

The Debate for the Most Critical Rare Earths Project in the World Begins

written by InvestorNews | July 10, 2023

American Rare Earths Limited is a leading developer of rare earth elements with a strong focus on developing sustainable and cost-effective extraction and processing methods. ARR's 100% owned three rare earths projects are all located in the USA. ARR has recently decided to re-domicile to the USA in line with their projects' location.

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

written by InvestorNews | July 10, 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
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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...”

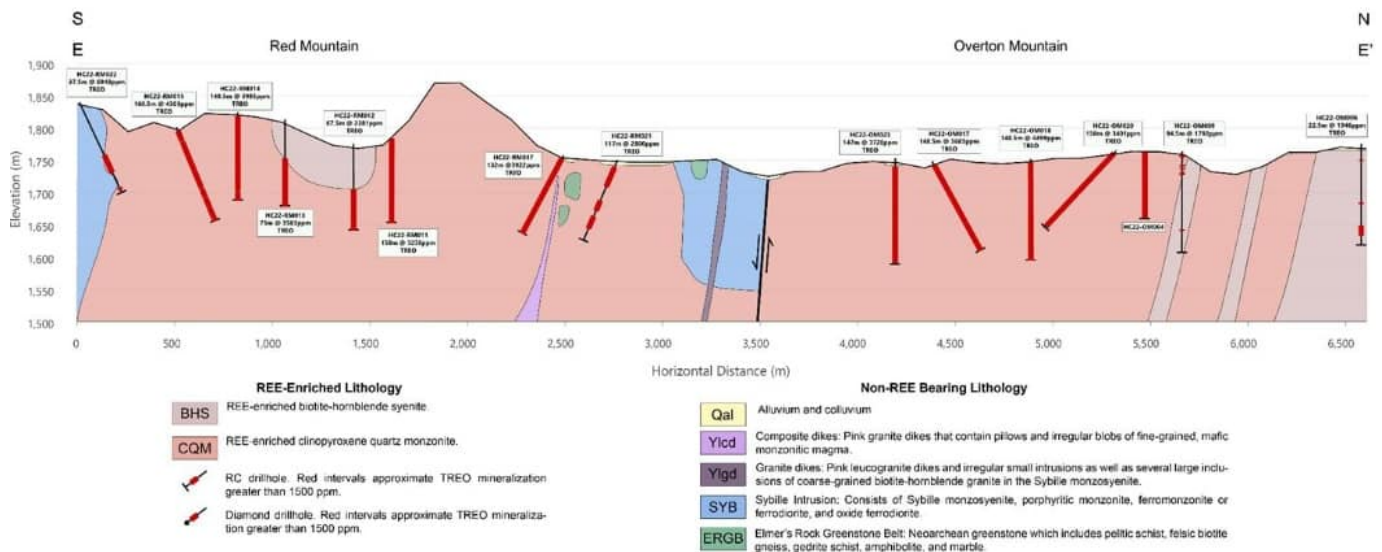
Global magnetic rare earth oxide consumption is forecast to more than triple by 2035. The US government has made no secret that it is seeking to onshore supply of all critical materials for supply chain and national security purposes. There is only one producing rare earth mine within the USA, the Mountain 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.

Energy Fuels Strengthens Its Rare Earths Supply Portfolio

written by InvestorNews | July 10, 2023

When I last discussed [Energy Fuels Inc.](#) (NYSE American: UUUU | TSX: EFR), it was all about the working capital the Company had cobbled together to move forward. [The article](#) was entitled “Show me the money!”, a quote stolen from the movie “*Jerry McGuire*”. The reason being, following the closing of [the sale of three wholly-owned subsidiaries](#) to enCore Energy Corp. (NYSE American: EU | TSXV: EU), which together held Energy Fuels’ Alta Mesa ISR Project, for total consideration of US\$120 million, the Company had accrued a war chest of roughly US\$240 million. Subsequently,

Energy Fuels has converted some of its marketable U308 inventory into US\$18.5 million cash with [a deal to sell](#) 300,000 pounds of natural uranium concentrates to the US government for the establishment of a strategic uranium reserve. This is all good news but the question becomes what will the Company do with all this capital?

On Monday, we gained some insight into how Energy Fuels was going to invest some of its capital going forward to expand its uranium and rare earth business lines. As a reminder, Energy Fuels is a leading US-based critical minerals company. The Company mines uranium and produces natural uranium concentrates that are sold to major nuclear utilities for the production of carbon-free nuclear energy. Energy Fuels recently began production of advanced rare earth element (“REE”) materials, including mixed REE carbonate, and plans to produce commercial quantities of separated REE oxides in the future. Energy Fuels also produces vanadium from some of its projects, as market conditions warrant, and is evaluating the recovery of radionuclides needed for emerging cancer treatments. The Company’s White Mesa Mill in Utah is the only conventional uranium mill operating in the US today, has a licensed capacity of over 8 million pounds of U308 per year, and from various uranium-bearing ores, has the ability to produce vanadium when market conditions warrant, as well as REE products.

Completes the Acquisition of Rare Earth and Heavy Mineral Project in Brazil

The latest update from Energy Fuels sheds some light on its emerging rare earths business segment. First, the Company [announced](#) that it has completed its previously announced

acquisition of seventeen (17) mineral concessions between the towns of Prado and Caravelas in the State of Bahia, Brazil totaling 15,089.71 hectares (approximately 37,300 acres or 58.3 square miles). At the Closing, the Company paid the mineral owners the remaining US\$21.9 million in cash. Acquisition of the Bahia Project is expected to supply the raw materials needed by the Company's US facility for the production of advanced rare earth materials used in EVs, clean energy, and defense technologies.

Prior to closing on the Bahia Project, Energy Fuels commenced a sonic drilling program on the property to further define and quantify the heavy mineral sand resource, particularly at depth. The Company expects to finalize the Phase 1 sonic drilling at the Bahia Project this month, totaling 2,250 meters. The Company plans to announce the Phase 1 drilling results this year and start Phase 2 drilling in Q3/2023. Once data from both drill programs are available, the Company plans to engage industry leaders to calculate an initial mineral resource estimate for use in an S-K 1300 (US) compliant Initial Assessment and an NI 43-101 (Canada) compliant Technical Report.

Expanding the White Mesa Mill

Another area Energy Fuels is deploying capital is the production of separated Neodymium-Praseodymium (NdPr) products at the White Mesa Mill and plans for future REE separation. The Company is currently separating lanthanum ("La") and cerium ("Ce") from its commercial rare earth carbonate stream utilizing existing Mill infrastructure. Energy Fuels is proceeding with the modification and enhancement of its infrastructure at the Mill ("Phase 1") to expand its "light" REE separation facilities to be capable of producing commercial quantities of separated NdPr oxide. Earlier this year, the Company began construction on its "Phase 1" REE

separation facilities, which includes modifications and enhancements to the solvent extraction circuits at the Mill. Because Energy Fuels is utilizing the existing infrastructure at the Mill, “Phase 1” capital is expected to total only about \$25 million. “Phase 1” is expected to be operational later this year or early 2024, at which point Energy Fuels believes it will be the ‘first to market’ among US companies with commercial quantities of separated NdPr available to EV, renewable energy, and other companies for offtake.

Granted the capital expenditures noted above will barely make a dent in Energy Fuels’ war chest, it’s good to see the Company prudently spending capital to advance and diversify its business. However, keep in mind this is the largest US producer of uranium. Uranium production still remains the Company’s core business, and it continues to make progress on resuming production at its mines.

Energy Fuels currently trades at a market cap of approximately US\$1.13 billion (C\$1.51 billion).

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

written by InvestorNews | July 10, 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 | OTCQX: 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 | July 10, 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 1 of 2

written by Matt Bohlsen | July 10, 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.

Rare earths expert Alastair Neill on Vital Metals

written by | July 10, 2023

“Overall Vital appears well on the way to producing commercial quantities of rare earth concentrate, a first in Canada.” – Alastair Neill, President, Critical Minerals Institute

[Vital Metals Limited](#) (ASX: VML | OTCQB: VTMXF) is an Australian listed company whose subsidiary, [Cheetah Resources](#), is developing the Nechalacho project in the Northwest Territories of Canada. The deposit was previously owned by [Avalon Advanced Materials Inc.](#) (TSX: AVL | OTCQB: AVLNF), and they sold the rights in 2019 to Cheetah for the material 150 meters above sea level. Avalon retained the rights to the basal zone deposit which is underground. The deposit is reported to have 94.7 million tonnes at 1.46% REO (0.1% Nd/Pr cutoff). The mineral hosting the rare earths is bastnaesite, which is good as this mineral has been processing successfully for many years.

Vital raised A\$45 million recently through a targeted share

placement at A\$0.04 per share. According to their [press release](#) the funds will be used for:

- Finalisation of construction activities and undertake commissioning, ramp-up and operations at its Rare Earth Extraction Facility in Saskatoon, which will produce a rare earth carbonate product
- Accelerated development of Tardiff deposit at Nechalacho, Canada, including mining studies

A strong balance sheet for ongoing working capital requirements

This project is the most advanced rare earth project currently in Canada. The initial focus is the North T zone which has a resource of 101,000 metric tonnes at 9.01% contained Total Rare Earth Oxides (TREO). Based on tests run at their Saskatoon rare earth extraction plant they can get a 75% recovery to produce a 43.7% concentrate. Based on this, the deposit would produce 6,825 metric tonnes of TREO which would contain 1,600 tonnes of Neodymium (Nd) and Praseodymium (Pr). Tests have been done using X-ray Transmission (XRT) to sort the ore as the ore is hosted in quartz, which is white, and the rare earth mineral which is red. This is a simple way to upgrade the TREO content at site.

There is an offtake agreement with REEtec, a Norwegian company that is developing a new rare earth separation process. The agreement is for Vital to deliver 1,000 tonnes per year (TPY) of TREO (excluding Cerium (Ce)). Based on that Ce will be eliminated before shipping the concentrate to Norway. This is a step that has been done before by Molycorp in the 1980s. It reduces the material handling by 50% and obviously the size of downstream processing equipment. The North T zone will provide 3,400 of the 5,000 tonnes which means Cheetah will have to open the Basal zone to meet the balance of the supply contract.

Looking at today's prices on Shanghai Metal Market (SMM) the separated value of this contract is over US\$286 million. Assuming Vital gets 1/3 of the value for the concentrate this would produce revenues of over US\$95 million of which US\$92 million would come from Nd/Pr. Details of the agreement are not revealed so REEtec may be a toll arrangement which could produce more revenue for Vital though I expect the initial target would be to sell La, Nd and Pr in Europe as there are customers in Europe.

Interestingly the extraction plant is located beside the Saskatchewan Research Council (SRC) which has announced that they will be building a rare earth separation facility to process monazite by 2024. SRC has two rare earth experts from China on staff. SRC is also putting in an Nd/Pr metal facility which takes the oxide to the next level in the supply chain.

In addition to the Nechalacho project, Vital has a project in Tanzania called Wigu Hill. Vital has signed a project development and option agreement with Montero Mining & Exploration Ltd. (TSXV: MON), to acquire and develop the Wigu Hill project. The Wigu Hill project is a light rare earth element deposit and consists of a large carbonite complex with bastnaesite mineralization with a NI 43-101 Inferred resource estimate of 3.3Mt at 2.6% light REOs. This is also a bastnaesite mineral.

Overall Vital appears well on the way to producing commercial quantities of rare earth concentrate, a first in Canada. Questions that do need to be answered are what are the costs of operating an open pit mine in Northern Canada and the costs to transport material to Saskatoon.

MP Materials is riding the rare earths tonnes per year train

written by | July 10, 2023

[MP Materials Corp.](#) (NYSE: MP) emerged from the Chapter 11 of MolyCorp and is the only producing rare earths mine in the USA. At one time the in the 1990s it was producing upwards of 40% of the world's rare earths. MP has a current market cap of US\$5.6 billion, which puts it slightly ahead of [Lynas Rare Earths Ltd.](#) (ASX: LYC), which is the biggest producer of separated rare earths outside of China. Combined their market caps exceed the annual revenue of separated rare earths globally.

MP has made some interesting news this year. Q1 revenues of US\$166.3 million which is 50% of their revenues from all of 2021. This is due to the high pricing of Neodymium (Nd) and Praseodymium (Pr) in Q1 of this year. Based on Roskill's report of 2015, MP's content of NdPr is 16.3% of the total volume. This may vary a little but it is likely to be the two elements that set the pricing for their concentrate as the balance of the materials are of little value. Looking at a basket price, NdPr will account for 93-94% of the total value, assuming all elements were sold which is doubtful as the Chinese have lots of the remaining elements, especially Cerium and Lanthanum. Gross margins in Q1 2022 were 88%, up from 81% in 2021, but I expect this will fall for the balance of the year as NdPr prices are now 20-25% lower than Q1 peaks. Either way, MP is poised to improve its Net Income to US\$168.4 million. MP has done a good

job in their sales price to China for their concentrate. I calculate they are getting somewhere in the range of 40-50% of market value, which is high versus traditional pricing for concentrate which I have seen at 25-30%.

In April a definitive [supply agreement](#) was announced between MP Materials and GM to supply rare earth alloy and magnets for GM's EV program. This is significant as it would restore NdPr rare earth metal, alloy and magnet production. The USA does produce Samarium Cobalt magnets but these are typically used in military applications. There is no indication on what technology will be used to produce the metal, which in China is a messy process. Planned capacity is 1,000 metric tonnes of NdFeB magnets. This will require 280-300 tonnes of NdPr. The previous Molycorp plant was designed to produce 20,000 tonnes of REO of which NdPr would account for over 3,000 tonnes.

This does leave the question as to where MP will sell the remaining NdPr. Europe has one metal/alloy producer and one magnet producer, and Japan is the other logical market, but Lynas owns 80% of the Japanese market and has a shorter supply line. What is left is China. Also to supply other US car producers MP would have to expand capacity, and it is not clear what limits or exclusivity GM has with MP Materials.

The challenge is that the original plant was designed as a single train of 20,000 tonnes per year. Nowhere in China is there a single train much larger than 5,000 tonnes per year (TPY). Lynas built four 5,500 TPY trains. This allows flexibility should there be issues like reduced demand during COVID where one or two trains can be shutdown to allow matching with demand, or if one train has operational issues. I would expect that MP, with the input from [Shenghe Resources](#) (a related party of MP whose ultimate parent is Shenghe Resources Holding Co., Ltd., a rare earth company listed on the Shanghai Stock

Exchange, and as of its [March 31, 2022 quarterly report](#), a buyer of MP's rare earth concentrate that accounted for more than 90% of MP's product sales), will reconfigure the plant to be more flexible. Also MP, like anyone else, will not go from zero to 20,000 TPY overnight. There will be a qualification process and time to acquire accounts so multiple trains makes sense as one penetrates a market as they can be brought on as the business grows.

The other news was that the US Department of Defense (DOD) granted MP \$35 million to build a heavy rare earths at Mountain Pass. I find this interesting as Mt. Pass has 98.6% of its content in light rare earths. This would mean at a run rate of 20,000 TPY the total output of the heavy rare earths would be 280 TPY. The only real valuable heavy rare earths are Terbium (Tb) and Dysprosium (Dy) which would total about 10 TPY combined. At today's pricing, which for Tb is high, in my opinion, this plant would generate revenues of \$10-11 million per year.

Overall MP has been doing well – selling concentrate to China. What will happen to profits as they move downstream only time will tell.

Rising demand benefits the only integrated producer of

bonded rare earth permanent magnets outside of China

written by InvestorNews | July 10, 2023

[Neo Performance Materials Inc.](#) (TSX: NEO) (Neo) is an almost totally integrated Western (Canadian) company that processes mixed rare earth concentrates to produce separated individual and specifically blended rare earths to produce rare earth metals, alloys, and “bonded” rare earth permanent magnets. What makes Neo special is that they are the only company in the world that operates dual supply chains inside and outside of China for REE separation and REE advanced materials and end-use products. Neo owns the only operating commercial rare earth separation facility outside of Asia. It’s in Europe (Estonia facility) and it has sales and production centers spread across [10 countries](#) globally.

All of the above makes Neo unique as a Western producer of rare earth materials as well as end-use products, which are critical in the green energy and EV revolution.

Award winning facilities

As announced on [February 22](#) and [March 28, 2022](#), Neo won awards for two of its key factories, the first in Thailand and the second in Estonia. The awards were Gold Medals awarded by EcoVadis for 2021 sustainability performance.

The second announcement [stated](#): “This places Neo’s Silmet facility in Sillamäe, Estonia in the top five percent of all facilities around the world reporting to EcoVadis for its sustainability programs in 2022... The Silmet facility processes mixed rare earth feedstock into a variety of high-purity rare earth specialty materials, including neodymium-praseodymium

(NdPr) oxide, which is used by Neo's Magnequench business unit to produce neodymium-iron-boron (NdFeB) magnetic materials and magnets for automotive, factory automation, home appliance, circulation pump, and other applications."

This impressive recognition is also very well timed given the surging demand for NdFeB magnets used in many EV motors. Global electric car sales finished March 2022 with [851,000](#) sales for the month (the second best month ever), 60% higher YoY, with market share of 15%.

The global OEM automotive industry today uses mainly sintered NdFeB rare earth permanent magnets, but the use of bonded type NdFeB in this application is growing rapidly. Neo has pioneered the use of bonded NdFeB magnets in automotive applications with Japanese customer/partner, Honda, and this use is expanding. Neo has agreed with European magnet customers to expand its capacity there and to add sintered NdFeB magnets to its product lines. The EU has encouraged and is financially supportive of this move by Neo.

Prices for rare earths materials and end-user products used in the green economy have been surging the past year, due to demand exceeding supply, and this is reflected in Neo's latest financial results. This supply deficit looks to be baked in for at least the next decade due to the growth of the green economy.

Q4 2021 and Full-Year financial results highlights (in USD)

As [reported](#) on March 10, 2022, Neo achieved the following outstanding financial results:

- "Q4 2021 revenue of \$153.4 million higher by 39.0% YoY; full-year 2021 revenue of \$539.3 million was higher by 55.5% YoY.
- Volumes in the fourth quarter of 3,311 tonnes; full-year

volumes expanded by 20.2%.

- Operating income of \$12.7 million in the quarter; \$59.9 million for the year.
- Adjusted Net Income for the quarter of \$16.1 million, or \$0.39 per share, with full-year Adjusted Net Income of \$55.0 million, or \$1.42 per share.
- Adjusted EBITDA for the quarter of \$19.7 million; 2021 Adjusted EBITDA of \$81.9 million was 183.7% higher YoY.
- Cash balance of \$89.0 million after raising \$38.0 million from equity offering and distributing \$12.8 million in dividends to shareholders.”

As shown above, full-year 2021 revenue was 55.5% higher YoY, based on volume growth of 20.2%. Clearly higher-end product prices helped support the stellar results. Neo sums it up well and the general direction the business is heading by stating:

“Neo reported strong year-over-year (YoY) gains in revenue, volumes, operating income, Adjusted EBITDA, and profitability in the year ended December 31, 2021, driven largely by increased demand for products across all three of its operating divisions, higher selling prices for rare earth materials, and continuing progress in several of the Company’s strategic initiatives.”

I did warn investors that this was what we were expecting from Neo with our December 22, 2021 article: [“Neo Performance Materials looks to expand capacity as it rides the tailwind of growing rare earth permanent magnet demand.”](#)

Neo Performance Materials is one of a few Western companies able to process rare earths and make magnets



Source: [Neo Performance Materials website](#)

Closing remarks

Neo Performance Materials occupies a rare and critical position in the Western supply chain to produce rare earths specialty products. Demand for powerful rare earth type magnets used in many consumer goods as well as in wind turbines and EVs is expected to surge this decade.

Neo Performance Materials trades on a market cap of [C\\$546 million](#) and a current PE of [17.6](#). 2022 PE is forecast at [7.82](#).

The next catalyst for Neo will be the Q1, 2022 earning results due out before the market opens on [May 13, 2022](#). Stay tuned.

Energy Fuels is now producing uranium, vanadium, and mixed rare earths, a first in the world accomplishment

written by InvestorNews | July 10, 2023

Earlier this week I discussed a [rare earths and uranium 'junior'](#); but today I take a look at a uranium/vanadium and rare earths 'producer' that continues to do well over the years by navigating successfully the market's highs and lows and more recently expanding into rare earths processing/production.

The Company is [Energy Fuels Inc.](#) (NYSE American: UUUU | TSX: EFR). Energy Fuels is [the number one uranium producer in the U.S.](#) and has the potential to become one of the lowest-cost,

non-Chinese rare earth producers in the world. In its latest move the Company is looking at commercially developing a newly applied (to rare earths) technology to produce rare earth metals and alloys, a step down the supply chain and higher up the value-add chain.

Below is their stock price chart which is quite impressive given the uranium bear market from 2014 to 2021, when many uranium miners went out of business.

Energy Fuels 5 year stock price chart



Source: [Yahoo Finance](#)

Rare earths processing business

In the past year, Energy Fuels has expanded to also become a processor/producer of commercial mixed rare earths. Energy Fuels is buying U.S sourced rare earths' ore and then processing it to produce a mixed rare earth carbonate using its existing, operational, White Mesa Mill. The Company [states](#): "Because our product is ready for separation into individual rare earth oxides without further processing, we are currently producing an intermediate rare earth product in a more advanced form than any other U.S. company. We will be receiving additional shipments of natural monazite sand in... 2022, and we are in advanced discussions with several monazite suppliers around the world to secure a diverse supply of feed for this exciting initiative."

MOU for the development of a novel technology for the production of rare earth element metals

As [announced](#) on December 15, 2021 Energy Fuels has executed an MOU with Nanoscale Powders LLC (NSP) for the development of a newly applied technology for the production of rare earth

element metals. The release [stated](#): “We believe this Technology, which was initially developed by NSP, and will be advanced by the Company and NSP working together, **has the potential to revolutionize the rare earth metal making industry by reducing costs of production, reducing energy consumption, and significantly reducing greenhouse gas (GHG) emissions.** Producing REE metals and alloys (REE Metals) is a key step in a fully integrated REE supply chain, after production of separated REE oxides and before the manufacture of neodymium iron boron (NdFeB) magnets used in electric vehicles (EVs), wind generation and other clean energy and advanced technologies..... Energy Fuels’ initial investment in the Project is intended to advance the Technology to allow for: (i) the continuous, pilot-scale production of 10 kilograms per hour of neodymium-praseodymium (**NdPr**) metal that meets typical specifications for NdFeB magnets at TLR Level 7; (ii) the separate build of a batch reactor able to produce key minor magnet metals (e.g., dysprosium, terbium); and (iii) the demonstration of samarium-cobalt alloy production....The MOU contemplates a phased development of the Project to scale-up to the production of 1,000 metric tonnes of one or more REE Metals per year. Energy Fuels will have the right to earn up to a 100% interest in the entity and Technology.”

Note: Bold emphasis by the author.

Existing uranium and vanadium business

Energy Fuels has the largest uranium resource portfolio in the U.S. among producers, with an ability to rapidly scale up low-cost U.S. uranium and vanadium production if needed.

With the recent tight supply situation for uranium, Energy Fuels is now looking at entering again into long term uranium supply contracts. The Company [states](#): “We believe this new dynamic

could create opportunities for Energy Fuels to enter into long-term supply contracts for a portion of our production with nuclear utilities at prices, quantities and other terms that generate sufficient project cashflow, all while keeping the majority of our production leveraged to further potential increases in uranium prices.”

Energy Fuels White Mesa Mill and a list of their businesses



Source: [Company presentation](#)

Closing remarks

The smartest mining companies these days are able to quickly adapt to price swings in the commodity markets as well as bring on new products. Even better to be able to sell value-added products and form an integrated supply chain in the USA.

In the case of Energy Fuels, they now offer investors so much more than a year ago, including:

- Uranium/vanadium production that can rapidly scale when needed from their existing mines and Mill.
- Mixed rare earths carbonate production using the White Mesa Mill.
- Potentially, in the near future, rare earth metals production using a novel production technology with their agreement to buy 100% of Nanoscale Powders LLC. If successful, Energy Fuels [believes](#) “Nanoscale’s metal-making technology could be orders of magnitude safer and less expensive than the current established technology.”

Finally, if we do happen to get a Russian invasion of Ukraine there is also the possibility we may get interrupted supply of Russian sourced uranium if sanctions are applied. That could

potentially send uranium prices higher.

2022 looks set to be another good year for Energy Fuels. Their market cap is [US\\$1.03 billion](#) after a recent dip, so worth a look for investors wanting to gain U.S exposure to uranium, vanadium, and rare earths.