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Will the energy transition be the boost low grade nickel developers need to get

The energy transition could provide the demand boost that low grade nickel plays need. Plc: DNY59 via Getty Images.

July 3, 2023 | **Josh Chiat**

- **Nickel miners face a huge challenge finding the metal required to fuel the EV transition**
- **It could crack open the door to delivering large scale, low grade projects previously overlooked because of their capex and scale**
- **But does grade remain king when it comes to nickel sulphides?**

If assessments from Benchmark Mineral Intelligence are to be believed, within two decades we could need as many as 72 new nickel mines pumping out 42,000t of nickel every year to match demand from the battery and electric vehicle industry.

Let that sink in.

As a point of reference, we are talking about mines the size and scale of Glencore's Murrin Murrin, the largest standalone nickel operation in Australia, a low-grade laterite deposit and HPAL plant which took over 15 years to hit something resembling its 40,000tpa nameplate capacity.

By 2026 BloombergNEF estimates there will be 100 million EVs on the world's roads. By 2040 that could rise to 700 million. That's a whole lot of nickel, even if many of those cars will use nickel-less but lower range lithium-iron-phosphate battery types.

In the short term the nickel market has been depressed this year by weaker than expected demand — more from the construction steel side — from China, with LME metal prices falling by a third to around US$20,750/t. The other fact is a massive rise in supply from Indonesia, the world's biggest nickel producer.

If you're after new supply outside of Indonesian and Chinese control, something governments in North America and Europe are keen as beans on, then the development options are more limited.

It could well spur a rush of M & A, as RFC Ambrian noted earlier this year.

What sorts of nickel projects will be developed in the new boom though? Is grade still king, or will large, low grade deposits which until now have proven too costly and complex to develop receive a new lease of life as car manufacturers look for nickel every which way but up?

The old school

There have been a slew of low grade mines developed over the past 50 or so years, though they don't have the glitz and glamour of the narrow-veined high grade nickel fields of places like Kambalda, which has produced some 1.6Mt of nickel metal since its discovery sparked Australia's first modern mining boom in the 1960s.

Kambalda's ore has been typically mined at above 2% nickel and commonly well above 3%, though it is contained across multiple orebodies with production levels that are individually modest.

Most of the world's famous nickel sulphide fields are above the 1% mark, though grades have been declining.

Famous nickel sulphide fields like Thompson, Sudbury and Norilsk, all of which have stood the test of time, have grades in the 1-2% range. Vale's Voisey's Bay, only discovered in 1993, boasts reserves averaging 2.13% nickel.

But with major high grade discoveries like these the question is whether we can continue to rely on them to produce the nickel needed for the energy transition.

The largest growth centre for both steelmaking and battery grade nickel is and will continue to be Indonesia, enabled by the intensity of capital Chinese companies like Tsingshan and Huayou Cobalt, and international players like Brazil's Vale have thrown into the region since it stopped unrefined exports of its laterite ore in 2014.

But there is a push to grow nickel production in Western jurisdictions amid a wider trend towards resource nationalism, and a general acceptance that nickel production of all kinds needs to lift substantially.

According to RFC, production of class 1 nickel sulphate produced from nickel sulphides needs to rise by between 0.7-1.1Mt by just 2030 to satisfy demand from stainless steel, EVs and batteries.

A door creaks open

As that's been going on, big nickel hits have inspired share price runs for a number of ASX listed explorers.

In recent weeks we've seen Adavale Resources (ASX:ADD) surge on mineralisation (but not yet assays) from its Kabanga Jirani project near the large and high grade Kabanga deposit in Tanzania. Western Mines Group (ASX:WMG) surged in April on large, low grade hits from its Mulga Tank project in the Minigwal greenstone belt to the east of Kalgoorlie.

That's not to say anything of Chalice Mining (ASX:CHN), which turned from small cap to ASX 200 player virtually overnight in 2020 with the discovery of the Julimar nickel, copper and PGE deposit 70km north of Perth on the western margin of the Yilgarn Craton.

In Canada, Australia's **Aston Minerals (ASX:ASO)**, long associated with small cap investing identity Tolga Kumova, announced the delineation earlier this year of a resource totalling 1.044Bt at 0.27% nickel and 0.011% cobalt at Bardwell in Quebec, near the historic gold mining town of Timmins.

The question now is how can it actually be developed?

Tasked with working that out are new chairman Peter Breese and managing director Russell Bradford, best known for the integral role they played in global nickel miner LionOre before its top of the market US$6.4 billion sale to Russia's Norilsk in 2007.

Bradford told Stockhead the reality was high grade nickel discoveries were scarce and that low grade nickel miners had been able to learn to make their operations work.

"Where are these high grade deposits? There's not a lot around," he said.

"And where are these large scale high-grade deposits? There's certainly not a lot around.

"I read the other day day Appian pushed out the Santa Rita quarterly and they mined over 10.4Mt I think at 0.23% nickel, produced 4500t of nickel for the quarter at US$3.20/lb operating costs. (NB: The mine was sold subsequent to this interview for US$1.065b.)

"So it can be done, right?

If you've got grade, fantastic well done, but I've seen many operations with high grade, including ones that I've operated, that have not been efficient at all.

"So I think it's a function of the team, the people, the experience, all of those things. You can make a low grade deposit work just as well as a high grade deposit."

Team high grade

But it's worth noting many of these low grade, large scale nickel projects sitting in the portfolios of junior explorers and private equity vehicles often go decades without being developed.

Take PE firm Waterton Global's Dumont for example. It contains over a billion tonnes of reserves at a grade of just 0.27% nickel. Once fully operational the deposit would produce 50,000t of nickel and 2000t of cobalt metal a year.

But studies have been going on for well over a decade and the mine's capex is likely to run into the billions.

Some miners say grade remains king when it comes to nickel explorer.

Lunnon Metals (ASX:LM8) managing director Ed Ainscough, whose $160 million capped explorer is up over 100% since its IPO in 2021, said there was a clear development pathway for its high grade Kambalda ores.

Located just down the road from BHP's Nickel West Concentrator, Lunnon owns four historic mines once developed by WMC including Foster, Jan, Fisher and the OG Silver Lake shaft.

But it is new Kambalda style discoveries at Baker and Warren that have excited. A PFS on Baker outlined an ore reserve at classic Kambalda grades of 2.86% Ni for 17,500t, that would cost a little shy of $18 million to bring into production.

"I think grade is king," Ainscough said.

"Obviously, the other element of grade being beneficial is that the higher the grade, the smaller the volume you have to mine and move and I think, certainly customers and downstream customers, are very focused on the carbon footprint of the metal they're buying.

"You've got these concepts that people are going to start reporting on the energy intensity of the minerals that are in the end product.

"And then obviously, the higher the grade, the less tonnes you have to move to get the same amount of metal.

"So I think there's a kind of an emerging recognition that the grade is still king.

"And while you can see a lot of companies listed here and overseas generating very long widths of quite low grade mineralisation, it does come with some future implications in terms of the footprint: The cost, the capital and energy intensity to extract that metal."

Lunnon's big break could come with the expansion of downstream industry in WA.

Nickel West's nearby Kambalda concentrator was only restarted last year as Mincor Resources (ASX:MCR) restarted the old WMC mines in North Kambalda as well as the greenfields Cassini discovery near Widgiemooltha after six years on ice.

But Mincor's ore could be lost to BHP from 2025 with Andrew Forrest's Wyloo Metals, which plans to partner on a nickel sulphate and potential pre-cursor plant in Kwinana with IGO (ASX:IGO), taking a majority stake in the listed company, now at more than 80%.

That could make Lunnon's development of Baker an even more attractive proposition for BHP. It also means there could be more competitive tension when it comes to negotiating on the offtake for its ore.

"I think that the best value we can add for our shareholders is to find, I've said this before, as much high grade nickel as quickly and as safely as possible so that we can be a key player in some of these decisions," Ainscough said.

"We've even got it on the … byline on our website … that we want to be a key player in the re-emergence of Kambalda as an important source of high grade nickel. I think we've already done that.

“And really, if Mincor disappears, it elevates I think our importance in what is still one of Australia’s preeminent and most prolific nickel belts.”

The majors muscle in

BHP’s (ASX:BHP) $9.6 billion purchase of copper miner OZ Minerals has obvious synergies, with the Prominent Hill and Carrapateena copper-gold mines in South Australia’s Gawler Craton a strong complement to its massive Olympic Dam mine and smelter.

But those advocating the case for the development of large and low grade nickel deposits in the modern day and age would be quick to point out the deal also includes the acquisition of the $1.7 billion West Musgrave nickel and copper mine, already under construction and due to begin producing 35,000t of nickel in concentrate and 41,000t of copper per annum from the middle of the decade.

That BHP was keen to shoulder the risk on constructing that asset speaks volumes.

Discovered by Western Mining in the early 2000s, West Musgrave was sold by BHP to junior Cassini Resources for just $250,000 in 2014, a price that indicates it had little hope the deposit would be developed as nickel prices tanked amid China’s economic slowdown and a supply rush from Indonesia.

Cassini was bought by OZ, which paid only scrip, for around $70m in 2020. The deposit is now worth many times that, owing to the speed with which the EV boom has moved the goalposts.

Also this year Anglo American, which owns nickel assets in Brazil and Finland, piled into a significant stake in one of Aston’s neighbours Canada Nickel, which is listed on the TSX-V.

“That to me is showing that these Tier 1 companies who are wanting to get into the nickel space are saying ‘let’s think about the next 20 years’,” Bradford said.

“Where are we going to get this metal? Well, let’s scan the market, where are these metal projects.”

Anglo cut a $24 million cheque for 9.9% of Canada, which owns the Crawford project, located 42km north of Timmins in Ontario. With a mine life that could stretch to 43 years, that project is similarly low grade and carries a potential capital bill of up to US$1.2 billion.

Is the money there?

Exponents of low grade nickel sulphide deposits often note that some of the world’s largest nickel mines are not the high grade, narrow veined orebodies seen at sites like Mincor’s Kambalda operations.

Rather they point to mines like Mt Keith and its satellite orebody Yakabindie as the sort of operations majors often invest in — long mine lives with low grade but predictable orebodies.

Mt Keith historically grades between 0.5-0.6% nickel against the 2.5% plus grade seen in Kambalda and is indeed one of Australia's largest producers, the lynchpin of BHP Nickel West's northern operations.

But it was a slog to get the thing off the ground.

Mt Keith was discovered in the nickel boom in 1969 but didn't deliver first ore until 1995.

It's a technically challenging orebody — much of the nickel is in silicate from which it is too difficult to liberate the nickel metal.

Mt Keith and its satellites benefitted from the construction of its 40,000tpa plus concentrator and the rest of the Nickel West supply chain developed by WMC in the afterglow of the 1960s nickel boom.

It sits just a few hundred klicks north by road of the Kalgoorlie Nickel Smelter, which is again around 600km east of the Kwinana Nickel Refinery, where BHP now makes nickel sulphate crystals for lithium ion batteries in Tesla and Toyota EVs.

Initial testwork suggests Aston has low levels of nickel in silicate. And the Bardwell ore can be processed to produce a concentrate with a nickel grade of around 11.29% nickel, 0.37% cobalt, 24% sulphur, 38.2% iron and 8.2% magnesium oxide.

But Bradford acknowledged support will likely be needed for a company of Aston's market cap, currently $88 million, to deliver a project of the scale of Bardwell.

Government support?

Should it be feasible, the route could come from government funding.

Massive and increasing incentives to produce battery metals in the US and Canada are now in play, opening a theoretical route to production for projects which appear on first glance to be commercially challenging.

That urgency is made even starker by the fact that over 15% of class 1 nickel sulphide supply comes out of Russia, supply which could be sanctioned or cut off from the Western market post the invasion of Ukraine.

"This is going to be a big mine. I know the Canadian government has a pot of money, it's like C$3.8 billion at the moment, for critical mineral projects," Bradford said.

"And if I roll forward six months, two years, I know how that Canadian process works, because last year I actually did quite a bit of it in Ottawa.

"You have Global Affairs, they have over 20 offices in America, and they facilitate meetings with car manufacturers, battery suppliers, all the people who need nickel.

“We’ll be going to them and saying, can you help us now set these meetings up? This is how you’ll eventually get people who will invest in the project on board.

“The Canadian government are pretty well set up for that and they’ve been very vocal around non Chinese equity stakes, non Chinese supply or offtake, so I think that they’ll be ready for a project like this to help get them into that space where they want to be.

“Being nickel as well, it is in the top five critical mineral commodities.”

Bradford says while a scoping study and further feasibility work needs to be done, he does not see Bardwell taking the same 20-year discovery to development timeframe as BHP’s Mt Keith and West Musgrave mines.

Past examples

It is difficult to find examples of nickel sulphide projects of the scale and grade of the Canadian ultramafics being developed in recent years.

One that was developed was the Talvivaara mine in Finland, which boasted 1Bt in reserves grading 0.22% nickel, 0.13% cobalt, 0.5% zinc and 0.02% cobalt.

With over 2.2Mt of nickel metal and 1.3Mt of copper, the mine was expansive, but it failed, with the owner sinking in 2014.

However, the project still operates today as a heap leach operation, salvaged by the Finnish Government via its State-owned miner Terrafame.

Importantly it’s the largest source of home-grown nickel, copper and cobalt for the European EV industry, meaning it is one of the few options for them to secure those metals outside of the Chinese EV supply chain.

Another was BCL, which operated low grade mines and a smelter in Botswana which were once part of the LionOre portfolio.

That was one of the businesses managed by Bradford, who said the company mined 0.4-0.5% nickel underground and produced a concentrate grading just 5-6%, well below the level Aston’s initial test work shows it can achieve.

It went into administration in 2016 as prices hit decade lows, though by that time they had fallen to around a third of current levels.

Bradford, who was no longer involved by that point, noted an historic fall in nickel prices to sub-economic levels occurred in the late 2000s and then again in the mid-2010s.

Fetching US$7600/t in February 2016, prices today are far more attractive, with nickel paying upwards of US$20,000/t, equivalent to around US$9/lb.

“If you look back when we sold (LionOre), and then if you roll forward two years, the nickel price probably dropped 60-70%,” Bradford said. “Prices of any commodity (can) make life very difficult.

“I started in nickel in ’95 and it was only in 2003-04 we started to see anything above US$3 a pound for nickel.

“Did you ever see a dollar a pound for copper? I don’t think we ever did. We just lived in a world of pain and low prices and you just fix things and keep things going and that’s what we did.”

Source: https://stockhead.com.au/resources/highs-and-lows-will-the-energy-transition-be-the-boost-low-grade-nickel-developers-need-to-get-off-the-ground/