

Jack Lifton on Appia Rare Earths' Brazilian Acquisition and the Critical Minerals Institute Summit

written by InvestorNews | April 4, 2023

In this InvestorIntel interview, Tracy Weslosky talks with [Critical Minerals Institute](#)'s (CMI) Co-Chairman Jack Lifton about why [Appia Rare Earths & Uranium Corp.](#)'s (CSE: API | OTCQX: APAAF) acquisition of a Brazilian rare earths ionic clay project, if finalized, will be an "intelligent vertical integration by Appia."

Speaking about Appia's Alces Lake Project as a "premier deposit of neodymium-rich monazite in North America," Jack explains how the new Brazilian project will be synergistic with the Alces Lake Project. Jack discusses how the new Brazilian project can be a low radiation source of critical heavy rare earths such as dysprosium and terbium.

Speaking about the upcoming [Critical Minerals Institute Summit II](#) (CMI Summit II) to be held in Toronto on June 14-15, 2023, Jack discusses that he intends to address if the North American industry can become self-sufficient in critical minerals. He goes on to discuss how the shortage of experienced competent mining engineers, in some ways, is a bigger problem for the Western world than the supply of critical minerals.

To access the full episode, [click here](#).

Subscribe to the InvestorIntel YouTube channel by [clicking here](#).

About The Critical Minerals Institute

The **Critical Minerals Institute** or **CMI** is an international organization for critical mineral companies and professionals focused on battery and technology materials, defense metals, and ESG technologies in the EV market. Offering a wide range of B2B service solutions, the **Critical Minerals Institute** hosts both online and in-person events designed for education, collaboration, and service solutions that address critical mineral challenges for a decarbonized economy.

To learn more about The Critical Minerals Institute, [click here](#).

American Rare Earths Releases 1.43Bt Maiden Resource at the Halleck Creek Rare Earths Project in the USA

written by InvestorNews | April 4, 2023

[American Rare Earths Limited](#) (ASX: ARR | OTCQB: ARRF) (“ARR”) is focused on developing its 100% owned Halleck Creek Rare Earths Project in Wyoming and La Paz Scandium and Rare Earths Project in Arizona. ARR [stated](#) that these projects “both have potential to be among the largest, rare earths deposits in North America.” The Company also owns the Searchlight Rare Earths Project in Nevada, USA.

American Rare Earths 3 projects in the USA

Key sites

1 Halleck Creek, WY

- Exploration Target of 1.01 to 1.27 billion tonnes
- High value magnetic metals (NdPr)
- JORC Resource Drilling Completed Dec 2022
- Significant JORC Resource Q1 2023

2 La Paz, AZ

- JORC resource of 170 million tonnes
- Exploration target of 742 to 928 million tonnes
- High value magnet metals (NdPr & Scandium)

3 Searchlight, NV

- <30km from only producing REE mine in US
- Initial sampling encountered substantial grades of heavy and magnet REE



High value magnet REEs

60 Nd Neodymium	59 Pr Praseodymium
-----------------------	--------------------------

Source: [Company presentation](#)

Note: The Halleck Creek Project now has a resource not yet shown on the image above (see below for details)

Halleck Creek Rare Earths Project in Wyoming – Maiden Resource – 1.43B tonnes

The Halleck Creek Project stands out for its good grade and potential huge size, as well as having the key magnet rare earths Neodymium and Praseodymium (NdPr).

ARR's [March 17 news release](#) gives some idea of the huge project size [stating](#): *"Final drill assays indicate a significant rare earth deposit in Wyoming, spanning over 10 square kilometers to depths of 150 meters."*

Then on March 31, 2023, ARR announced some very important news when it reported a maiden JORC Resource estimate for its Halleck Creek Rare Earths Project. The news [stated](#):

“The JORC Resource at Halleck Creek is 1.43 billion tonnes with an average TREO grade of 3,309 ppm, and an average NdPr grade of 734 ppm. The JORC Resource estimate has exceeded expectations in comparison to previous exploration target estimates and has demonstrated the Halleck Creek project has the potential to become a world class deposit.”

Note: Bold emphasis by the author.

ARR's CEO [stated](#):

“With a maiden JORC Resource estimate of 1.43 billion tonnes this project is strategically significant, containing over 4.73 million tonnes of rare earth oxides. With only a quarter of the licence area drilled and remaining open at depth, the upside potential is significant. The Halleck Creek project is shaping up to be a strategic asset for the USA to supply rare earths for future generations...”

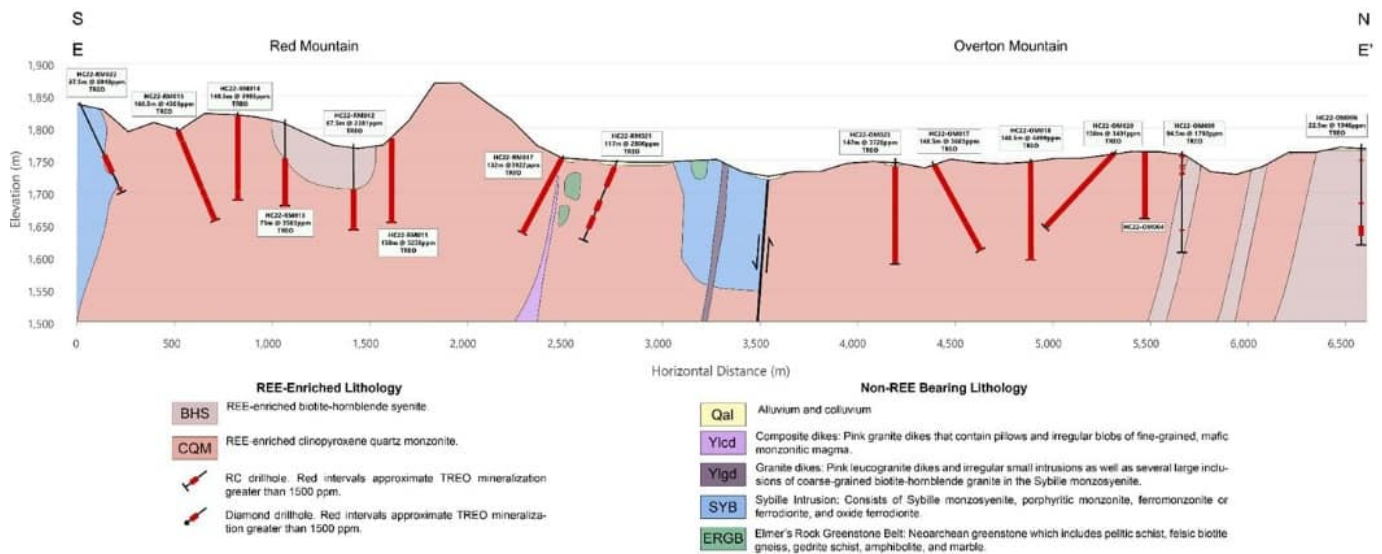
Global magnetic rare earth oxide consumption is forecast to more than triple by 2035. The US government has made no secret that it is seeking to onshore supply of all critical materials for supply chain and national security purposes. There is only one producing rare earth mine within the USA, the Mountain Pass mine in California. The USA needs a number of these mines to secure onshore supply of rare earths and we believe Halleck Creek is part of the future solution.”

Halleck Creek test work already demonstrates that the ore responds well to conventional processing technology, which reduces operating and capital costs. The ore has exceptionally low levels of radioactive penalty elements such as uranium and thorium, which is great news as this allows for further reducing processing costs while boosting the ESG profile. Finally, the

Project is close to infrastructure and a highly skilled workforce.

The [next steps](#) for the Project include metallurgical test work and a Scoping Study later in 2023.

Halleck Creek Project cross section below provides an overview of the Red Mountain and Overton Mountain areas



Cross Section of Overton Mountain and Red Mountain

Source: [ARR news release March 17, 2023](#)

Why is American Rare Earths' stock price virtually unchanged since the great resource announcement?

A "world class deposit" and in the USA. This is superb news for the Company, yet the stock price barely moved. Why?

The reason may be that Tesla recently [announced](#) plans to eliminate the use of rare earths in its 'next generation' EVs. This is the platform to build a cheaper EV, often called Tesla Model 2 or the Tesla Compact Car. It remains to be seen if this

change will succeed or eventually move across to all Tesla models. Some of [Tesla's Investor Day 2023](#) comments were:

"We have designed our next drive unit, which uses a permanent magnet motor, to not use any rare earth materials at all.....so we can make lower-cost products that are still efficient and compelling, and we can make them at scale."

To be clear, it still needs still to be seen if Tesla can achieve this goal. We need to remember that the most powerful and efficient electric motors use the magnet rare earths NdPr. By having an efficient motor, you use less power and can therefore use a smaller battery for the same output, thereby reducing battery costs.

Furthermore, EV drivetrains (essentially the motors) are just one part of the global total demand picture for Neodymium Iron Boron ("NdFeB") magnets, representing [21% of rare earths demand](#) in 2022. Other key demand drivers for NdFeB magnets include wind turbine motors, electrical appliances (PCs, smartphones, etc), and various other electric motor uses.

What this all means is that while EVs are an important driver of NdPr demand, they are by no means the only driver. Also, for now, NdFeB magnets remain the preferable option for use in most EVs, especially those sold into western markets where quality matters.

Tesla boasted at [Tesla Battery Day](#) in 2020 that they would start producing lithium from clay using only salt. Of course, this has never happened. Perhaps that was a ploy to get lithium prices lower while Tesla continued to secure supply. One can question Tesla's motives regarding rare earths, only time will tell.

Closing remarks

The current dip in sentiment in the magnet rare earths space caused mostly by the Tesla news but also by a Q1/2023 China EV sales slowdown, should only be a temporary blip along the way for what still looks like a very strong decade for the magnet rare earths.

Companies such as American Rare Earths that can progress large-scale quality projects in the USA should do very well.

American Rare Earths trades on a market cap of [A\\$93 million](#).

ARR is definitely worth a second look after the recent great resource announcement at Halleck Creek and the potential for Halleck Creek to become the largest North American rare earths deposit and a world-class deposit.

Can the Global Automotive Industry Source Enough Critical Minerals to Meet EV Production by 2030?

written by Jack Lifton | April 4, 2023

American President, Joe Biden, has decreed, and the U.S. Congress has mandated, that, by 2030, 50% of new domestic American OEM automotive production must be of electric vehicles (EVs). Further, the U.S. government now requires by law that, by 2028, for a new EV purchaser to receive a tax credit of up to

\$12,500, then 80% of the vehicle's components must have been made in the United States from raw materials produced and processed in the United States.

American OEM automakers are losing money hand-over-fist on making and selling EVs. Ironically, it is their profits from internal combustion engine (ICE) vehicles that are keeping them afloat. Without subsidies, also known as "tax credits," no one could continue to make and sell EVs. And, quite frankly, without ICEs, Tesla could not afford to be in the EV business. The supply chains for universal automotive components used both by ICEs and EVs could not exist without the scale and sales of the ICE industry.

Sourcing Critical Minerals for EV production

I think that the idealogues, both elected and unelected, in North America and Europe need to answer some questions. Today I am asking, "How does the global non-Chinese OEM automotive industry plan to source enough critical minerals and metals, annually, to meet government-mandated, not market-driven goals for the production of EVs by 2030?"

In the following discussion, I'm going to limit myself to the critical minerals and materials needed for the production of EVs just in the United States. Keep in mind that American domestic OEM automotive production is just 10% of the global annual total production.

The domestic American OEM automotive assembly industry most of which is owned and operated by foreign-owned manufacturers is building today, in North America, at least nine new factories to construct lithium-ion batteries for EVs. In addition, a half dozen EV drive train factories and a dozen assembly plants will

be built or converted to pure EV production by the end of this decade.

Calculating the amount of Critical Minerals needed

The figures below are averages used in a variety of lithium-ion types. The only constants are for lithium and graphite, which are calculated for a 100 kWh Tesla battery no matter what the cathode chemistry.

The figures for material usage for rare earth permanent magnets are for one drive motor. American cars typically use two.

For the battery:

Material/Metal	Usage per BEV	For 7,500,000 EVs
Lithium (no matter which chemistry)	6-8 kg (measured as metal)	45-60,000 metric tonnes
Nickel	40 kg	300,000 metric tonnes
Cobalt	12.5 kg	93,750 metric tonnes
Manganese	24.5 kg	183,750 metric tonnes
Copper	53 kg	397,500 metric tonnes
Graphite	66 kg	495,000 metric tonnes

For the drive motor and the 25 accessory micro-motors:

Neodymium / praseodymium (75:25)	1.5 kg	56,250 metric tonnes
Dysprosium	0.05 kg	562 metric tonnes
Terbium	0.01 kg	112 metric tonnes
Gallium	tbd	

Note that the amounts above are annual needs for 50% of

projected American domestic production using a production number baseline of 15,000,000 vehicles per year, which is more than 2022 production and sales but far less than the 21st-century average.

The material usage per vehicle comes from the most recent estimates of the International Energy Association (“IEA”).

Finally, note that the amount of lithium required, up to 60,000 tonnes, measured as metal, is equal to 360,000 tonnes, measured as lithium carbonate equivalent (LCE), which is more than half of the global production of LCE in 2022!

Assuming that 50% of global OEM automotive production in 2030 will be EVs, you need to multiply the above demand numbers each by a factor of between 5 and 10 just to assume that the total global production of vehicles remains the same in 2030 as today, about 100,000,000 vehicles per year.

The amount of lithium necessary for enough stationary storage to manage a world totally converted away from fossil fuels is estimated to be 3.5 times as much as is necessary for the conversion of the global automotive fleet, so you need to add that demand to the above totals. I do not know how much of the world’s energy production in 2030 will be from non-fossil fuels, but even if it is just 20% of the total the above demand numbers would double.

The question we need to ask...

The core questions are:

1. Can the world’s economies divert enough of their total capital and natural resources to effect the above transformation(s)?
2. Even, if so, are there sufficient resources of the

critical minerals and processing capacity for transforming them into end user products to carry out even this percentage of the transformation in just 7 years?, and

3. Would even the attempt to transform the global energy production economy from fossil-fuels to alternate energy destroy wealth creation and its wide distribution bringing about the decline of the Western standard of living and the destruction of any hope that the developing world has of achieving that standard?

It's time to decide if it's all worth it.

Mel Sanderson of American Rare Earths Discusses Two US Rare Earths Projects Accelerating Forward

written by InvestorNews | April 4, 2023

In this InvestorIntel interview during PDAC 2023, Byron W King talks with [American Rare Earths Limited](#)'s (ASX: ARR | OTCQB: ARRNF) President of North America Melissa 'Mel' Sanderson about developing two large rare earth deposits in North America. Discussing how key magnetic rare earths such as neodymium and praseodymium comprise 27% of the deposit at their Halleck Creek Rare Earths project in Wyoming, Mel provides an update on their recent [high-grade assay results](#) from the project, with a NI 43-101 resource planned to be released by the end of March or

early April and a PEA by the end of the year.

Mel goes on to discuss the upside potential at American Rare Earths' scandium-rich La Paz rare earths deposit in Arizona where they already have a 170.6 million tonnes JORC compliant resource and are planning to grow the resource through additional drilling. Providing an update on their US Government funded R&D partnerships with the Lawrence Livermore National Laboratory and other university research partners, Mel discusses how American Rare Earths is leading the way to cleaner, greener processing and separation technologies for rare earths.

To access the full InvestorIntel interview, [click here](#).

Don't miss other InvestorIntel interviews. Subscribe to the InvestorIntel YouTube channel by [clicking here](#).

About American Rare Earths Limited

One of the only ASX-listed companies with exposure to the rapidly expanding US market, American Rare Earths is developing its 100% owned magnet metals projects, La Paz in Arizona, and Halleck Creek in Wyoming. Both have the potential to be among the largest, rare earths deposits in North America. The company is concurrently evaluating other exploration opportunities while collaborating with US Government supported R&D to develop a sustainable domestic supply chain for the renewable future.

To know more about American Rare Earths Limited, [click here](#).

Disclaimer: American Rare Earths Limited is an advertorial member of InvestorIntel Corp.

This interview, which was produced by InvestorIntel Corp., (IIC), does not contain, nor does it purport to contain, a summary of all the material information concerning the "Company"

being interviewed. IIC offers no representations or warranties that any of the information contained in this interview is accurate or complete.

This presentation may contain “forward-looking statements” within the meaning of applicable Canadian securities legislation. Forward-looking statements are based on the opinions and assumptions of the management of the Company as of the date made. They are inherently susceptible to uncertainty and other factors that could cause actual events/results to differ materially from these forward-looking statements. Additional risks and uncertainties, including those that the Company does not know about now or that it currently deems immaterial, may also adversely affect the Company’s business or any investment therein.

Any projections given are principally intended for use as objectives and are not intended, and should not be taken, as assurances that the projected results will be obtained by the Company. The assumptions used may not prove to be accurate and a potential decline in the Company’s financial condition or results of operations may negatively impact the value of its securities. Prospective investors are urged to review the Company’s profile on [Sedar.com](https://www.sedar.com) and to carry out independent investigations in order to determine their interest in investing in the Company.

If you have any questions surrounding the content of this interview, please contact us at +1 416 792 8228 and/or email us direct at info@investorintel.com.

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

written by InvestorNews | April 4, 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 [Hastings Technology Metals Limited](#) (ASX: HAS | OTC PK: HSRMF), a Company engaged in the exploration, 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 Gascoyne 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 12½-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 [Neo Performance Materials Inc.](#) (TSX: NEO) for an aggregate price of C\$134.6 million. [The acquisition](#) 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 products such as electric vehicles and wind turbines. Additionally in October (seemingly a very busy month for the Company), Hastings signed a non-binding offtake Memorandum of Understanding (MOU) with [Solvay](#), 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 | April 4, 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 additional 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, [Energy Fuels Inc.](#) (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	

The top billionaires are now

chasing the critical magnet rare earths – Part 2 of 2

written by Matt Bohlsen | April 4, 2023

[In part 1](#) we looked at a growing trend where billionaires have started investing or taken a strong interest in rare earths companies, mines, and/or projects around the world. In particular, the story focused on **James Litinski's** rise to fame at MP Materials Corp. (NYSE: MP), as well as the recent billionaire moves of KoBold Metals (**Jeff Bezos, Michael Bloomberg, Bill Gates**) chasing rare earths in Greenland and **Gina Rinehart** buying into Arafura Rare Earths Limited (ASX: ARU).

Here in Part 2 of this series will take a look at more billionaires chasing rare earths such as **Andrew 'Twiggy' Forrest, Chris Ellison, and Elon Musk.**

Andrew Forrest's Wyloo Metals and Hastings Technology Metals Ltd.

As [announced](#) on August 26, 2022, Australian billionaire Andrew Forrest's private company Wyloo Metals has agreed to an A\$150 million [cornerstone investment](#) in Hastings Technology Metals Ltd. (ASX: HAS), through the issuance of secured, redeemable, exchangeable notes. Even more interesting was that Hastings intends to use the A\$150 million proceeds to acquire a 22.1% strategic shareholding in Canada's [Neo Performance Materials Inc.](#) (TSX: NEO). Neo uses rare earths to make magnetic powders and magnets, which can later be used in the permanent magnet electric motors used in most quality EVs and wind turbines.

Hastings controls two rare earth projects in Western Australia, the [Yangibana Project](#) (more advanced) and the [Brockman Project](#). At the Yangibana Project, Hastings plans to build a mine and

beneficiation plant and a hydrometallurgical plant nearby in Onslow, to produce 8,500 tpa TREO production and [3,400tpa NdPr.](#)

It was also [revealed](#) in November 2022 that Andrew Forrest's Fortescue Metals Group Ltd. (ASX: FMG) has signaled the company hopes to open up a business mining and refining rare earths.

Chris Ellison and rare earths junior VHM Limited

Mineral Resources Limited (ASX: MIN) CEO Chris Ellison has been an early leader in the lithium boom, yet now he has also turned his attention to rare earths. Ellison has backed rare earths junior VHM Limited which is set to IPO on the ASX in January 2023. VHM Limited [state](#) they have "one of the world's largest, highest-grade rare earth deposits" at their Goschen Rare Earths and Mineral Sands Project in Victoria, aiming to begin production by H1, 2025. The rare earths in the Goschen Project include neodymium, praseodymium, dysprosium and terbium.

Elon Musk's insatiable demand for rare earths to feed Tesla's vehicles

In 2018 it was [reported](#) by Reuters that "Tesla's shift to a magnetic motor using neodymium in its Model 3 Long Range car adds to pressure on already strained supplies of a rare earth metal....." Musk and Tesla (NASDAQ: TSLA) had come to learn that by using the most powerful and lightweight permanent magnet electric motors they were able to save weight and improve efficiency, which improves both performance and range as well as cost (a smaller battery is needed to achieve the same range). Permanent magnet motors are currently the smallest and lightest electric motors you can buy. The only catch is they require the magnet rare earths. So this is now Tesla's current problem. How to source the magnet rare earths in the volumes they need now and in future years as they scale to 20 million electric cars per year by 2030. Tesla's chair Robyn Denholm gave investors a

huge clue during a speech in Canberra to mining industry leaders in 2021, when she predicted that Tesla could soon consume [more than \\$1 billion a year](#) in Australian produced lithium, nickel, **rare earths**, and other battery metals. Then again [in October 2022](#), Denholm strongly advocated that Australia can do so much more to support the EV supply chain. Tesla chairman suggested Australia is capable to do mining, refining, battery cells production, and even make electric vehicles. She said Australia has the raw materials, including lithium, cobalt, copper, and **rare earths**.

I would add that Canada also has this very [same potential](#) and is now focused to build up an EV supply chain, notably in Ontario and Quebec. The Canadian government has allocated C\$3.8 billion of financial support for critical minerals in its 2022 budget.

Tesla's electric cars have shifted towards using more permanent magnet motors that use the magnet rare earths



Hong Kong – August 13, 2021 : People walk past the Tesla official showroom in Queens Road East, Wan Chai, Hong Kong.

Source: [iStock](#)

Closing remarks

This “billionaires chasing the critical magnet rare earths” series has exposed a relatively new trend where several of the richest and most powerful billionaires in the world have turned their attention to the magnet rare earths, namely neodymium (Nd), praseodymium (Pr), and dysprosium (Dy). Billionaires now involved in rare earths include James Litinsky, Jeff Bezos, Michael Bloomberg, Bill Gates, Gina Rinehart, Andrew Forrest, Chris Ellison and indirectly Elon Musk via Tesla.

The reason for this unprecedented interest in the magnet rare earths sector is simple. The most powerful and efficient

electric motors need the most powerful magnets, and these are made from the magnet rare earths Nd, Pr, and Dy. Also, they typically use Boron (B). Electric motors are replacing the internal combustion engine and are now central to most modern day technology especially green technology such as electrification of our transport network and renewable energy generation.

Reaching net zero carbon emissions means the next 2-3 decades will rely heavily on switching to electric motors and that will require a secure source of the critical rare earths.

Investors can also learn from these leading billionaires and invest in the magnet metal rare earths while we are still in the early stages of what looks likely to be a decade long boom.

For more information you can visit InvestorIntel's page ["Critical Minerals & Rare Earths"](#).

The top billionaires are now chasing the critical magnet rare earths – Part 1 of 2

written by Matt Bohlsen | April 4, 2023

In this two part series we look at a growing trend where billionaires have started investing or taken a strong interest in rare earths companies, mines, and/or projects around the world. The significance is that these billionaires are very well known and followed. Plus it now appears they have their targets set on the 'magnet' rare earths sector, which many analysts

forecast to go into deficit this decade, driven by the shift to renewable energy and electric vehicles. The magnet rare earths mostly refers to neodymium and praseodymium (NdPr), the world's most sought after rare earths. Dysprosium (Dy) is the third key rare earth used in magnets. It is also used in control rods for nuclear reactors.

One can argue that this trend all started back when, now billionaire, James Litinsky bought a mine in California from bankrupt Molycorp and subsequently turned the mine into USA's largest producing rare earths mine, with the company MP Materials Corp. (NYSE: MP) now valued at [US\\$5.48 billion](#). As Wikipedia [states](#): "In June 2017, the Mountain Pass mine was purchased at auction for \$20.5 million by a new entity called MP Mine Operations LLC (MPMO). MPMO was a consortium formed principally by JHL Capital Group, a Chicago-based investment firm led by James Litinsky." Litinsky recognized, well before others, that the most powerful magnetic electric motors need rare earths, and that these motors would become essential to modern life technology, especially in the green revolution. Litinsky and his partner's move buying a mine for just US\$20.5m that is now worth 200X or more today was pure genius!

The world's most powerful electric motors are used today in wind turbines and electric vehicles. They rely on the critical and valuable magnet rare earths (Nd, Pr, Dy)



Source: [iStock photo](#)

Jeff Bezos, Michael Bloomberg, Bill Gates & others are looking towards Greenland for rare earths

As [reported by InvestorIntel](#) in September 2022, Jeff Bezos, Michael Bloomberg, Bill Gates & others (via their company [KoBold Metals](#)) are looking towards Greenland as a source of rare earths and other critical metals. KoBold Metals is partnered with Bluejay Mining PLC to find the rare and precious metals in Greenland. An August 2022 article by CNN [quoted](#): “Billionaires are funding a massive treasure hunt in Greenland as ice vanishes.....Greenland could be a hot spot for coal, copper, gold, rare-earth elements and zinc, according to the Geological Survey of Denmark and Greenland.” While there are challenges in Greenland the fact that billionaires who made their money in online shopping, financial services/media, and software are now scouring the globe for rare earths speaks to their importance and value in modern society.

Gina Rinehart buys into Arafura Rare Earths Limited

Gina Rinehart, the world's richest woman, recently bought [A\\$60 million](#) worth of Arafura Rare Earths Limited (ASX: ARU) shares via her private company Hancock Prospecting, as part of an A\$121 million capital raising by Arafura. Arafura's news release on December 5, [stated](#): "Hancock Prospecting Pty Ltd acted as a cornerstone investor, committing to invest \$60 million which will result in a post-completion interest of ~10%....Funds raised will be applied towards orders for long lead items, commencement of fabrication in readiness for main plant construction and early works."

Europe and the global auto manufacturers are also chasing the critical magnet rare earths

In September 2022 The European Commission [stated](#): "Lithium and rare earths will soon be more important than oil and gas. Our demand for rare earths alone will increase fivefold by 2030. [...] We must avoid becoming dependent again, as we did with oil and gas." The European Critical Raw Materials Act is due for release in Q1, 2023.

European Critical Raw Materials Act – securing the new gas & oil at the heart of our economy (red underline by the author)

"Lithium and rare earths will soon be more important than oil and gas. Our demand for rare earths alone will increase fivefold by 2030. [...] We must avoid becoming dependent again, as we did with oil and gas. [...] We will identify strategic projects all along the supply chain, from extraction to refining, from processing to recycling. And we will build up strategic reserves where supply is at risk. This is why today I am announcing a European Critical Raw Materials Act."

Source: [Blog of Commissioner Thierry Breton](#)

2023 will likely see more urgency from countries and EV and wind turbine companies regarding sourcing the magnet rare earths.

Part 2 of this series will take a look at Andrew ‘Twiggy’ Forrest’s rare earths foray, as well as some other companies and billionaire’s rare earths dependency and challenges to secure enough supply, including Tesla’s CEO Elon Musk.

Market conditions offer temptations that critical mineral investors simply cannot ignore

written by InvestorNews | April 4, 2023

In this InvestorIntel interview, host Tracy Weslosky interviews [Hallgarten & Company](#)’s Principal and Mining Strategist Christopher Ecclestone about the impact of existing markets conditions on the critical minerals sector. Starting with an overview of existing market conditions and the impact of rising inflation and interest rates, Christopher says that the “current basement prices” in mining offer investors temptations they simply cannot ignore.

Tracy presses Christopher on these specific opportunities and requests examples of both his favorite critical minerals and companies investors may enjoy researching. Offering a top 3 hit list of critical minerals and offering 3 companies to review

that have these resources, Christopher reinforces the theme that existing market conditions offer opportunities for those who are knowledgeable in this sector.

To access the full InvestorIntel interview, [click here](#)

Don't miss other InvestorIntel interviews. Subscribe to the InvestorIntel YouTube channel by [clicking here](#).

Disclaimer: This interview, which was produced by InvestorIntel Corp., (IIC), does not contain, nor does it purport to contain, a summary of all the material information concerning the "Company" being interviewed. IIC offers no representations or warranties that any of the information contained in this interview is accurate or complete.

This presentation may contain "forward-looking statements" within the meaning of applicable Canadian securities legislation. Forward-looking statements are based on the opinions and assumptions of the management of the Company as of the date made. They are inherently susceptible to uncertainty and other factors that could cause actual events/results to differ materially from these forward-looking statements. Additional risks and uncertainties, including those that the Company does not know about now or that it currently deems immaterial, may also adversely affect the Company's business or any investment therein.

Any projections given are principally intended for use as objectives and are not intended, and should not be taken, as assurances that the projected results will be obtained by the Company. The assumptions used may not prove to be accurate and a potential decline in the Company's financial condition or results of operations may negatively impact the value of its securities. Prospective investors are urged to review the Company's profile on [Sedar.com](#) and to carry out independent

investigations in order to determine their interest in investing in the Company.

If you have any questions surrounding the content of this interview, please contact us at +1 416 792 8228 and/or email us direct at info@investorintel.com.

With plans to become a significant producer of the magnet rare earths, Defense Metals deserves a deeper dive

written by Tracy Weslosky | April 4, 2023

The Wicheeda Project plans to produce 25,000tpa of REO which represents ~10% of the current global production

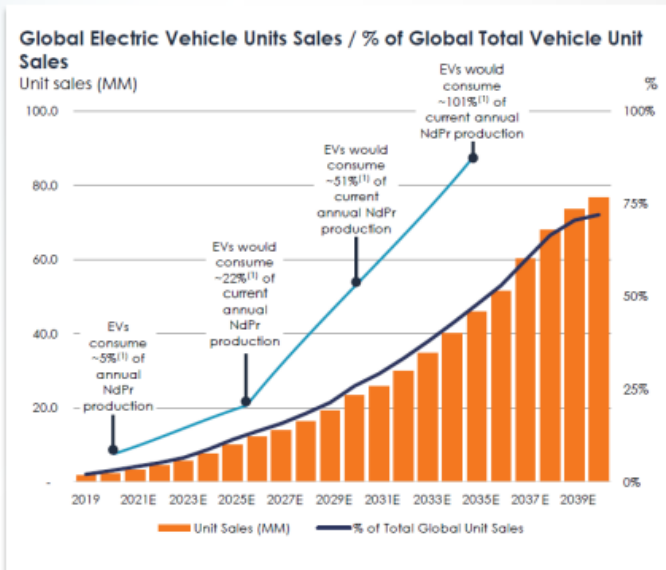
Magnet rare earths demand is forecast to surge this decade. This is because an electric vehicle (“EV”) uses 1kg to 3kg of neodymium–iron–boron (“NdFeB”) magnets in standard drivetrain electric motors. NdFeB magnets are in [93%](#) of all EVs. Global demand for EVs is expected to grow from 6.75 million in 2021 to over 70 million by (or before) 2040. This will require huge amounts of neodymium.

Every ten million new EVs require ~10,000 tonnes of additional

neodymium or ~20% of the current annual global supply

ELECTRIC VEHICLES – A DRIVER FOR RARE-EARTH DEMAND

- An electric vehicle (EV) uses 1kg to 3kg of neodymium-iron-boron (NdFeB) magnets in standard drivetrain motors
- NdFeB magnets are in 93% of all electric vehicles. Tesla, GM, Ford, VW, Hyundai, Toyota and others build vehicles using these magnets
- Every ten million new EVs require ~10,000 tonnes of additional neodymium or ~20% of current annual global supply. Over 70 million electric vehicles are expected to be sold when internal-combustion-engine vehicles are phased out



DEFENSE METALS CORP. TSXV:DEFN OTCQB:DFMTF FSE:35D

6

Source: [Company presentation](#)

The key problem for the EV industry is where will the new magnet rare earths supply come from and can the West become independent from Chinese supply. Today's company is working towards a solution.

[Defense Metals Corp.](#) (TSXV: DEFN | OTCQB: DFMTF | Frankfurt: 35D) ('Defense Metals') plans to become a significant producer of the magnet rare earths neodymium and praseodymium from their 100% owned Wicheeda Rare Earth Element Project spread over 4,244 hectares and located 80 km northeast of Prince George, British Columbia, Canada.

Brought to my attention a few dozen times over the last 2-years, I am fond of Dr William Bird, Director – who is deemed a leader in understanding rare earths in our sector; and likewise, President & Director Luisa Moreno who has at least 10,000 professional hours in this sector by now I suspect. With a PhD in Materials Science and Mechanics, this is the theme we are

stressing at the [Critical Minerals Summit](#) on Wednesday, November 9th and that is the scarcity of talented professionals with both the experience and education to tackle the formidable task of creating a decarbonized economy.

The Project has an Indicated Mineral Resource of [5 million tonnes averaging 2.95% LREO](#) (“Light Rare Earth Oxide”), and an Inferred Mineral Resource of 29.5 million tonnes averaging 1.83% LREO. Key rare earths contained include neodymium (Nd) and praseodymium (Pd), as well as cerium (Ce) and lanthanum (La). The Resource is amenable to an open pit project and contains a mix of monazite and bastnaesite ore.

Some of the best drill results to date at the Wicheeda Rare Earth Element Project include:

- WI21-49 – [3.79% Total Rare Earth Oxide \(“TREO”\) over 150 Metres](#)
- WI21-54 – [3.81% TREO over 117 metres.](#)
- I21-58 – [3.09% TREO over 251 metres.](#)
- WI21-59 – 2.76% TREO over 212 metres.

Strong PEA result with a NPV8% of C\$517 million

The Wicheeda Project [PEA](#) (Jan. 2022) resulted in a post-tax NPV8% of [C\\$517 million](#) and a post-tax IRR of 18%, using a price assumption of US\$100/kg NdPr. Initial CapEx is estimated at [C\\$440 million](#).

Once in production Defense Metals targets to produce 25,423tpa of REO over a 16 year mine life, which would make the company a globally significant rare earths producer with ~10% of the current global production.

The Wicheeda Project plans to produce ~25,000tpa of REO which

represents ~10% of the current global production

CHINA CONTROLS THE RARE-EARTH SUPPLY CHAIN				
(tonnes REO)	Country	SUPPLY CHAIN		
		Mining & Mineral Upgrade	Cracking	Separation
		Ore Conc	Mixed Chemical Conc	Separate Oxides
140,000	China	China	China	China
38,000	United States	United States	China	China
30,000	Myanmar	Myanmar	Myanmar, China	China
25,000	WICHEEDA	(projected)		
17,000	Australia	Australia	Malaysia	Malaysia, China
3,000	India	India	India	India
2,700	Russia	Russia	Estonia	Estonia
4,000	Madagascar	Madagascar	China	China
2,000	Thailand	Thailand	Thailand	Thailand
1,000	Brazil	Brazil	Brazil	Brazil
1,000	Vietnam	Vietnam	Vietnam	Vietnam
500	Burundi	Burundi	China	China

Projected Wicheeda annual production 25,000 tonnes REO

~10% of the Global Current Production

DEFENSE METALS CORP TSXV:DEFN OTCQB:DFMTF FSE:35D

5

Source: [Company presentation](#)

The Wicheeda Project is accessible by a major forestry road that connects to a highway, with the town of Prince George 80kms away. Power lines and a gas pipeline are <40kms away and a major rail line is nearby.

Next steps for Defense Metals include a PFS to be completed in H1 2023, a pilot plant in 2024, and a FS completed in 2025.

The Wicheeda Project location map and key points showing adequate road access and reasonable local infrastructure including access to power and gas <40kms away

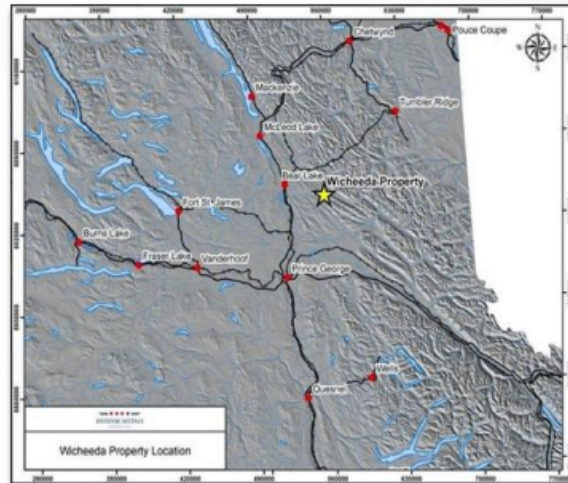
WICHEEDA DEPOSIT IN STRATEGIC LOCATION

Strategically positioned 80 km from Prince George and accessible from a major forestry service road, which connects to **Highway 97**

The 100% owned 4,244-hectare Wicheeda deposit, has power transmission lines, a gas pipeline and a major rail line nearby

Prince George, British Columbia, is a mining centre, with a skilled workforce

Port of Prince Rupert is 500km to the west and accessible by rail and road



Source: [Company presentation](#)

Given the size and quality of the resource, safe location in Canada (with forestry road access, power & gas not too far away) and strong fundamentals supporting key magnet rare earths demand this decade; most investors would agree Defense Metals is worthy of a deeper look. Defense Metals current market cap is [C\\$44 million](#).