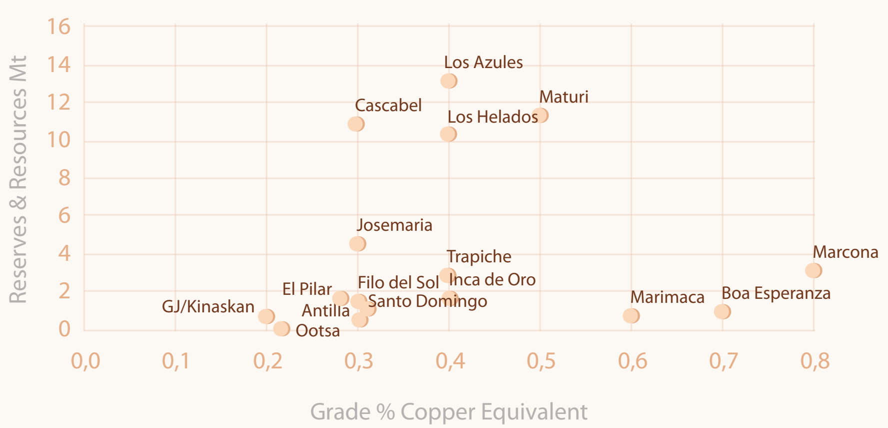
"We would like to get to the point of updating the resource if we achieve a significant increase that warrant's putting it out, and complete first round of scout holes into the AntoNorte area," president and CEO John Black told *Mining Journal*.

Increasing scale is important for Regulus' future bargaining position, but also to support the cost of processing for the part of the deposit that contains arsenical sulphides. To this end, Black is keenly interested in the processing solution Newmont opts for at its Yanacocha Sulphides project, which is some 35km away.

"As we interact with the gold guys, we are learning more about pressure oxidation and autoclaves to tackle [arsenical] material, which converts sulphide minerals into scorodite that sequesters the arsenic in a stable form that is not water soluble," said Black.

"Most major gold producers have to treat refractory ores

Jnr Americas projects by resources/reserves: Copper equivalent



Source : S&P Global

and are comfortable with that. Newmont has completed its feasibility and received environmental permitting to build a large autoclave at Yanacocha and will possibly make a decision in the first half of this year about how they go forward."

New exploration blood is present via Chakana Copper (Soledad), Hannan Metals (San Martin), Camino Metals (Los Chapitos) and C3 Mining (Jasperoide). 2020 work was severely restricted by the government's COVID-19 shutdown.

Newco Element 29 is looking to drill at its Elida porphyry copper-molybdenum-silver project once it completes its public transaction. However, Peru's growing production pedigree doesn't mean drilling permitting timelines are fast.

"It is a little bit complicated and it takes time, expense and expertise to do. You can't just pull up and drill really quickly. It took us over three years to get drill permits for the northern part of Antakori," said Black.

Ecuador

With Peru faltering, Ecuador has increasingly taken the copper exploration spotlight in recent years.

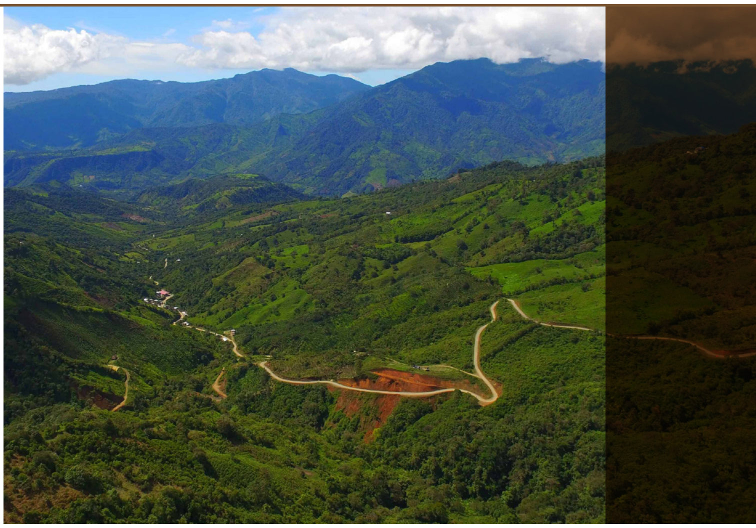
The 2013 Alpala discovery by SolGold at Cascabel reinvigorated interest, leading to BHP and Newcrest Mining investing in the company, while drawing Anglo American, Fortescue, Hancock and others to explore there. Ecuador also received a boost when Ecuacorriente's 95,000tpy Mirador deposit, the country's first large-scale copper mine, went into production in 2020.

More recently, Solaris Resources entered the fray to continue exploring the Warintza deposit, which was discovered by the legendary porphyry whisperer David Lowell. The company hit intercepts of about 1km of almost 1% copper equivalent from surface at Warintza Central within a cluster of several similar-sized targets.

The emergence of Solaris has stolen some of Cascabel's limelight: looking equally promising yet closer to surface and – as it was put together by Richard Warke's Augusta Group – without the corporate shenanigans that have exasperated SolGold observers.

Solaris has a 40,000m drill programme underway on Warintza Central off about 1km of strike length down to 1km depth and across 450m, so about a 1.35Bt volume.

"We are funded well beyond drilling off Warintza Central, which shows the confidence in our view that it this is part of a much larger cluster of porphyries in this 5km by 5km belt," president and CEO Daniel Earle told *Mining Journal*.



Eyes have been on SolGold's Alpala for years, and the market is eagerly awaiting a pre-feasibility study. Originally due in late 2020, it was again delayed in February until late 2021 to do more optimisation work.

The 2019 PEA considered four production scenarios that had up to a 66-year mine life and pre-production capital expenditure of $2.4-2.8 billion. There were expectations for corporate fireworks towards the end of 2020 when BHP's standstill agreement with SolGold came to an end. Howver, instead CEO Nick Mather only narrowly kept his board seat at the AGM, leading him to subsequently resign after 13 years in the role.

Many shareholders were disappointed with the 2020 $100 million royalty financing deal that Mather made with Franco-Nevada, believing it left the company a less attractive takeover target.

Newcrest withdrew its board member because it disagreed with the direction Mather was taking the company. Exploration in Ecuador is advancing, although the government has been careful not to allow a free-for-all.

Concessions are awarded during certain windows via a Swiss auction system. The last auction was in 2017 and another is due this year, although it will depend upon the results of the current presidential elections. SolGold took advantage of its early presence to be one of the winners during the last round, picking up concessions throughout the country.

Cornerstone Capital Resources, a 15% partner in Cascabel, and Aurania Resources, run by Fruta del Norte Discoverer Dr Keith Barron, are also exploring for copper, while Lumina Gold's Cangrejos is at PEA stage.

Continued on page 26

Solaris Resources on winning streak in Ecuador

Aerial view of the Warintza Project, Ecuador

Equinox spin-off making a name of its own through the growing Warintza project

With the management of the Augusta Group, which has an unrivalled track-record of value creation in exploration and development within the mining sector, totalling over $4.5 billion in exit transactions in the past decade, Solaris Resources is emerging as a force to be reckoned with as it pushes ahead with an expanded drilling programme at its flagship Warintza copper project in Ecuador.

Spun out of Equinox Gold, the company has been on a winning streak since listing in Toronto in July – and the shares are up a mouth-watering 360% in the last eight months. Solaris graduated from the TSX-V to a full listing in Toronto on February 9 and is flush with cash after closing on a private placement worth more than C$80 million.

That's more than enough funding to complete an ambitious exploration programme at Warintza and reach preliminary-economic-assessment stage by the end of this year, or early 2022.

Several important disclosures have excited the market recently: November's results from drilling at Warintza Central that included 1,004m at 0.71% CuEq from surface, nicely dovetailing with similarly positive results in the target area in September. Then on February 16, the company announced a new discovery at Warintza West, where maiden drilling and the first detailed geophysical survey of the project revealed a more extensive porphyry system than previously understood. The first hole drilled at West marked a new discovery with results of 798m grading 0.31% CuEq with the entire interval residing outside of the high-conductivity anomaly that corresponds to high-grades at Central.

CEO Daniel Earle said he had his foot "on the accelerator" as he and the board authorised a larger drilling programme across the whole Warintza project. The programme will use 12 rigs instead of six – one of the largest drill programmes on the continent. The increased drill programme would allow for further testing of the mineral continuity of the property's known zones, Warintza Central and Warintza West, while simultaneously testing the discovery potential at Warintza South and Warintza East targets, all within close proximity to Warintza Central.

Warintza Central has been the priority up to now and work will continue there for several more months, alongside drilling elsewhere. Solaris is looking to unveil a measured and indicated resource estimate for Warintza in 2021, a year expected to demonstrate growth potential throughout the project.

The plan is to drill at least 40,000 metres at Warintza Central, an expansion from the historical 7,000m that trails back to the early 2000s when the first discovery was made by legendary geologist and explorer David Lowell.

Lowell is probably best known for co-authoring the Lowell-Guilbert Model, where he used the model to discover some of the most profitable mineral finds in the history of mining, such as La Escondida in Chile, the largest copper producer and deposit ever discovered to this day.

Solaris is also on the look-out for significant gold discoveries at Warintza and drilling will soon to be underway at the Caya gold anomaly, one of three multi-km scale gold anomalies identified northeast of Warintza Central.

Earle said the plan this year was to confirm where there was the most potential before focusing on an area "where we want to do the most work, and before we move onto economic and engineering studies".

Warintza, he said, showed all the signs of being a world-class property, every bit as promising as flagship copper discoveries elsewhere in the world, such as Oyu Tolgoi in Mongolia. Earle became CEO in 2019, after making a name for himself as a Bay Street analyst known for making canny calls on exploration and development projects such as Ventana Gold.

"Just looking at Warintza Central, there's potential here for a large, high-grade open pit with the grade starting right from surface, with a very low waste-to-ore strip ratio, and access to primary infrastructure, including renewable power and abundant fresh water - critical for modern copper projects."

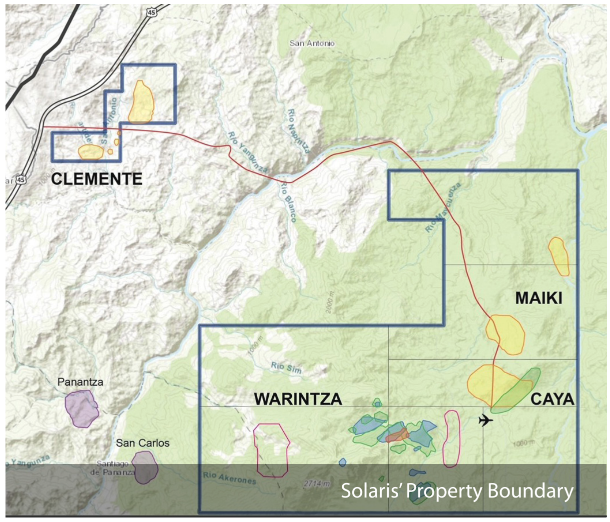
"This is almost totally unique in the industry today, where you won't find many other projects that are drilling holes over a kilometre stretch with high-grade copper mineralisation right from surface."

Earle reckoned 40,000 metres testing a 1.35 billion ton volume would be drilled in the first half with a drill-spacing sufficient for an indicated category resource at Warintza Central. That would be sufficient for a detailed resource estimate, mine plan and the basis for a PEA and subsequent feasibility study.

Solaris has recently brought in former Ivanhoe executive, Chad Wolahan, to deliver an engineering and economic assessment for Warintza. At Ivanhoe, Wolahan was responsible for project planning and management of technical programmes supporting the advancement of the Democratic Republic of the Congo's Kakula project from PEA through to feasibility.

A factor behind Solaris's growing popularity is that it is managed by the Augusta Group. Augusta was founded by well-known mining executive Richard Warke – Solaris' executive chairman – and specialises in exploration and development-stage projects, most recently growing and eventually selling Arizona Mining for C$2.1 billion in 2018.

"Having experience and knowledge about how to manage these early-stage projects is a critical feature of being part of



the group, and access to capital comes along with that," said Earle.

Solaris is about more than Warintza, however. The company has showcased discovery potential on the grass-roots Tamarugo project in Chile and the Capricho and Paco Orco projects in Peru. And it has exposure to the Ricardo project in Chile via a joint venture and farm-out agreement with Freeport-McMoRan.

Additionally, it has significant leverage to increasing copper prices through a 60% interest in the development-stage La Verde joint-venture project with Teck Resources in Mexico.

To round things off, the copper market is on a tear, amid hope for a strong economic recovery, and with green policy agendas at the heart of spending plans around the globe.

Solaris Resources – at a glance

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Josemaria copper-gold project is ready for development

Josemaria Resources' Argentina project set to lead the pack

With the copper price coming alive and a new cycle taking off, Josemaria Resources is one of the best-positioned junior explorers to benefit from rising demand as it advances its eponymously named copper-gold-silver project in San Juan, Argentina, towards a construction decision.

A 2020 feasibility study detailed an openpit operation to feed a conventional process plant at 150,000 tonnes per day over a 19-year mine life, with average annual metal production of 136,000 tonnes of copper, 231,000 ounces of gold and 1.2Moz of silver at a life-of-mine C1 cash cost of $1.55/lb copper equivalent following an initial capital cost of US$3.1 billion.

And as a new copper cycle gets underway, potential first production in 2026 means Josemaria has a good chance of being one of the first new development projects into production. The project would yield an after tax net present value (NPV) of US$1.53 billion at an 8% discount rate, a 15.4% internal rate of return (IRR) and 3.8-year payback period at metal prices of $3 per pound copper, $1,500/oz gold and $18/oz silver.

Currently, the copper price is more than 20% higher than that, at $3.70/lb, and beyond the $3.50/lb widely seen as the minimum incentive price to bring new production on stream.

"Every 10% increase in the copper price adds $500 million in NPV to the project," said Adam Lundin, Josemaria Resources president and CEO.

Josemaria hosts a proven and probable mineral reserve of 1 billion tonnes grading 0.30% copper, 0.22 grams per tonne gold and 0.94g/t silver containing 6.7Blb of copper, 7Moz of gold and 30.7Moz of silver.

The process plant will use a three-line conventional semi-autogenous ball-mill crushing circuit with the operation to be built via an engineering, procurement, construction, and management contract. Life-of-mine average recoveries of 85.2% copper, 62.6% gold and 72% silver, producing clean, precious-metal-rich concentrate, with 27% copper content and no significant penalty elements.

The mine design incorporates technology including autonomous truck and production drill fleets and optionality to incorporate green energy. Key feasibility metrics are the $20,000 per tonne of installed capacity and a capital intensity of $16,700 per pound of copper-equivalent.

"These are very big systems. What we have to do now is build a plant and then we will be mining for the next 100 years.

The vision is to build Josemaria and then other deposits in the area can come in," said Adam Lundin, referring to the major Andes parallel structure that cuts across the region and is one of the biggest alteration zones of this type in the Andes.

The Lundin Group has covered most of this through Josemaria Resources and sister companies Filo Mining and NGEX Minerals.

Site geography at Josemaria lends itself to developing an efficient operation as it will have gravity on its side. Mining is due to start from the high-grade supergene cap at the top of the hill. The ore will be trucked to two primary crushers, and then, once crushed, conveyed 2km to a 60,000t coarse stockpile. Material from the coarse stockpile will continue to move downhill to the 150,000tpd plant, which uses semi-autogenous grinding mills, followed by conventional ball-mill grinding and sulphide flotation.

Concentrate logistics will utilise truck and rail transport from site to an export port in Rosario, Argentina.

Josemaria Resources submitted an environmental impact statement in late February and guides that the approval process may take about 12 months. Meanwhile, the company aims to negotiate a tax-stability agreement with provincial and federal authorities to further de-risk the project.

"This year is about getting into the permitting process. The big win I anticipate is negotiating a tax-stability agreement with the government in order to have a meaningful, ready-to-go copper project, which I think will take us to the top of the table of undeveloped projects globally," said Lundin.

The Lundin family name has a long-established pedigree with copper in Argentina, with Adam's father Lukas finding both the Alumbrera and Veladero deposits in the past century through his companies International Musto and Argentina Gold.

Adam Lundin and the Josemaria Resources team will also be able to call on the experience of fellow Lundin company

Alfredo Vitaller, General Manager, Josemaria, presents Governor Sergio Uñac, San Juan, Argentina with the Environmental Social Impact Assessment in February 2021

Lundin Gold, which negotiated a tax-stability agreement with the government of Ecuador for the Fruta del Norte gold project, particularly as Ron Hochstein, president and CEO of Lundin Gold is a director, of Josemaria Resources.

Negotiating a tax-stability agreement will also help the company's plans to finance the $3.1 billion, which given the precious metals content and demand for copper concentrates, means several sources of capital are available, including precious metals streaming.

"This gives us a lot of flexibility to bring in one of the big streaming or royalty companies. 230,000oz of gold spilt in half and sold forward would bring in a lot of money. We own 100% of the project, so we could also look to bring in a partner for 30%, so we could be above $2 billion quickly," said Adam Lundin.

Josemaria Resources – at a glance

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Major Shareholders
Lundin family

Continued from page 21

"Operational security remains the biggest challenge in Colombia and the government certainly cannot make any guarantees in that

Peru

Peru was perhaps the country that gained most during the last copper cycle, as its annual production rate grew to about 2Mtpa.

After two years in which no new mine builds started, Peru will see construction of the $140 million Marcona tailings copper and iron ore project in 2021.

The country has Anglo American's $5.3 billion Quellaveco project and Minsur's Mina Justa under development, but apart from these its pipeline has dried up considerably.

Southern Copper's Tia Maria project in Moquegua is ready to go, but stalled due to unresolved social conflict.

Teck's Zafranal project in Arequipa is shelved while the owner looks to sell, viewing its QB2 and QB3 projects in Chile as more attractive.

Candente Copper's Canariaco Norte project has been at feasibility stage for almost a decade, but has struggled to fund ongoing work – even though Fortescue Metals Group

Chile

Copper production in Chile continued despite the COVID-19 pandemic, as operators kept the red metal flowing. State copper agency Cochilco forecasts production will grow 22.6% through 2031 to 7.1Mt, peaking at 7.35Mt in 2028.

Chile has various copper expansion projects underway, including: Teck's QB2, due on stream at the end of 2022; Antofagasta Minerals' Los Pelambres; and various projects owned by state copper company Codelco.

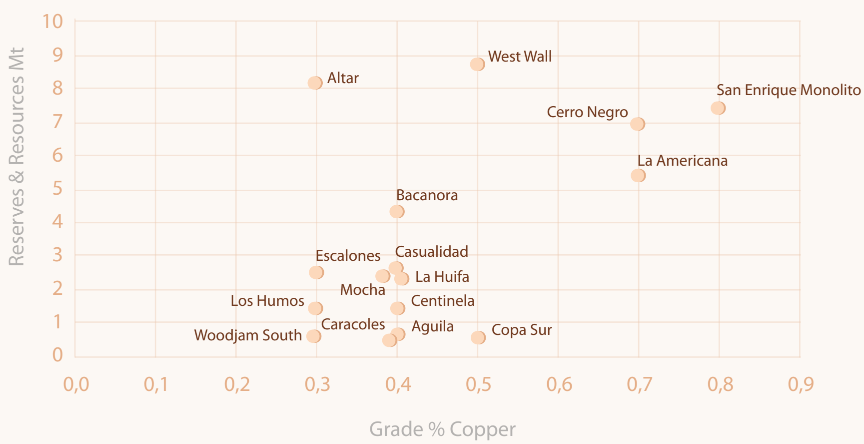
These are brownfield expansions rather than greenfield developments, many of which will use plant supersizing to compensate for declining grades. Capstone Mining's Santo Domingo project is a rare example of a greenfield project.

Also in the Copiapo region, Los Andes Copper is advancing Vizcachitas to PFS, while Hot Chili's Productora has a PFS for an 11-year mine life with average annual output of 66,000t and 25,000oz of gold over the first eight years.

NGex Minerals' Los Helados copper-gold-silver deposit is drilled out, with an indicated resource of 17.6Blb of copper, 10.1Moz of gold, and 92.5Moz of silver. The project is essentially waiting for higher prices and someone with a chequebook.

Development in Chile is becoming more challenging. Miners' access to continental water is being turned-off due to increasing scarcity, drought, environmental impacts and competition from communities, with all new developments and expansions effectively having to incorporate seawater or wastewater usage. The power costs of operating desalination plants and pumping water into the high Andes is forcing companies to become decarbonisation champions

Jnr Americas projects by resources/reserves: Copper only



Source : S&P Global

and seek power from (cheaper) renewable sources, including building their own solar and wind farms.

Chile lacks meaningful greenfield exploration due to the perennial issue of access, as ground in the most prospective regions is essentially squatted at low cost by a handful of large miners.

Majors account for 84% of exploration budgets, according to Cochilco, mainly on brownfields exploration. Cochilco, using S&P Global data, said some $458 million was budgeted for exploration in Chile in 2020, with 75% of funds for copper. Spend was dominated by large producers: Antofagasta Minerals (22%), Anglo American (17%) and Codelco (9%). Junior explorers accounted for just 6% of the total.

Due to COVID-19, the 2020 budget was some $200 million down on the $650 million spent in 2019.

"The weakness in Chile is the lack of grassroots exploration. A reform to put more vitality into the exploration process was tried, but is it difficult to modify things when there is a set-up of established, important economic interests," Plus Mining's Juan Carlos Guajardo told *Mining Journal*.

With exceptions such as Marimaca Copper's eponymously named project – which is almost within sight of Antofagasta airport – and Mirasol Resources' Nandi project 30km northwest of Escondida, junior explorers have to content themselves with the third region around Copiapo.

Change is coming to Chile's mining sector through the constitutional reform process as the populace pushes for greater wealth distribution, and greater protection of water sources and the environment. This Sword of Damocles sees miners accelerate development projects to get them completed before changes are made, while earlier-stage projects move into a holding pattern.

"Change is coming to Chile's mining sector through the constitutional reform process as the populace pushes for greater wealth distribution and greater protection of water sources and the environment"

"Advanced projects are looking to accelerate to advance as much as they can to benefit from high prices. Projects at PEA, PFS and even feasibility are moving into wait and see more," said Guajardo.

Despite this, Guajardo sees an uptick in interest from foreign exploration companies looking to start exploration in Chile.

"I don't think foreign companies understand the dimension of the depth of the changes coming in Chile, but maybe the fact that the investment map around the world is very difficult means people observe convulsion in Chile and don't distinguish it from convulsion in other countries. Chile has a track record and infrastructure and, so it seems, is still a place where many people believe you can make a bet," he said.

Colombia

Colombia is set to occupy more space on the copper exploration radar. The mining regulator planned to auction copper exploration areas in Cesar in February, an area which has seen little systematic exploration, and where the main exploration presence has been Max Resource, which believes it has a Kupferschiefer deposit, although it has yet to undertake drilling.

The timing could not be better as Glencore's Colombian thermal coal subsidiary Prodeco announced in February it will return its mining contracts as it exits the business.

Continued on page 32

Marimaca timing its run to meet resurgent demand for copper

Low-cost project ready to the make the most of market demand

Copper projects are in the spotlight amid growing forecasts of a severe supply crunch for the king of base metals. One of the projects currently in development is Marimaca Copper's Marimaca project in northern Chile, which president Hayden Locke says is uniquely positioned to meet resurgent demand for copper.

The company's flagship Marimaca oxide deposit boasts a resource of 113 million tonnes in the measured, indicated and inferred categories, with an average grade of 0.6% total copper, according to a December 2019 mineral resource update, which saw a 100% increase over the maiden estimate from 2018.

Better yet, according to Locke, are the results of an August 2020 Preliminary Economic Assessment, which put the Marimaca project firmly in the lowest quartile of copper projects in terms of capital intensity and operating costs.

The PEA showed a pre-production capital cost of $285 million, or $7,125/tonne of copper production capacity, 46% below the industry weighted average and 23% below the threshold for the bottom quartile.

It estimated life-of-mine average all-in-sustaining costs of $1.29/lb of copper, putting Marimaca in the lowest 15% of the AISC curve (based on Q3 2020 data from Wood Mackenzie).

Other highlights of the PEA included a post-tax net present value of $524 million and post-tax internal rate of return of 33.5%. The company is targeting completion of a feasibility study and all permitting in 2022, which would put in on track to start production in 2024.

"The vast majority of copper discoveries are very large scale and have high development capex and long lead development times.

This project has a very low capital cost, very short development time, and very low execution risk from a financing perspective and from a construction and operational aspect," Locke says.

"The reason is that it's a simple openpit mine, whereas a lot of new discoveries now are getting deeper and deeper underground at lower and lower grades, meaning they have to move more tonnes.

"Marimaca is relatively high grade for a low-strip open pit. It involves simple processing, so has a much lower capital intensity than a typical big sulphide copper project."

Another obvious benefit is the location in northern Chile, the highest-ranked Latin American jurisdiction in the Fraser Institute Annual Survey of Mining Companies 2020 and a country well-known for being by far the world's largest producer of copper.

Locke, who spent a large part of the last decade with junior companies in Africa – among other roles, he was CEO of Moroccan-focused potash developer Emmerson plc and had an executive role at West Africa-focused Papillon Resources before that company was bought by B2Gold – says having a project in Chile is "amazing".

Adding to the low jurisdictional risk is the fact that the project is situated in the low Andes, only about 1,000m above sea level, close to roads and powerlines, and within 60km of two port cities (Antofagasta and Mejillones) boasting large pools of skilled workers.

Marimaca also plans to take advantage of a seawater pipeline running 7km to the north of the deposit.

"That means we're not going to be tapping any freshwater aquifers that might be used for drinking.

"We're not going to risk polluting these aquifers by drilling down into them. This will eliminate one huge risk associated with mining in this part of the world."

Marimaca was discovered in 2016 and had the honour of being the only major greenfield copper discovery anywhere in the world between 2015 to 2019, according to S&P Global Market Intelligence. Despite this achievement, Locke says the Marimaca project's "only weakness" is its scale.

However, he believes that there are more Marimaca-style discoveries to come, noting that Sergio Rivera – the former director of Codelco's exploration activities in Chile who made the Marimaca discovery and is now VP of exploration for Marimaca Copper – "thinks we're potentially on to a new copper district in Chile".

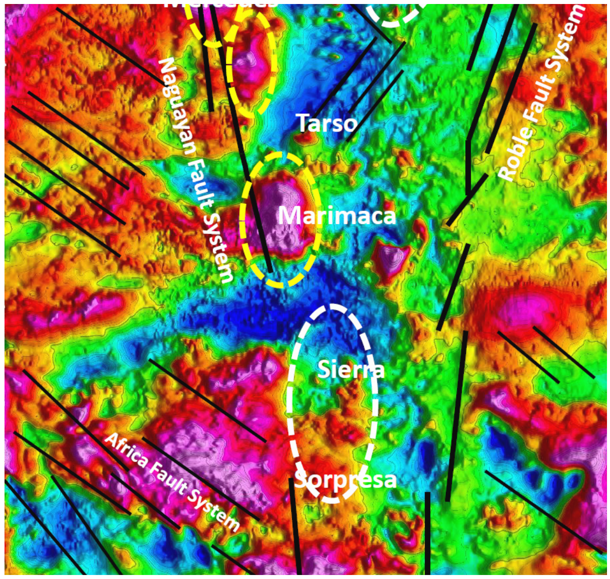
The Marimaca deposit is a new type of copper deposit in this part of northern Chile, and the breakthrough was made by challenging the consensus and generally accepted wisdom of the geological potential in the region, according to Locke.

He says his company has an amazing opportunity to apply the lessons learned from the Marimaca discovery to the surrounding area.

"Now we control this whole belt that's never been explored, and we intend to go out and drill the targets we have identified pretty aggressively," he says.

A recent drone-mounted high-resolution magnetic survey of Marimaca Copper's licence area identified five large-scale anomalies believed to be potential Marimaca-style deposits.

Follow-up work involving surface geochemical sampling and reconnaissance mapping at two of these targets – Cindy and Mercedes – delivered encouraging results. Geochemical sampling at Cindy identified a copper anomaly extending over 1km of strike with grades as high as 2.9% Cu. Sampling at Mercedes identified another large anomaly with grades as high as 0.6% Cu.



Marimaca Copper is fully financed to conduct the drilling campaign, thanks to the completion of a C$28.98 million ($23 million) equity financing in December 2020 and a follow-up placement of just over C$30 million to a strategic, long-term, investor in February 2021.

Drill rigs were mobilised in January 2021, with the plan being to drill at the Cindy, Mercedes and Llanos anomalies and to test for extensions at depth at the Marimaca deposit, where there is copper sulphide potential below the already defined oxide deposit.

Locke says results from the Marimaca drilling campaign are expected by the end of Q1 and results from the three new targets are expected by the end of Q2.

Marimaca Copper – at a glance

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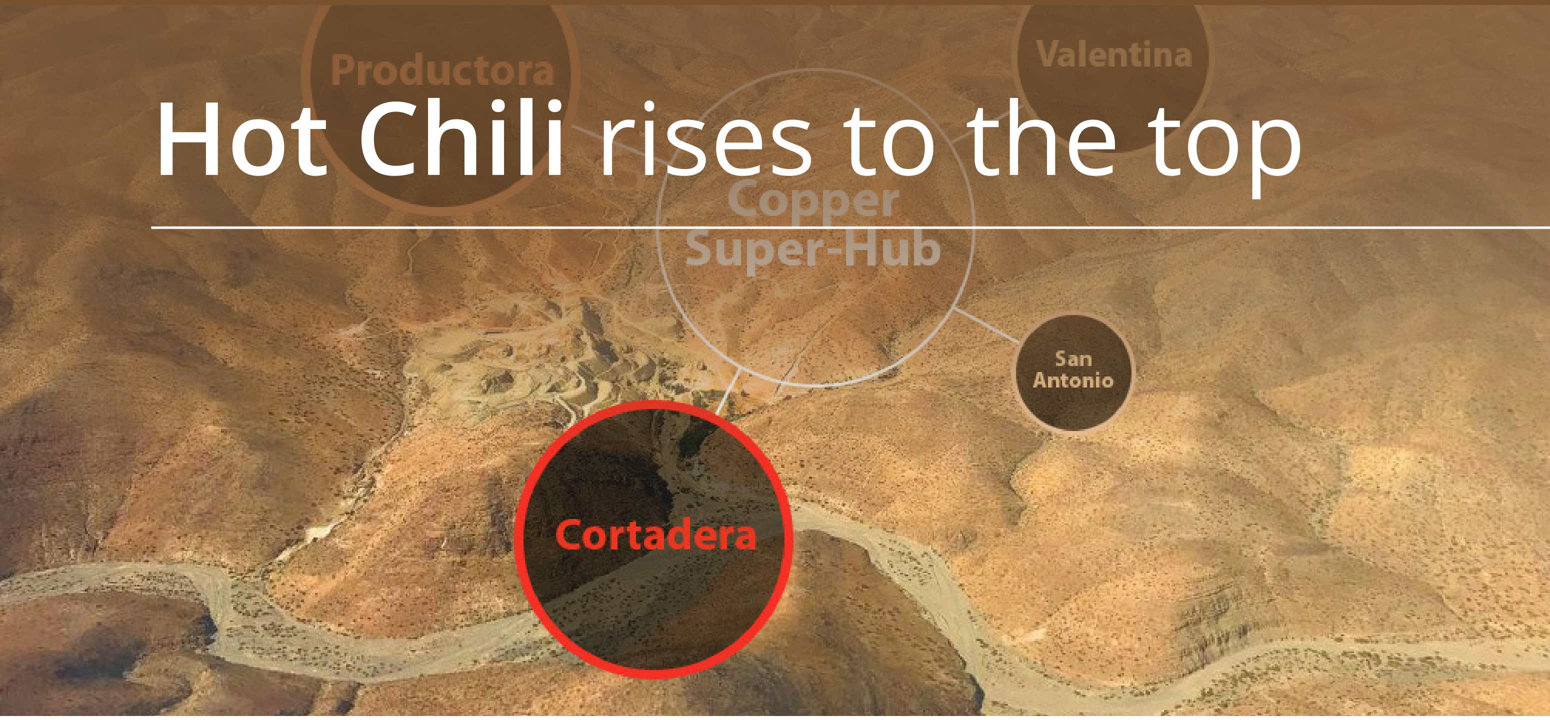
Hot Chili rises to the top



Chile-focused copper junior aggressively drilling to expand one of world's best new copper finds

Size is not everything in the mining business, but scale is something North American copper investors certainly appreciate. Back in 2011, Barrick Gold paid C$7.3 billion for Equinox Resources and its copper-gold mines in Zambia and Saudi Arabia after the Australian company listed in Toronto. Five years later, TSX-listed Ivanhoe Mines added the fabulous Kakula copper discovery to its 2008 find at Kamoa in the DRC and now has a market value around C$9.4 billion.

Promising Toronto-listed Ecuador copper explorer Solaris Resources is in the early stages of a new, big drilling campaign at Warintza, but has already seen its market value climb past C$700 million. And Newmont Mining has just agreed to pay more than C$450 million for GT Gold (TSXV: GTT) and its circa-3Mlb indicated copper-equivalent resource at Tatogga (average 0.47% Cu-eq resource grade) in British Columbia. With other recent healthy copperco funding and the red metal itself selling for more than US$4/pound, deal momentum in the space is clearly escalating. All of which means there is likely only one direction ASX-listed Hot Chili can go from here. That's north.

Sitting on one of two major global copper discoveries of the past five years or so, Hot Chili is fully funded to complete an aggressive drilling programme this year aimed at extending the maiden JORC 451 million tonnes grading 0.46% copper-equivalent (1.7Mt of copper and 1.9Moz of gold) reported for Cortadera in northern Chile last October. That's up with Rio Tinto's maiden 503Mt at 0.45% Cu-eq for Winu in Western Australia in a list compiled by S&P Global Market Intelligence, which highlights the dearth of major new copper finds around the world over the past decade. Hot Chili also has the Productora project within its Costa Fuego hub – 50km from the Chilean coast and port at Los Losas – which has a JORC resource of 273Mt grading 0.52% Cu-eq. All up, the company is sitting on circa 2.9 million tonnes of copper, 2.7Moz of gold, 9.9Moz of silver and 64,000t of molybdenum, in what is – compared with similar projects – the formative stage of the exploration cycle for Cortadera and wider Costa Fuego area.

Unlike Rio and Winu, and less advanced developers in the Americas, Hot Chili has battled to get market recognition in Australia of the progress made in Chile, where it has been working for more than a decade, but only two years ago added Cortadera to its portfolio. Since landing the deal to acquire Cortadera, it has featured regularly in compilations of the best drill intercepts from multi-metal programmes around the globe, with some stunning, 500-950m-wide mineralised diamond core results that have shown the Cortadera porphyry copper-gold deposit sequence's scale and growing metal endowment from near-surface. Already, Cortadera's scale makes Hot Chili the standout copper-resource holder on the ASX, and, according to the company's MD Christian Easterday, "one of the few low-altitude, no-arsenic, tier-one locations, infrastructure-ready major copper resources" worldwide – certainly one owned by a A$135 million-market-cap junior.

"And this is an emerging project," says Easterday. "Not one that has been in the global pipeline for some time that is stalled. The important thing to look at with the global copper development pipeline is the cost, technical and other factors slowing the progress of some major projects. In that context, it's important to look at some of the key attributes of Costa Fuego. It's at 800-1,000m elevation, near the coast, on the Pan American Highway and near established infrastructure in northern Chile; it's not a 3,000-4,000m altitude project. It hasn't got 300ppm arsenic sitting in the metallurgy. We can produce a clean copper-gold concentrate."

Compared with the nearest emerging deposit of similar scale, Winu, Costa Fuego continues to look good.

"We're certainly sitting in a very good pedigree," Easterday says. "I believe both discoveries have got a long way to go.

"At this stage the comparison is very similar on a grade basis, as bulk tonnage copper discoveries. But when you look at the detail clearly, Cortadera is coming out head and shoulders above Winu. We don't have 90m of desert to remove to get to the deposit … [which has] a very dramatic impact on pre-strip capital requirements; all of our deposits go through to surface and have very low strip ratios. We're not sitting 350km from Port Hedland. Our infrastructure advantage that we have in relation to Winu is really night and day in comparison. And in addition we believe the combined approach of joining Cortadera and [currently producing] Productora together, and other assets within the Costa Fuego grouping, offers us a significant amount of flexibility in how we stage development of this large project so that we can maximise value and minimise all of the risks associated with that."

Hot Chili's planned 40,000m of drilling this year, including a number of deep holes to infill and extend the 104Mt grading 0.74%Cu-eq "high-grade core" at Cortadera, will double the amount of drilling done so far.

"Our aim this year is to elevate it to a top five to six project in the world," Easterday says. "We have quite a lot of treasury coming in this year [through Chile government tax refunds and in the money options, adding to last year's $25 million equity injection] to support a $20 million, very aggressive drilling programme on this. We're aiming to lift Cortadera into legitimate tier-one territory and become a titan of the copper sector … [to support a] blueprint for 100,000tpa copper project and 100,000ozpa gold producer.

In plain speak that's a project that will kick out US$800 million per annum of revenues and we're looking to position this as a 20-year project. These are very rare. We're already by far the largest ASX [listed] copper resource, and we're sitting in a league where this part of the copper space is dominated by the North Americans."

'Tier-one territory' means circa 5Mt of copper, or more.

"So we require another 2Mt of contained copper metal," says Easterday. "We're going to be shooting for that very aggressively, and what's really exciting for us this year is we have not started testing that depth component of Cortadera. This thing is open-ended in a lot of its lateral extents but, more importantly, when you have an over-1km vertical ore column that has a high-grade core the size that is evident in Cuerpo 3, we can grow this quite rapidly. We have not tested that magical zone at around 1,000m that made [SolGold's] Alpala and the Cascabel project what it is today. That's really where those fingers of that porphyry turned into a hand and … we've got all the indications that a similar thing may be possible at Cortadera. We will be putting a lot of money into six or seven or eight very deep holes underneath Cuerpo 2 and Cuerpo 3, and seeing if this discovery turns into something a lot, lot larger in a very short period of time."

Adding to the continuous stream of drill results set to flow from Cortadera this year, Hot Chili will keep investors informed about work at the exciting Santiago Z ground, which was recently picked up after mapping and soil geochemical work – completed in December and January – highlighted a 4km-long copper porphyry feature that's 5km from its "world class" Cortadera copper-gold discovery and features a molybdenum soil anomaly "more than twice the size and four times the tenor of Cortadera's soil molybdenum footprint".

Detailed mapping and geophysics is planned for the first half of 2021 in advance of first-pass drilling. Hot Chili picked up Santiago Z as part of its option agreement with a private Chilean landowner on the San Antonio high-grade copper mine 5km from Cortadera. With copper prices soaring, it's no surprise a North American dual listing for Hot Chili is on the radar for the second half of 2021.

Hot Chili – at a glance

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Major Shareholders
GS Group Australia PTY Ltd, HSBC Custody Nominees (Australia) Ltd, Citicorp Nominees PTY Ltd

Continued from page 27

Coal represents a substantial amount of Colombia's exports and there are indications that the partners of the nearby Cerrejon coal mine – Colombia's largest – are also looking to exit, presenting the government with a sudden gap in its financial planning. However, the plan is far from popular among explorers, who have spent years struggling with bureaucracy to advance their projects in the country.

"Shareholders have called me assuming the auction process will be similar to those held in Peru … but Colombia is only offering grassroots exploration projects and it is quite difficult to understand the point of all this," the CEO of a publicly-listed exploration company told *Mining Journal*.

"Operational security remains the biggest challenge in Colombia, and the government certainly cannot make any guarantees in that respect," the CEO added. "In fact, if it were to do so and only for those companies that were successful in the proposed auction process, it would unfairly prejudice those of us who have been patiently trying to advance our existing titles. I also find it hard to understand how the auction process is in any way 'objective' when the ANM will effectively decide which projects different participants get to see. This may be a can of worms."

Accelerating the development of its nascent copper sector could help alleviate that pain, although it will take years to build it to a scale where it can make a meaningful contribution to the national budget. It may accelerate efforts to put crucial pieces of the permitting process in place, specifically the subtraction of forest reserve areas for exploration. The environment ministry is working on a protocol for this, without guidance on potential timelines.

Colombia identified great copper potential in the Choco-Antioquia belt in the 1970s and 1980s, but bureaucratic issues, such as obtaining drilling permits within forest reserve areas, has stymied efforts.

Private company Minera Cobre de Colombia (MCC) has concessions over 4,700km^2, including most of the 200km-long Mande Batholith, which has remained unexplored for decades due to security and access issues. The flagship is Comita, a joint venture funded by Rio Tinto.

"There are at least six district-scale projects of about 15km by 20km, and within each of those we have clusters of porphyry copper targets, with known mineralisation, geochemical data, airborne geophysics and ground IP, indicating numerous porphyry centres," MCC president and CEO Jeff Toohey told Mining Journal. But he cannot drill it yet.

So Atico Mining continues as the country's sole producer from its El Roble VMS deposit in Choco. Atico has so far been unable to find more mineralised lenses, despite years of exploration, and is increasingly turning its attention to develop the La Plata VMS deposit it acquired in 2020 in Ecuador. Cordoba Minerals is advancing a PFS for its Alacran deposit in Cordoba, but has encountered intermittent community and security issues.

It is now scheduled for completion by year end.closer to copper and more banks have been knocking on my door," he told *Mining Journal*.

Copper plays green card in North America

Projects advancing, but challenges to development persist

The growing focus on decarbonisation and the need for copper for electrification and electric vehicles means mining promoters firmly believe their copper projects are aligned with society's goals, thus permitting new mine developments in Canada and the USA is increasingly possible.

Recently, the USA has seen the start-up of two modest mines: Nevada Copper's Pumpkin Hollow in Nevada; and Excelsior Mining's Gunnison deposit in Arizona.

Nevada Copper highlights the financial challenges new developers face, including debt renegotiations and emergency capital injections.

The company finally expects to reach steady-state production of about 5,000 tonnes per day in mid-2021.

Exploration interest has increased in Alaska, Nevada, Arizona and Minnesota, although organised social resistance has not faded, despite the promise of the greenest of green metals.

Such opposition is likely to extend project timelines.

In Alaska, Trilogy Metals has steadily advanced its Arctic project, having recently obtained federal permission to build the crucial Amblar District road. To the south, Northern Dynasty is appealing a decision by the US Army Corp of Engineers to withdraw its support of its controversial Pebble project.

In Minnesota, the Duluth Complex hosts significant copper potential. PolyMet's NorthMet openpit project has received all major state and federal permits for a $945 million phase-one, 32,000 tonne per day operation.

The Duluth Complex would produce about 1.2 billion pounds copper, 170Mlb nickel, 6.2Mlb cobalt and 1.6 million ounces of precious metals over 20 years.

Ore would be processed at a former steel plant. However, its permits are subject to an appeals process.

Meanwhile, Antofagasta Minerals is inching towards the permitting process for its Twin Metal's project.

Resistance elsewhere has seen Aquila Resources' Back Forty project in Michigan knocked back, while in Arizona, Hudbay Mining's Rosemont and Rio Tinto's Resolution projects face considerable community resistance.

The latter needs a controversial land swap, which Native American tribes say will destroy sites of cultural and religious value, an issue that has taken on a new context following the destruction of a 46,000-year-old aboriginal cave system by Rio in Australia in 2020.

Indeed, the UK Local Authority Pension Fund Forum has asked how the project will affect local communities in the wake of the Australia incident. Also in Arizona, Copper Fox Metals has a preliminary economic assessment using in-situ copper recovery for its Van Dyke project, outlining a 17-year mine life to produce 1.1Blb, with peak production of 85Mlb/y following a $290.5 million initial capital expenditure.

Its processing solution received a boost in January when the Florence town council decided it would not appeal an Aquifer Protection Permit recently granted to Taseko Mines for its in-situ recovery project nearby. Taseko is effectively providing Copper Fox a route to follow.

Canada

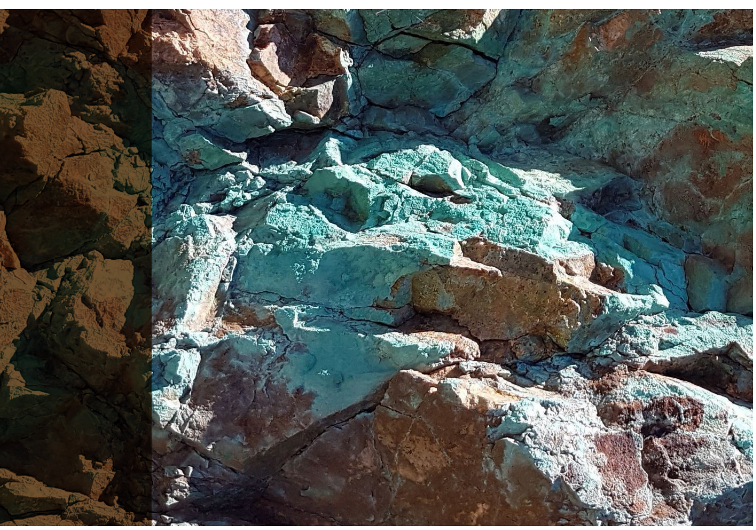
Copper exploration is also taking off in Canada following the successful restart of mining operations at Minto in Yukon, which was acquired by Pembridge Resources in 2019, and the success of Copper Mountain Mining's eponymously-named mine in British Columbia.

Copper Mountain has proposed a US$148 million mill expansion, to 65,000tpd, as part of a new mine-life plan estimated at 21 years. Total production is expected to be 2Blb of copper, 978,000oz of gold and 6.7Moz of silver.

"This mill-expansion study builds upon the growth projects that are already underway and illustrates the immense potential that the Copper Mountain mine provides.

" In two years we have more than doubled the mine life, grown the mine's productive capacity, increased net asset value and significantly decreased cash costs," said CEO Gil Clausen.

Copper Mountain highlights how companies seek to utilise BC's growing decarbonisation credentials, given that most of its grid power is hydroelectric. The company is piloting Komatsu's trolley-assist system in its pit, which others such as Northisle Copper and Gold may seek to replicate in their development.



"Exploration interest has increased in Alaska, Nevada, Arizona and Minnesota, although organised social resistance has not faded"

BC also enjoys considerable existing mining infrastructure, which could potentially be repurposed for new mining operations and provide for the possibility of a reduction in the size of disturbed areas, as well as cutting development costs.

Much will depend upon provincial authorities and First Nations lending support to negotiations between developers and the owners of the historical assets.

Northisle is hopeful of just such an outcome for its potential 75,000tpd North Island porphyry copper-gold project, including rehabilitating the existing deepsea port and repurposing the pit of BHP's former Island mine to deposit its tails.

"We think this is one of the most attractive copper-gold projects in Canada, as you can build this mine in an extremely sustainable fashion.

"We have access to the cleanest and, probably, cheapest power in the world.

"The mine site is 25km from the Island former mine owned by BHP, with infrastructure that can be repurposed for our mine," president and CEO Sam Lee told Mining Journal.

Also in BC, Copper Fox has a 25% carried interest in Shaft Creek, in partnership with Teck Resources, and is expecting completion of a PEA in the coming months for a 133,000tpd operation.

Libero Copper plans to spend $4 million on follow-up drilling at its Big Red project this year.

"We need more depth as with reverse circulation, we had four holes that were mineralised from top to bottom and returned 0.41% copper equivalent, higher than any openpit mine in BC," Libero's executive chair Ian Slater told *Mining Journal*.

Continued on page 37

Barksdale's North American exploration attracts the majors

In Arizona and Mexico, the company has a plan to achieve its goals

Luckily for Barksdale Resources, president and CEO Rick Trotman has a lot of plans in place to complete its goals in the coming years. In the Patagonia district of southern Arizona, OTCQX- and TSXV-listed Barksdale Resources has a growing portfolio of precious and base metals assets – including Sunnyside, San Antonio, and Four Metals – as well as its San Javier project further south in central Sonora, Mexico.

For Trotman, inking the original deal to obtain its Arizona projects was the spark that created Barksdale in its current form and led to new investment from Teck Resources and Osisko Gold Royalties, together comprising approximately a 20% shareholding in the company. Bringing in these two major shareholders was another defining moment for the company, which now has a $34 million market cap.

"These big majors understand deposits and they understand risk, and they were basically betting on us," Trotman said, adding that branching out into Mexico was the third defining moment for the company. "Obviously we've got lots more to come, but those are the ones that really changed the direction of where Barksdale is going."

Barksdale Resources plans to make the company more valuable by de-risking its projects and executing its game plan.

"We've really focused on the assets and building the right team, we have the right addresses and we're doing all the right things, so it's just a little bit of patience and a little bit of luck on the exploration results side of things," Trotman said. He added: "All of our shareholders love it when a plan comes to fruition."

According to Trotman, patience is the key to success.

"We're slowly consolidating districts and trying to build up long-term value, and we've had a number of different headwinds that pushed against us, such as permitting challenges, COVID, financing, all of these," Trotman said. But we've remained diligent, we've remained patient, and ultimately that will be the key to our success".

Barksdale Resources has witnessed its share of challenges in the past year, with three projects still in permitting delays for exploration drilling. The delays are partly due to the global pandemic, which has caused bottlenecks for logistics, personnel and permits.

"For us, the pandemic has really led to delays. We deal with governments and it has had an impact when it comes to permitting. There's also the logistics of getting people moved around, to work on different things, and obviously logistics have become a pain during COVID," Trotman said.

"Most of the issues that we've faced to date have been timing-related, adding delays here and there, but we think it will all start to free soon and return to a kind of steady state by summer.

"The big key moment for us coming soon is going to be breaking that dam and starting the drill that's turning. Then we can make some of those discoveries and really start highlighting why we think these projects are special," Trotman said.

Trotman expects the start of all three projects this year will provide all the momentum they need for future growth.

"That first permit comes through, we start drilling and that will add some sizzle to the market. On top of that we get the next permit, and it kind of snowballs and builds off of itself," Trotman said, adding that the results will bring more excitement.You can never gauge what the results are going to look like. Ultimately if they are what we think they could be, then people will get excited and we'll just keep that momentum going," Trotman said.

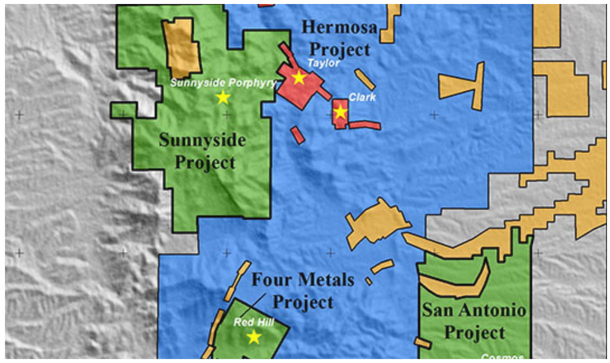
Trotman said the company has no plans for future deviation, and that it will focus on its core projects, maintain discipline and execute its plan.

"That's why people are investing in us," Trotman said. "We want to show the world that the projects we have are indeed of merit, that they are projects that can have big discoveries and those discoveries will obviously bring about significant financial reward for folks that invested in us early."

With copper prices at an 8-year-high, rising above $4 per ounce in mid-February, competition for assets in the copper porphyry market is also on the rise.

New players are entering the market and looking for projects and financing. Trotman said that while there may be additional competition for investors, there is a clear difference between early stage companies without cash flow and the established players, such as Barksdale Resources.

"Ultimately, raising money is the only way you can keep pushing forward, so that's key," Trotman said, adding that the increased competition is a positive. That's a nice tailwind to have, and what the big companies are looking for to kind of restock the shelves, so to speak".



Barksdale Resources is committed to increasing shareholder value by acquiring, exploring and de-risking high-quality precious and base metal projects in the Americas. The acquisition of the San Javier project in Mexico has opened new opportunities for copper and gold discovery in the region.

Holding multiple projects in the Patagonia region of Arizona, the company has access to several historical metal and silver mines, as well as three known copper-molybdenum-porphyry deposits. Having acquired over 12,000 acres of mineral rights in the region, including the prized Sunnyside project, there is no downside to the future growth of Barskdale Resources. In the copper porphyry market, there is no success without challenges and obstacles. For Trotman, the real success doesn't happen overnight, but through patience and strategic investment.

"What we are facing are very short-term challenges with pretty significant long-term upsides, so for the patient folks that are willing to give us a bit of time, I know they will be truly rewarded".

Barksdale Resources – at a glance

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Kodiak Copper: A new copper-gold discovery in Canada

High hopes for the companies expanded drill programme

TSXV-listed Kodiak Copper Corp is riding high this year following the discovery of high-grade copper porphyry mineralisation at its MPD project in south-central British Columbia in 2020. The company's market cap has increased exponentially and has been able to finance a larger programme for the future. Claudia Tornquist, president and CEO of Kodiak, said the porphyry discovery at their Canadian site, which came at the start of their discovery process, was a game changer.

Kodiak is not the first company to have explored the MPD site. In fact, it has been explored by a number of companies over the past 50 years. This all changed last year when Kodiak's founder and chairman, Chris Taylor, chose to take a different approach and drill deeper to over 800m in depth. This uncovered what appears to be a large, well-developed, multi-centred alkalic porphyry system with a footprint of over 10sq km.

The discovery also boosted the company's share price, leading to a $12.7 million private placement in October last year, and saw Teck Resources coming onboard as a major shareholder with an investment of $8 million for a 9.9% shareholding.

"It's a vote of confidence for our project, but also I think it's telling that majors really are looking for good copper exploration projects," Tornquist said. "We were a small, junior exploration company and now that we have made the discovery, we can finance a much larger programme, which is very exciting".

Kodiak has up to 30,000m of drilling planned and fully funded, as well as further geophysical and geochemical surveying, prospecting, and geotechnical studies. In 2021, the company plans to be drilling four or five times as much as last year and a number of targets will be its their MPD property.

"We will continue drilling at the Gate Zone, where we made the discovery, but we also have other targets on the property called Dillard and Dillard East," Tornquist said. She added that all the sites are characterised by large regional magnetic lows, extensive copper-in-soil anomalies and encouraging historical drilling. Kodiak Copper also holds the Mohave copper-molybdenum-silver porphyry project in Arizona, and the Kahuna diamond project in Nunavut, Canada. Both projects have shown potential to hold large-scale deposits. It will be a very busy, very news-rich year for the company, with hopefully many more discoveries," Tornquist said. "As far as exploration probability goes, we have a very good chance of being able to generate more good results this year and going forward".

Tornquist also acknowledged the recent rally in the copper market had played a role in the company's success, with prices rising above $4 in mid-February.

"You can make a great discovery, but if it's in the middle of a downturn, you might still get stuck because nobody is willing to finance your further work," Tornquist said. "Making a discovery in the upswing of the commodities cycle, that's where you want to be".

Kodiak Copper – at a glance

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Major Shareholders
Teck Resources, management and board

Continued from page 33

Taseko's Yellowhead has the potential to be one of the largest openpit copper mines in North America and would be a 90,000tpd copper mine with a 25-year mine life to produce a total of 4.4Blb of copper, 440,000oz of gold and 19Moz of silver following a C$1.3 billion development.

With many First Nations being pro-development and even the provincial government being supportive, companies are hopeful that progress can be made.

"The [New Democratic Party] government is quite practical as one of the biggest supporters of its party are the unions, so no one talks about banning mining, rather how to get these jobs online faster," said Slater.

In Yukon, Western Copper & Gold's Casino deposit is one of the largest globally. In 2020, the company updated its resource for the first time in a decade to 2.2Bt measured and indicated containing 7.4Blb of copper and 12.7Moz of gold, with another 3.3Blb and 6.6Moz of inferred resources. It also initiated a PEA to on the new resource.

A 2013 feasibility study stated Casino requires a capital outlay of about US$2.4 billion, which at the time meant the project was marginal and required higher copper and gold prices.

"Companies seek to utilise BC's growing decarbonisation credentials, given most of its grid power is hydroelectric"

Rio Tinto is to start drilling at the Janice Lake copper-silver project in Saskatchewan, on which it has an option for an 80% interest from Forum Energy Metals. Drilling will initially focus on the 2.8km-long Rafuse target.

Mexico is also a significant producer of copper via Grupo Mexico's Southern Copper, whose main construction project is the 35,000tpy El Pilar in Sonora.

Down the coast in Sinaola, Oroco Resources' Santo Tomas porphyry project aims to advance on environmental permitting, definition drilling and preliminary engineering studies this year.