



Resources

Stocks Down Under

🗨️ *Here's something to think about: How come you never see a headline like Psychic Wins Lottery?* 🗨️

- Jay Leno (b. 1950), American comedian and television host

LAKE RESOURCES

Cleaner lithium for an electric world

ZEOTECH

A cheaper process to obtain a valuable product

COPPER MOUNTAIN MINING

Mountains of shareholder value

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Stocks Down Under rating: ★★★★★

ASX: LKE
Market cap: A\$ 336M

52-week range: A\$0.03 / A\$0.475
Share price: A\$ 0.325

Many lithium producers talk a good talk about the necessity of 'clean' lithium, but Lake Resources is one non-mining producer spruiking a timely and environmentally friendly solution to lithium extraction. The company's strategy for getting lithium out of the brines at its flagship Kachi Lithium Project in Argentina is meant to address the need for high-quality lithium-ion batteries as much as lithium demand, and the latest product tests suggest that Lake Resources is on the right track.

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52-week range: A\$0.042 / A\$0.115
Share price: A\$ 0.088

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Share price chart



Source: Tradingview

Cleaner lithium in a timely manner

Lake Resources' share price received a boost on the news that the company has received excellent battery test results from its high purity (99.97%) lithium carbonate. The initial tests, which combined Lake's product with samples of NMC622 batteries, were performed by Novonix (ASX: NVX), a battery materials and technology company which we wrote about on 18 June 2020. The results have so far indicated that Lake's product has greater capacity retention and electromagnetic behaviour against commercial batteries, although Novonix will continue its testing program over the coming months.

While the company has four other lithium brine projects and one lithium pegmatite project within Argentina's 'lithium triangle', Lake has focused on developing the Kachi Lithium Project, a 690 square kilometre in the southern end of Catamarca Province. Kachi's November 2018 Prefeasibility Study outlined a maiden JORC resource of 4.4 million tonnes of contained lithium carbonate equivalent (LCE) with an exploration target of 8-17 million tonnes, making the project potentially one of the larger brine deposits out there. The PFS targets 25,000 tonnes per annum of LCE.

Still, now that the DFS is underway, there is room to improve on the current numbers, including the estimated 25-year mine life, EBITDA of US\$155m in the first year of production and the Net Present Value of US\$782m (8% discount) and Internal Rate of Return of 22%.

Lithium's perfect storm

As the keyword here is sustainability, Lake Resources believes it has a clean and sustainable technology path of its own, using a direct lithium extraction process provided by its US tech partner Lilac Solutions. In this extraction process, lithium-depleted brine is returned back to the environment after an ion exchange. A process like this has a few practical advantages, including higher grade recovery, reduced water and land usage and lower capital costs. But the main benefit is time: unlike solar evaporation, which can take up to 10-24 months, this method only takes a few hours. While the environmental advantage is noteworthy for a project like Kachi (which at 690 square kilometres is the size equivalent of 11 Manhattan Islands), the momentum building behind lithium's second wave suggests that Lake Resources is the real benefactor in this scenario.

Now that its better-than-expected battery test results have coincided with lithium's perfect storm, the company can boast about a cleaner, timelier and lower cost process, with Kachi at the lower end of the operating cost curve for brine/evaporation projects at US\$4,100 per tonne. Such lower costs, combined with the present PFS capital expenditure cost of US\$540m, allow Lake to look at the scalability of Kachi – that is, the amount of concentrate the project can process to meet the growing gigafactory demand. After China's lithium spot price spiked 40% in January, confidence is returning to the lithium sector because the upside, should such pricing be sustained, is very substantial. The European Commission on Critical Raw Materials forecasts 181 new battery factories by 2030, which will need 18 times the amount of lithium currently supplied. Lake and Lilac's innovative process is one more solution to the lithium wave we're still racing to meet.

Increasing capacity

The current DFS will run at the same time as the Environmental Impact Study (EIS), with the aim of establishing an on-site demonstration plant at the end of the year. The demo plant will be the first real test of Kachi's potential scalability, with Lake optimistic about a processing capacity up to 50,000 tonnes per annum as well as eventually expanding Kachi to meet the dream exploration target range, which could potentially overshadow Galaxy Resources' Sal de Vida Lithium Project. First, though, the company will be hoping that the DFS can improve the current metrics further before the real development starts.

If there is a concern for Lake, it might be Argentina's left-leaning President Alberto Fernandez's plans. Fernandez's growth plan for Argentina's struggling economy includes a 10-year plan to stimulate mining (with a focus on lithium) and boost exports – with the possible return of higher export taxes to address the country's debt and to stop profits going elsewhere. Before he was elected in 2019, Fernandez signalled that legislation would remain unchanged. But as he was part of the government that enacted the tax in the first place, it could have been an empty electoral promise.

Lake's progress is enviable in the lithium community, not just for its high-quality concentrate, but its commitment to environmental and social concerns – something lithium production still needs. The company still has a long way to go in both its engagement with Novonix and Lilac Solutions as well as funding. Lake Resources is currently pursuing financing options along with offtake sample agreements, with a view to finalising the DFS in the first quarter of 2022 and a 2024 construction start. For now, the company gets four stars for a productive start to 2021.

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Source: Tradingview

Okay, first things first. If you thought, like we initially did, that zeolite is just some low-value mineral you find in pet litter, you'd be mistaken. The zeolites are a group of about 60 aluminosilicate minerals (i.e. they are based on aluminium, silicon and oxygen) known primarily for their ability to take water from their surroundings and convert it to heat. The name 'zeolite' came from a Swedish chemist in the mid-18th century who tried to heat a zeolite mineral and observed it giving off large amounts of steam - the word 'zeo' means 'to boil' in Greek. This ability to absorb moisture, that is, get the water to stick to its surface, means zeolite is used industrially as a drying agent. Dishwashers these days are increasingly using zeolite to get the dishes dry using much less energy.

The world needs what Zeotech can make

Zeolite shows up in a lot of places. For example, in your detergent, where the ion exchange properties of zeolite help pull calcium and magnesium out of the water so that the detergent can do its cleaning duties. Or in a petrochemical refinery where the zeolites help catalyse various reactions. One particularly important market for zeolite is water purification. Zeolite can soak up the ammonia and heavy metals in water sources more efficiently than competing technologies.

Zeolite occurs naturally, but chemists have been synthesising it since the 1950s so as to fine-tune the structure for the desired properties. That has led to standard synthetic zeolite products such as Type A, Type X and Type Y. The synthetic zeolite market today is probably worth US\$5-6bn per annum.

Zeotech is the result of an April 2020 licensing deal where an ASX-listed company called Metalsearch exclusively licensed technology from the University of Queensland for zeolite synthesis. At UQ's School of Chemical Engineering, Associate Professor James Vaughan and Dr Marco Peng had figured out a way to obtain zeolite from kaolin and related clay minerals. Basically, the Vaughan-Peng Process involved heating up the clay to more than 500 degrees Celsius and then leaching out the zeolite with a sodium hydroxide solution. UQ patented the process in 2019 and the patent application published late last year (see WO/2020/243770). What Vaughan and Peng were able to show in the laboratory was that the heating part of their process required 70% less energy than the standard competing process and a production time after the heating that was four times faster.

A breakthrough in the Sunshine State

Metalsearch were interested in the Vaughan-Peng Process because the company had been working on a kaolin project at Abercorn, in the North Burnett region of Central Queensland about two hours' drive west of Bundaberg, since August 2019. Kaolin is valuable today primarily because it's the starting point for the production of High Purity Alumina, but the Vaughan-Peng Process would then allow the production of zeolite as well. In July 2020, Metalsearch was able to report that the Vaughan-Peng Process could produce zeolite from Abercorn kaolin.

On 21 October 2020, Metalsearch announced that Vaughan and Peng had also found a way to obtain zeolite from leached spodumene, a waste product from hard rock lithium processing. A week later, Metalsearch announced that it had successfully produced Zeolite Type A in the laboratory using its new process. That was the announcement that, as we noted above, made everyone realise that Metalsearch was onto something big. Zeolite Type A, also known as Linde Type A, was the first synthetic zeolite to be commercialised seventy years ago. It remains a staple of the zeolite market worth perhaps US\$2bn to US\$3bn a year.

Why investors are hot for the boiling mineral

To be able to make it now using leached spodumene was a big deal because there's going to be a lot of spodumene mined in the years ahead as the world's need for lithium increases markedly. All those owners of hard rock lithium projects reasonably stand to lower their production costs with another value-added product if this latest technology has legs. Metalsearch was so excited by the possibilities of its new zeolite production technologies that it changed its name to Zeotech in December 2020.

2021 is likely to be an exciting year for Zeotech. The company will be talking to various potential future zeolite customers. Its technology will move off the laboratory bench and into a pilot plant. It will be in a position to work on Abercorn as a dual HPA/zeolite project after an initial JORC resource was established in July 2020. Importantly, in early 2020 Zeotech committed to a research programme in the use of synthetic zeolite in carbon capture, which could open up billion-dollar markets in environmental management. With the company funded for the foreseeable future after a \$1.7m placement at 5 cents back in January, which added to a \$2.7m cash balance at that time, we think investor enthusiasm for the new kid on the zeolite block will grow ahead of the pilot plant commissioning. Four stars.

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Source: Tradingview

If you drive east from Vancouver on the Trans-Canada Highway but then turn right onto the Crowsnest Highway when you get to the town of Hope, BC, it'll take you only three hours or so to get to Princeton, BC. They've been mining copper at Princeton, in a region called Okanagan-Similkameen, on and off since the 1880s. When the Copper Mountain Mine last came back to life in 2011, after five years of work, the intention was to go for a while yet. The current reserve is 2.1 billion pounds, and resource is 4.4 billion pounds meaning at least two more decades of mine life.

A Hall of Fame company-maker

Copper Mountain's resurrection was partly what got Copper Mountain Mining founder Jim O'Rourke inducted into the Canadian Mining Hall of Fame. O'Rourke and his team believed that their resource size could ensure a cost base low enough to withstand numerous copper price cycles, and they were able to raise the C\$438m for CAPEX and attract Mitsubishi as a 25% development partner based on that vision. Last year's mine performance shows their foresight. The 77.6 million pounds of metal produced at Copper Mountain, which exceeded guidance, came at an All-In Cost (AIC) of only US\$1.90 a pound, while All-In Sustaining Costs (AISC) was US\$1.69. We'll elaborate on that below.

So, if copper went back to the darkest day of the last ten years, at under US\$2.00 a pound, the mine could still keep going. Mind you, as of December 2020, Copper Mountain Mining still had C\$80m in short-term debt and C\$129m in long-term debt, so that the bankers might be nervous at US\$2.00 a pound. But at today's US\$4.00 a pound or thereabouts, the debt is rapidly coming down.

What, we hear some of you asking, do All-In Costs of US\$1.90 matter? Isn't AISC all that counts? Yes and no. Costs associated with a mine expansion are regarded as 'non-sustaining', meaning that it's not CAPEX that keeps the mine going. This is a mine currently producing at 100 million pounds of copper equivalent (77.6 million pounds of copper, 29,000 ounces of gold and 390,000 ounces of silver), but where the owners have plans to grow significantly. That makes AIC more important than AISC right now. The good news here is that, while AIC was US\$1.90 in 2020, the company is guiding to about the same in 2021, at US\$1.80-2.00. This year 85 to 95 million pounds is the expected output, partly thanks to higher grades, but mainly due to a third ball mill's commissioning. That expansion increases capacity to 45,000 tonnes per day, with completion by the September 2021 quarter.

Onwards to 65,000 tonnes a day

It's what comes after Ball Mill 3 that will be most interesting. In late November 2020, Copper Mountain Mining reported a new Life of Mine plan that proposed an expansion to 65,000 tonnes a day, equating to an annual production of just under 140 million pounds copper equivalent. And that's where big money rolls into the pleasant valleys of the Okanagan and Similkameen rivers—using a discount rate of 8%, the Life of Mine plan allowed Copper Mountain Mining to estimate a new after-tax NPV for its flagship mine of just over a billion US dollars. That's right – roughly double the current market capitalisation, so long as copper averages \$3.15 a pound over 21 years, gold \$1,700 an ounce and silver \$22 an ounce. Oh, and the USD/CAD exchange rate has to average 1.3.

The capital cost for this largesse? Only US\$148m, not onerous when the 2020 operating cash flow was about US\$100m. When Copper Mountain reported its new Life of Mine plan, it was at pains to explain that the benefits of the 65,000-tonne expansion were in addition to the work that was already ongoing to reduce operating costs at the operation.

A second project virtually for free

In case you're wondering, political risk is not really an issue for this proposed expansion. British Columbia's government is centre-left right now, but the province still managed a high Investment Attractiveness score in this year's Annual Survey of Mining Companies from the Fraser Institute. So, unless something goes badly wrong for copper prices, we confidently predict that Copper Mountain's November 2020 plans will ultimately be realised.

The C6C market cap might look small on your ASX trading platform compared to the number we've used above because only 17 million shares are available on ASX. Copper Mountain Mining's primary listing is on the TSX, but it cross-listed on ASX in 2018 after acquiring Altona Mining for its Eva Copper Project near Mount Isa in Queensland. A May 2020 Feasibility Study of Eva gave it an after-tax NPV of US\$437m at an 8% discount rate. This project can potentially be a second Copper Mountain at about the same size as the mine in Canada is today.

However, at the current share price, you get this upside for free, with the market not even capitalising the full value of the November 2020 Copper Mountain Life of Mine plan. Copper Mountain stock may have re-rated smartly in 2020 and into 2021, but we still think it's four stars.

Pitt Street Research Pty Ltd

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