# Appia and the demand for the critical Heavy Rare Earths

written by Jack Lifton | November 6, 2023 The rare earths necessary for the manufacturing of the magnets needed for the type of electric motors that can drive electric cars fall into two categories, the basic critical permanent magnet rare earths, neodymium (Nd) and praseodymium (Pr), and the critical, critical rare earths necessary for that purpose, dysprosium (Dy) and terbium (Tb). Without the addition of Dy and/or Tb to the alloy based on NdPr (a natural mixture called didymium) the magnetic material produced will not be able to maintain its (magnetic) strength at the high operating temperature and cycles of heating and cooling experienced daily by the electric drive motors to be used in EVs.

# Weathering the rare earth prices storm, all eyes are on Neo Performance

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"Neo Performance Materials' organization today is the closest that North America has yet come to a totally vertically integrated rare earth permanent magnet supplier. Now, the company has acquired and is moving to bring a significant rare earth deposit in Greenland into production. When that occurs, it will be the first company outside of China, ever, to be a totally vertically integrated manufacturer of rare earth permanent magnets. We should all be watching Neo Performance as if our (self-sufficient and secure) independent economic lives depend on it." – Jack Lifton, Co-Chairman, Critical Minerals Institute

# Hastings Technology Metals Poised to Emerge as a Major Player in the Rare Earths Market

written by InvestorNews | November 6, 2023 With all the talk of on-shoring, near-shoring, friend-shoring, or whatever is the popular term this week, it's easy to lose sight of the fact that most commodities are global in nature. I know I've become fixated on North American solutions when it comes to critical materials and rare earths but that's a somewhat myopic view. There are plenty of countries out there, near and far, that we consider our friends and who may or may not have cost advantages that overcome any incremental transportation fees to compete in our domestic market. Thus, we shouldn't fall into the trap of thinking that just because the U.S. Inflation Reduction Act, and other similar legislation, look to limit parts of the world from contributing to "made at home" solutions, as perhaps, North American miners and explorers aren't necessarily the best option.

One such example is <u>Hastings Technology Metals Limited</u> (ASX: HAS

OTCPK: HSRMF), a Company engaged in the exploration, 1 development, and mining of rare earths and specialty metals in Western Australia. This Perth-based company is primed to become the world's next producer of neodymium and praseodymium concentrate (NdPr). Hastings' flagship Yangibana Project (which comprises a mine and beneficiation plant at the Yangibana site, and a hydrometallurgical plant at Onslow), in the Gascovne and Pilbara regions of Western Australia, contains one of the most highly valued NdPr deposits in the world with NdPr:TREO ratio of up to 52%. The Project is permitted for long-life production, with offtake contracts signed and debt financing in an advanced stage. The first product to ship is targeted for H1/2025. Hastings also owns and operates the Brockman project, Australia's largest heavy rare earths deposit, near Halls Creek in the Kimberley.

Earlier this month, the Company increased the mineral reserves at the Yangibana Project and it now has JORC-compliant Proved and Probable Ore Reserves of 20.93 million tonnes at 0.90% TREO which includes a 37% component NdPr, making it one of the largest and highest-grade rare earths projects in the world. The company has made significant progress in advancing the project over the past few years, with a Pre-Feasibility Study completed in 2018 and a Definitive Feasibility Study (DFS) completed in 2020. The DFS confirmed that Yangibana is a highly viable project, with low operating costs and strong economic returns.

But where I find this story gets interesting is all the various financial dealings that Hastings is involved in. More than half of ~A\$400 million of total debt financing required for the Yangibana Project has been secured from the Northern Australia Infrastructure Facility (NAIF), which recently increased its financial support to A\$220 million with a  $12\frac{1}{2}$ -year tenor. Hastings also completed a Two-Tranche Placement to raise A\$110 million in new equity to progress the Yangibana Project in

October 2022. Nothing unusual about these two deals but here's the one that intrigues me. On October 14, 2022, the Company announced the completion of the acquisition of an approximate 19.9% shareholding in <u>Neo Performance Materials Inc.</u> (TSX: NEO) for an aggregate price of C\$134.6 million. <u>The acquisition</u> was funded by a A\$150 million cornerstone investment in Hastings by Wyloo Metals.

It would appear that the management team at Hastings does not doubt that this mine is moving forward. The NEO acquisition provides Hastings with a strategic stake in NEO and exposure to the global downstream processing of rare earth materials into magnets, critical components of environmentally friendly as electric vehicles and wind turbines. products such Additionally in October (seemingly a very busy month for the Company), Hastings signed a non-binding offtake Memorandum of Understanding (MOU) with <u>Solvay</u>, a French-based global leader in Materials, Chemicals, and Solutions. The deal outlines the intent of both parties to enter into a binding commercial offtake agreement for the supply of Mixed Rare Earth Carbonate (MREC). Under the agreement, the supply of an initial 2,500 tonnes per annum of MREC will be sent from Hastings' Yangibana Project to Solvay's plant in La Rochelle, France. Deals like this might explain why NAIF was comfortable increasing its financial support for the project.

Lastly, it's worth mentioning that Hastings has implemented rigorous environmental and social sustainability standards to ensure that its operations are in line with international best practices. This commitment and transparency were recognized with an exceptional ESG risk rating by Morningstar Sustainalytics with Hastings ranked 4th out of 159 companies rated in the Diversified Metals Mining subindustry category and placed 9th out of 193 companies in the Diversified Metals industry category. Hastings also undertook an EcoVadis assessment and achieved 68/100 which placed the company in the top 5% of companies assessed. This has not only helped the company attract investment from socially responsible investors but also win recognition for its efforts.

Hastings Technology Metals looks ready to take on the rare earths supply market and become a force to be reckoned with. The Company had A\$172.2 million in cash and equivalents as of December 31, 2022 and seemingly no issues raising additional capital as needed. Agreements are in place for ~70% of production for the first 10 years and there is still plenty of blue-sky exploration upside to further expand the resource at Yangibana. It appears I need to start looking past my own backyard for resource opportunities that are world-class.

# The rare earth permanent magnet dilemma is the NdPr (Neodymium-Praseodymium) supply issue

written by Jack Lifton | November 6, 2023 The table below was produced and sent to me by a colleague at Ginger International Trade & Investments PTE., LTD in Singapore. It is based on that group's more than 30 years of rare earth trading between China and the outside world. It is reproduced here with their permission.

I have very high confidence in the conclusions drawn in and from

the chart.

Note well that this is a chart of Chinese "demand" for NdPr, the principal metals in rare earth permanent magnets and the source of almost all of the revenue from all of the rare earth enabled products. Today (2022), Chinese internal demand for Nd/Pr for domestic products is certainly more than 50%. But, the Chinese domestic market for rare earth permanent magnet enabled devices is already huge and growing. China likes to describe itself as a "developing country." This is ridiculous and only a politically correct description for the purpose of giving the appearance of adhering to international treaties and organizations. The Chinese people are already at Purchasing Power Parity (PPP) with the USA, and their domestic industrial suppliers of consumer goods, such as BEVs, which can be very large users of rare earth permanent magnet motors, are far ahead of their foreign competitors. Just the 5 million EVs sold in the last three quarters of 2022 in China have probably consumed 12,500 mt of rare earths, as much as the entire USA, all of it imported from China as finished goods, used in 2022.

Look at the additional output estimated in the table to meet 2030 "Chinese" demand; it will require the equivalent output of 7, 2022, Lynases!

I am guessing, by the way, that the table uses only monazite feed stocks in the calculations, because monazite is the only widely used rare earth bearing mineral in which NdPr is, on average, 21%. Lynas' Mt. Weld monazite is exceptionally rich in NdPr at 25% of the TREOs contained. The table predicts therefore that an additonal 250,000 mt/per year of monazite will have to be mined to reach the Chinese demand target.

China, for the last 5 years has been busily buying the bulk of the rest of the world's annual output of monazite. Due to the content of thorium and uranium in monazite, there is today just one large scale capable processor in the Americas, <u>Energy Fuels</u> <u>Inc.</u> (NYSE American: UUUU | TSX: EFR). China is already far along in meeting the goals set in the table above.

The United States, Europe, and India are still in some kind of denial, and believe that, even if there is a supply problem, it is a financial one. But this is only part of the problem as the Chinese know. The real problem is the limit to the accessibility of rare earth reserves, globally, at economic prices. China seems to be ignoring the economic issue by trumping it with security of the supply of critical minerals.

When will the USA and Europe learn that lesson?

#### GINGER INTERNATIONAL TRADE & INVESTMENT PTE., LTD

China NdPr Demand 2030		
Item	metric tons	Remarks
Forecast demand 2030	78,000	acc. Huaron Research
Minus recycling raw material 25%	58,500	(78,000 t * 75%)
Recovery rate 62%	94,355	Average recovery rate of NdPr
NdPr as part of TREO 21%	449,309	total rare earth oxide output needed by 2030
Output TREO 2022	300,000	Unconfirmed number
Additional output needed	149,309	2030 needed TREO minus 2022 TREO
Lynas output 2022 in t TREO	21,850	(NdPr 5,880 t, rest REO 15,970 t)
Additional Lynases needed	7	

## Iluka Resources quietly becomes a western rare earths producer

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## Australian company now producing rare earths concentrates to meet increased demand

The boom in electric vehicles should increase the demand for rare earths dramatically in the decade ahead. Electric Vehicles (EVs) are <u>forecast</u> to grow about 11 times from the <u>2.2m</u> cars and trucks produced in 2019 to 22.4 million vehicles a year by 2030. <u>Other strong demand sources</u> for rare earths include catalysts, metal alloys, high tech products (smartphones etc), aerospace & manufacturing. Against this backdrop any company that can bring on production of rare earths (especially the valuable valuable Nd, Pr) is set to do very well based on the increased forecast demand.

## Rare earths demand drivers

×

<u>Source</u>

Additional NdPr oxide needed per EV (additional to an Internal Combustion Engine vehicle)

×

## <u>Source</u>

One Australian miner has recently become a rare earths producer.

**Iluka Resources** (ASX: ILU | OTC: ILKAY ) ("Iluka") is better known as an Australian mineral sands (zircon) and titanium producer, but in April 2020 they quietly commenced production of rare earths at their Eneabba Project in Western Australia.

Iluka has recently completed <u>Phase 1</u> (construction and commissioning) of the Eneabba Project and intends to sell 50,000 tpa of a 20% monazite-zircon ore concentrate for further processing offshore beginning in Q3, 2020. Iluka has an offtake agreement for 50ktpa for 2 years. Project life is estimated at 13 years with a projected 6 month payback.

Iluka <u>is now working on a Phase 2</u> of the Eneabba Project which involves a FS investigating techniques to purify the monazite to an 80% concentrate for sale further down the value chain. The early CapEx estimate for Phase 2 is \$20–40m, but this is subject to change as the FS advances.

Iluka is certainly advancing fast and has essentially become a largely unrecognized, western-located, rare earths concentrate producer.

## Iluka Resources monazite ore Eneabba Project in Western Australia

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## <u>Source</u>

## Closing remarks

New rare earths supply is very hard to come by because of large CapEx and environmental hurdles. Combine this with what is expected to be a 2 times surge in demand for rare earths this decade (boosted by demand for magnets used in electric vehicles and high tech devices) and you have a very compelling reason to be looking closely at the rare earth miners. In particular, any near term pure play rare earths producers located in safe western locations will be very highly attractive.

It appears for now that many investors are not fully aware of the potential NdPr demand surge ahead. This is understandable as we are yet to see EV demand really surge, and NdPr prices have not yet responded. A rise in NdPr prices as the dependent industries gain more attention will follow as analysts up their forecasts. For investors willing to come in early and take a forward looking decade approach, right now is an excellent time to get familiar with and invest into the rare earths sector. The usual risks apply, and yes China will no doubt continue to be a fierce competitor.

Iluka Resources, while not a pure play, is an exciting new western entrant in the field of rare earths producers. Assuming Iluka can execute well, the coming decade should provide an excellent tailwind for Iluka to build a valuable rare earths business to compliment their existing business.