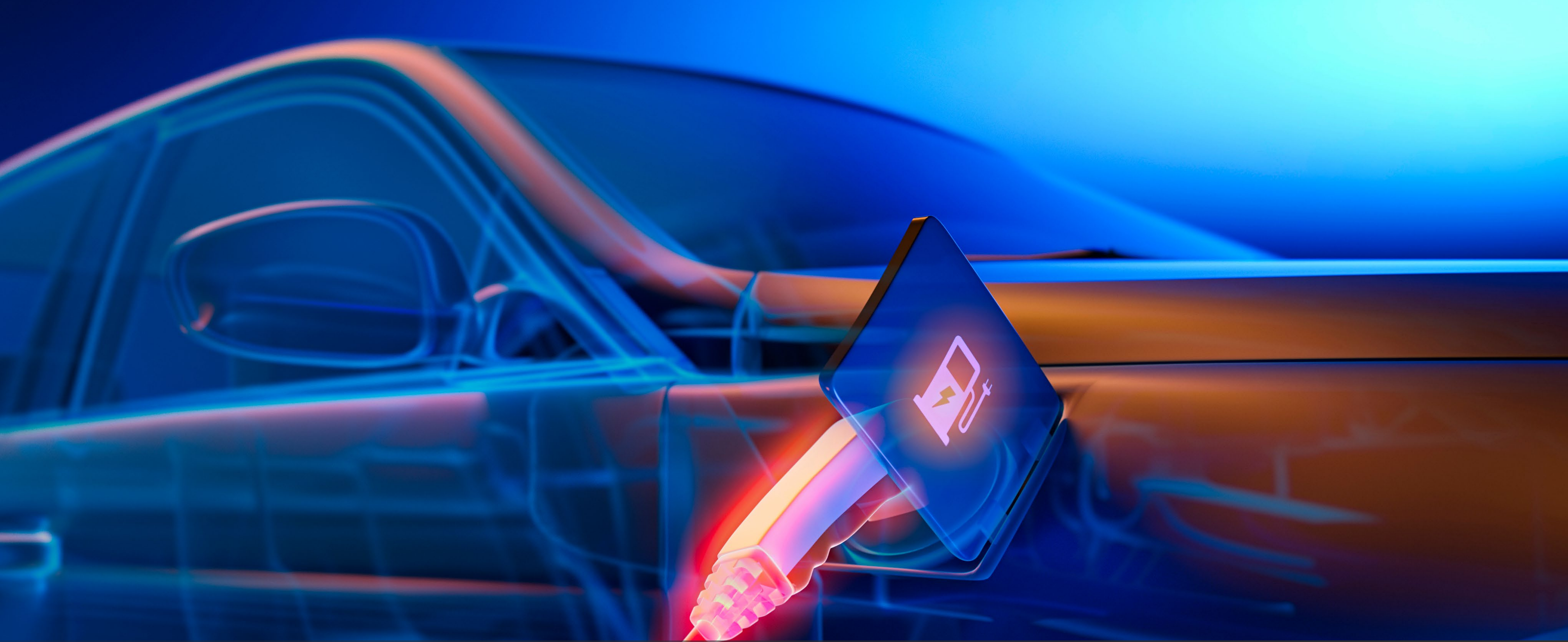

Sustainably Sourcing Magnet and Heavy Rare Earths to meet Net Zero Carbon Ambitions

Corporate Presentation

Cautionary Statement

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This presentation should be considered in its entirety. If you do not understand the material contained in this presentation, you should consult your professional advisors. The sole purpose of this presentation is to provide shareholders with an update on current activities of the Company and the current state of exploration at the Makuutu Rare Earths Project in the Uganda.

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Competent Person Statement

Information in this report that relates to previously reported Exploration Targets and Exploration Results has been crossed-referenced in this report to the date that it was originally reported to ASX. Ionic Rare Earths Limited confirms that it is not aware of any new information or data that materially affects information included in the relevant market announcements.

The information in this report that relates to Mineral Resources for the Makuutu Rare Earths deposit was first released to the ASX on 3 May 2022 and is available to view on www.asx.com.au. Ionic Rare Earths Limited confirms that it is not aware of any new information or data that materially affects information included in the relevant market announcement, and that all material assumptions and technical parameters underpinning the estimates in the announcement continue to apply and have not materially changed.

The information in this report that relates to Scoping Study results and production targets was first released to the ASX on 29 April 2021 and is available to view on www.asx.com.au. Ionic Rare Earths Limited confirms that it is not aware of any new information or data that materially affects information included in the relevant market announcement, and that all material assumptions and technical parameters underpinning the estimates in the announcement continue to apply and have not materially changed.

IonicRE's Vision

Integrated, Full Life-Cycle Rare Earth Company

Mining Rare Earths

- Mining magnet and heavy rare earths from the Makuutu Rare Earths Project, producing REOs for net zero carbon targets
- MLA to be submitted Oct 2022, expected award Q1 2023
- Long-life Ionic Adsorption Clay (IAC) deposit, low capex development
- Scalable asset, exploration upside

Refining Rare Earths

- Developing standalone refinery to separate magnet and heavy rare earths for downstream value addition to metals, magnets and RE compounds
- Evaluating US locations and downstream collaborations
- Scoping Study underway, expected Q4 2022

Recycling Rare Earths

- Recycling secondary sourced spent NdFeB magnets and swarf to produce separated, refined magnet REOs
- Demonstration plant expected to be in operation H1 2023 in Belfast, UK
- Completing the circular economy of rare earths

IonicRE Value Proposition

1. MAKUUTU IS A LARGE UNIQUE IONIC ADSORPTION CLAY DEPOSIT, PROVIDING SCALABLE EXPANSION POTENTIAL TO TAP INTO SURGING RARE EARTHS PRICING IN THE FUTURE
2. MAKUUTU A LOW CAPITAL DEVELOPMENT PROJECT, PRODUCING MAGNET & HEAVY RARE EARTHS CRITICAL FOR TOMORROW'S NET ZERO CARBON TARGETS
3. MAKUUTU'S STRATEGIC IMPORTANCE WILL INCREASE LONG TERM WITH DRAMATIC INCREASES IN DEMAND AT THE DOORSTEP
4. GEOPOLITICAL TENSIONS DRIVING SECURE, ALTERNATIVE SUPPLY OF MAGNET & HEAVY RARE EARTHS
5. DOWNSTREAM REFINING POTENTIAL TO UNLOCK VALUE OF MAKUUTU BASKET
6. MAGNET RECYCLING EXPOSURE WITH TECHNOLOGY READY TO COMMERCIALISE IN MODULAR, GLOBAL DEPLOYMENT

"When peering into the outlook for the next decade to come, it becomes quickly apparent that the rapid demand growth of the 2020s will soon be dwarfed by the astronomical demand growth of the 2030s – and therein lies the real defining challenge and opportunity facing the global rare earth industry today.

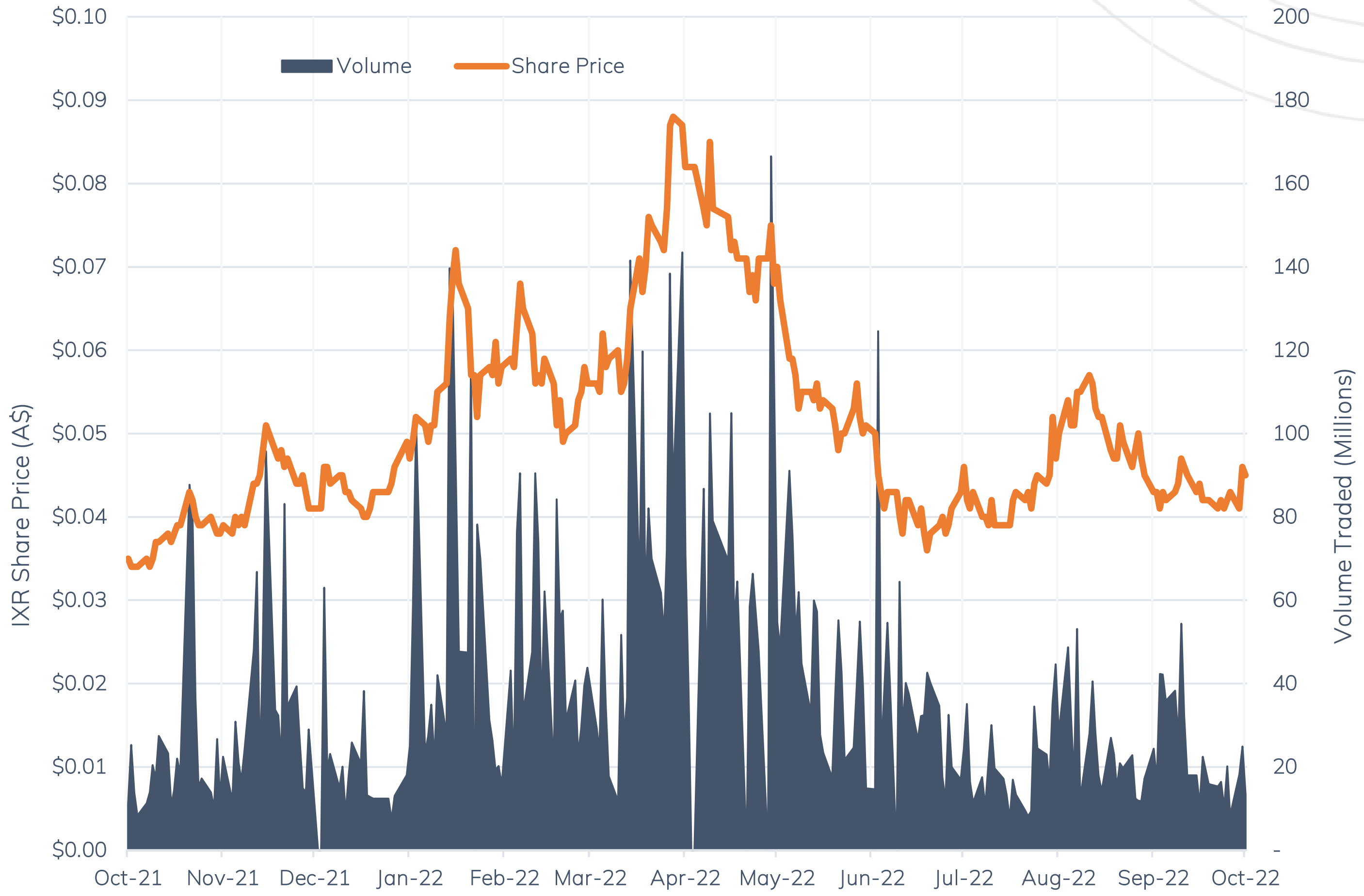
If the global industry continues to operate myopically – preparing, anticipating and investing only for a three to five-year outlook – the rate of demand growth for magnet rare earths will soon reach 'escape velocity'; a point at which annual demand growth becomes so great (i.e. >6,000 tonnes per annum) that it is simply implausible for the already-lagging supply-side to catch up and keep up."

Adamas Intelligence, Sept 28, 2020

IonicRE Corporate Snapshot

STRATEGIC VALUE DRIVEN BY THE UNIQUE MAGNET AND HEAVY REO BASKET

CAPITAL STRUCTURE (as @ 05/10/2022)	
Shares Outstanding	3,872,604,920
Total Options Outstanding	199,000,000 (exercisable at 1.8 to 6.4 cents)
Total Outstanding Performance Rights	10,200,000
Share Price	A$0.045
Market Capitalisation	A$174 million
12 month Share Price Range	A$0.033 – A$0.098
12 month Average Daily Volume / Turnover	38m shares (~A$2.2m)
Cash Balance (30/06/2022)	A$26.8 million
IXR MAJOR SHAREHOLDERS	
Major Shareholders (Top 20) Board, Executives, & Key Advisors	29.1% 8.6%
BOARD AND MANAGEMENT	
Trevor Benson	Chairman
Tim Harrison	Managing Director
Jill Kelley	Executive Director
Max McGarvie	Non Executive Director
Brett Dickson	Company Secretary & CFO

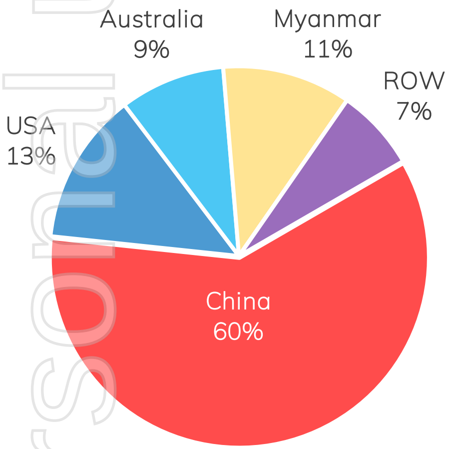


Rare Earth Supply Chain – Alternate capacity requires long term investment

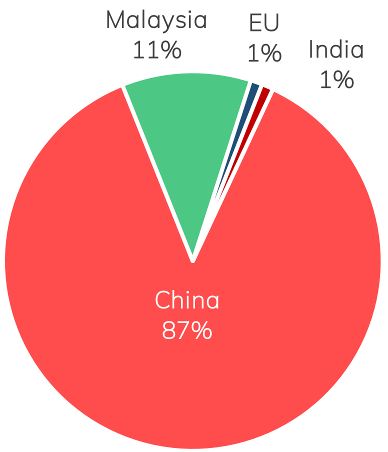
SUSTAINABLY SOURCING THE MOLECULES WILL REQUIRE DEVELOPING ALTERNATIVE CAPACITY GLOBALLY

- Rare earths are amongst the most resource-critical raw materials: they are of highest economic importance and at the same time feature a high supply risk – **supply chain dominated by China**
- **China has a dominant position in every value addition step in conversion of mined REEs to value added products**
- Developing a sustainable supply chain external from China **needs scale and capacity in every step → Long-term investment needed to facilitate this**

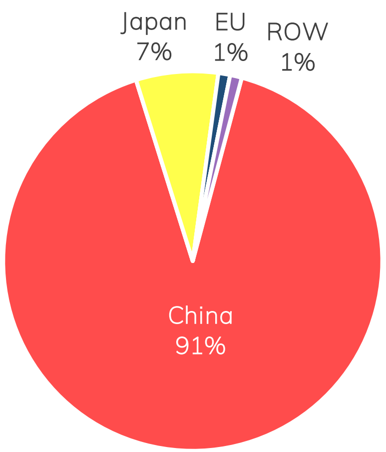
REE Mining[1]



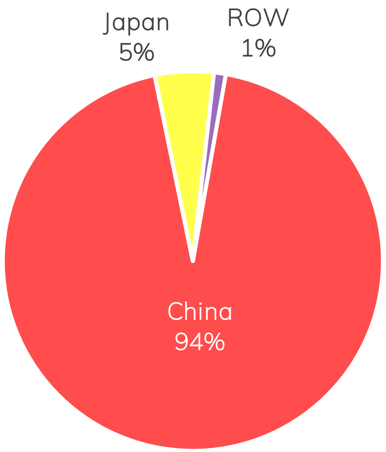
REE Processing[1]



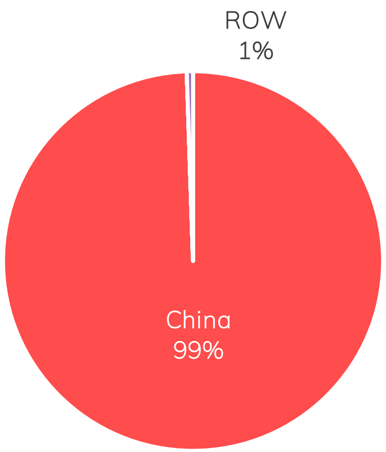
REE Metals[1]



REE Magnets[1]



REE Recycling[2]

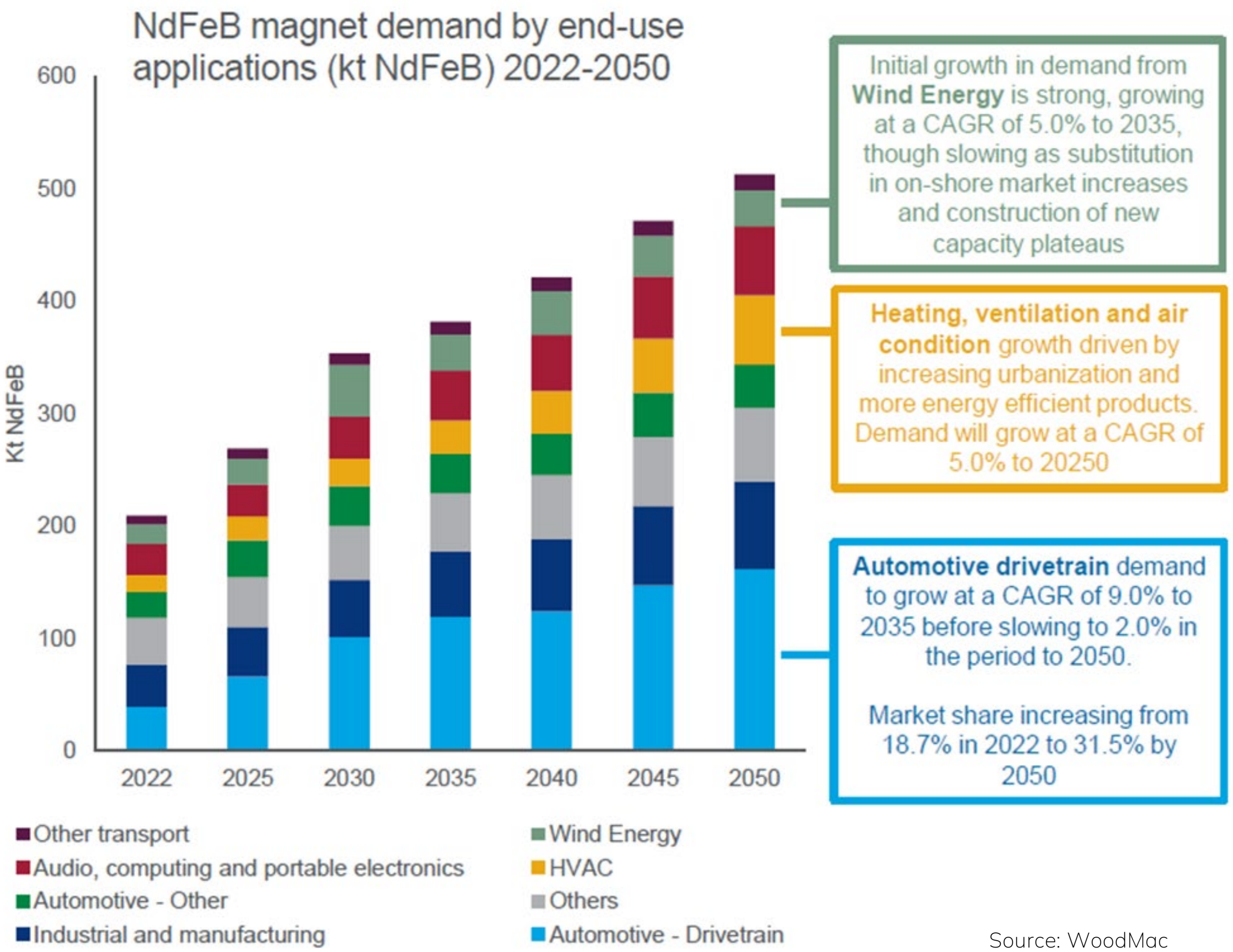


[1] Rare Earth Magnets and Motors: A European Call for Action A report by the Rare Earth Magnets and Motors Cluster of the European Raw Materials Alliances, Oct 2021. Argus Analytics Oct 2021. [2] Wood Mackenzie Global rare earths short-term outlook August 2022.

NdFeB Permanent Magnet Supply Demand to 2050

DEMAND FOR NEW NdFeB PERMANENT MAGNETS WILL EXCEED SUPPLY

- Significant increase in demand for NdFeB permanent magnets from now to 2050, **with 150% increase in total magnet capacity required forecast by 2050**
- EV demand the main driver as global forecast EV sales increase to estimated **80m units per annum by 2050**[1]
- HVAC (Heating, Ventilation and Air Conditioning) will be a growing demand as **populations adjust to climate changes globally**
- **No new western mines in construction now**
  - So where will supply come from given timeline to develop a new mine, commission and reach name plate production?
  - Near term, from 2023 onward, expected that demand for NdPr increasingly exceeds growth projections[2]
  - Global consumption of Dy presently exceeds production by 200 tonnes, rising to over 500 tonnes in 2023, resulting in the depletion of historically accumulated inventories and dysprosium oxide shortages from 2024 onwards[2]
  - Global consumption of Tb will exceed global production by nearly 300 tonnes in 2022 resulting in the drawdown of historically accumulated inventories and shortages from this year forward[2]



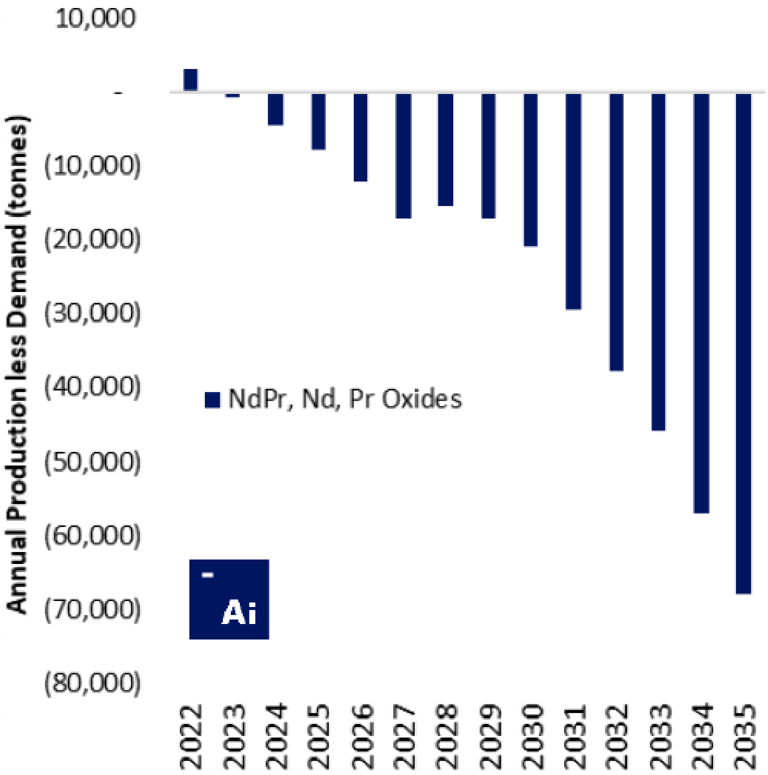
Source: WoodMac

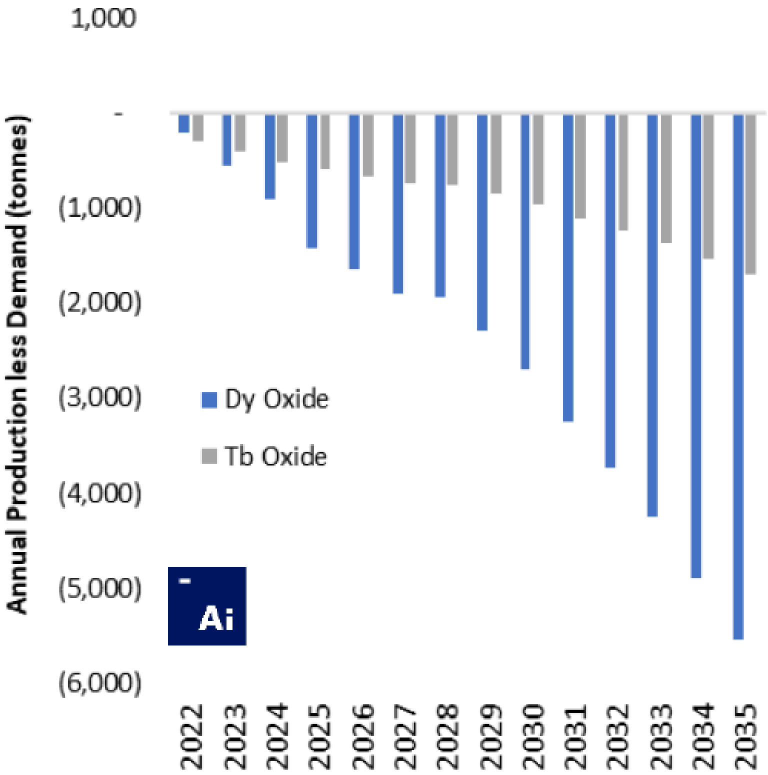
[1] Wood MacKenzie, Global rare earth strategic planning outlook to 2050, June 2022; [2] Adamas Intelligence, August 2022.

Where do the Molecules come from?

WITH DEMAND INCREASING, WHERE ARE THE MOLECULES OF Nd, Pr, Dy & Tb GOING TO COME FROM?

- Forecast deficit in magnet REOs from 2023 accelerating over the next decade → **DyTb deficit escalating now**
- There will be insufficient heavy rare earth oxide supply outside of China and Myanmar to meet the needs of emerging magnet makers





"With current global heavy rare earth oxide production increasing just marginally each year and the outlook for Myanmar (miner of 40% of the world's dysprosium and terbium) uncertain, heavy rare earth elements remain a massively under-addressed blind spot in the automotive supply chain."

"By 2035, Adamas projects the global rare earth market will be short more than one China's worth of NdPr oxide supply, and over five China's worth of Dy and Tb oxide supply, annually (referring to China's 2022 production levels) should supply not increase substantially more than what is currently anticipated."

Adamas Intelligence

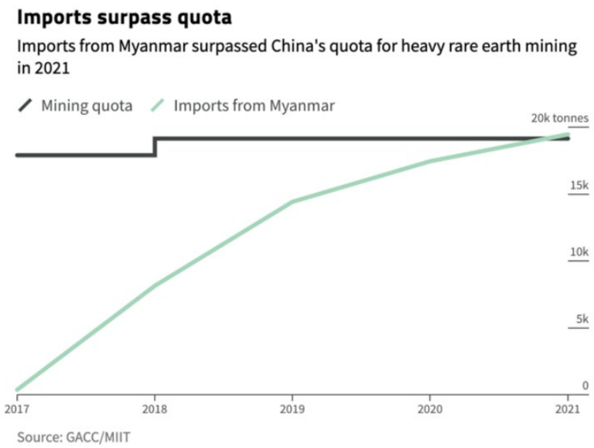
Existing Chinese Supply – Sourcing DyTb from Myanmar

CHINA INCREASING HARDROCK LREE MINED SUPPLY, IAC HREE SUPPLY QUOTA REMAINS STEADY

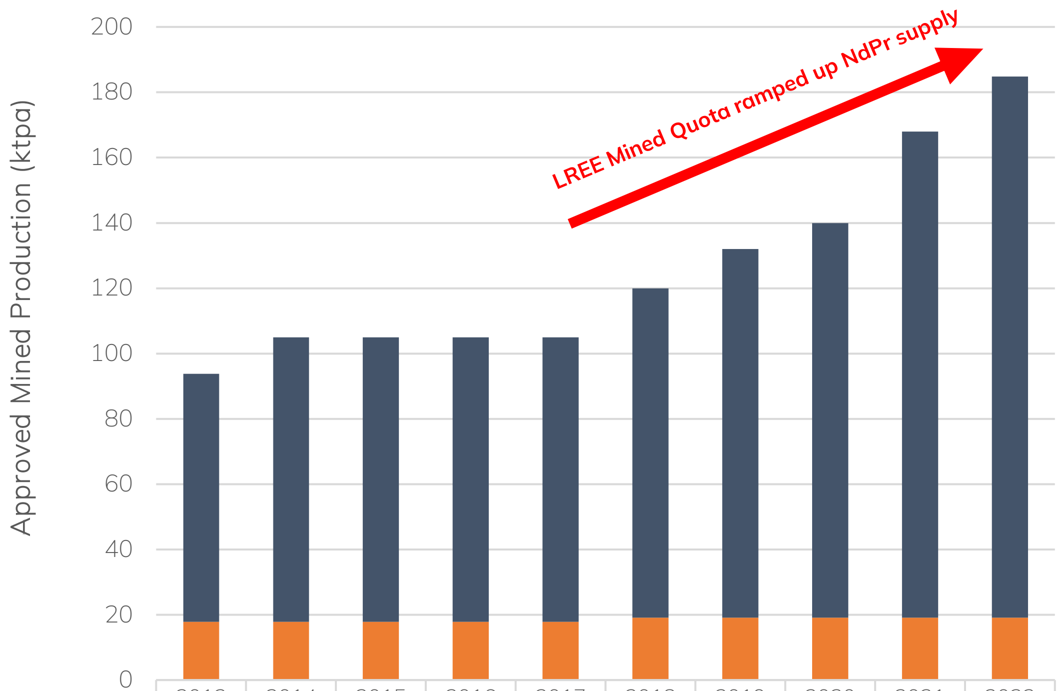
- China has maintained IAC HREE mining quotas at same level since 2018 (19 ktpa) whilst ramping up readily available hardrock LREE production (101 ktpa → 166 ktpa)[2]
- EV traction motors and generators tend to use high-temperature-performance grades of NdFeB magnets that contain elevated concentrations of HREE Dy and Tb
- Moreover, with China's known HREE resources dwindling and feedstock supplies from Myanmar into China drying up in the first half of 2022, China could soon face a domestic HREE supply crunch that could severely curtail its Dy and Tb exports[1]

"Imports from Myanmar now exceed China's domestic mining quotas, so even if the mines in China were producing at full capacity, Myanmar would remain the country's single largest source of new heavy rare earth supply – and with no other companies in China legally allowed to process this material, there is nowhere else for imports to go."
"With domestic stockpiles dwindling, Chinese enterprises are increasingly dependent on supply from Myanmar."

Global Witness[3]



Chinese REO Mining Production Quota[2]



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Hardrock - LREE	75.95	87.15	87.15	87.15	87.15	100.85	112.85	120.85	148.85	165.65
IAC - HREE	17.85	17.85	17.85	17.85	17.85	19.15	19.15	19.15	19.15	19.15

[1] Adamas Intelligence, August 2022. [2] Ministry of Industry and Information Technology, China, 2022. [3] Global Witness, Heavy Rare Earths Supply Chain Risk; Illicit minerals from Myanmar are the world's largest source of supply. August 2022.

Geo-Political Tensions – Driving Demand for Alternative, Resilient Supply

GLOBAL DESIRE TO DEVELOP ALTERNATIVE RARE EARTHS SUPPLY CHAINS TO PROTECT MANUAFCTURING AND DEFENCE

The scramble for rare earths carries big geopolitical risks

But without these metals there are limited solutions to our planetary problems

MISHA GLENNY + Add to myFT

A worker blasts the ground with water at a rare earth metals mine in Nancheng county, Jiangxi province. China dominates the production and supply of rare earth metals © Reuters

DEFENSE

Pentagon suspends F-35 deliveries after discovering materials from China

The issue does not affect flight operations of F-35s already in service.

"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."

"We have to build a more resilient supply chain, supporting projects and attracting more private investment from mining to refining, processing and recycling."

*European Commission President von der Leyen recalled some hard facts: **without secure and sustainable access to the necessary raw materials, our ambition to become the first climate neutral continent is at risk.***

14 September 2022

European Commission

"DOE, DOD, and the Department of State signed a memorandum of agreement (MOA) to better coordinate stockpiling activities to support the U.S. transition to clean energy and national security needs."

White House Briefing, 22 February 2022

Financial Times, The scramble for rare earths carries big geopolitical risks, 27 September 2022;
Politico, Pentagon suspends F-35 deliveries after discovering materials from China, 7 September 2022.

IonicRE aspires the build alternative supply from mine and recycling

DEVELOPING A SECURE, TRACEABLE, MAGNET AND HEAVY RARE EARTH SUPPLY CHAIN TO FACILITATE NET ZERO CARBON AMBITIONS

The Mine – Makuutu

Makuutu is one of **very few global ionic adsorption clay (IAC) deposits** with scale to move the needle on heavy rare earth oxide (REO) supply

MRE of **532Mt @ 640 ppm** with significant Exploration Upside

Simple mining and low capex processing to produce Mixed Rare Earth Carbonate (MREC)

No radionuclides

The Refinery – Unlock flow of REO to downstream partners

Opportunity to **maximise revenue** from the Makuutu MREC product

Collaborate with end users on **development of secure and traceable REO supply chain**

REOs → Metal → Magnets

Focusing on **potential in US market**

The Basket – High Margin

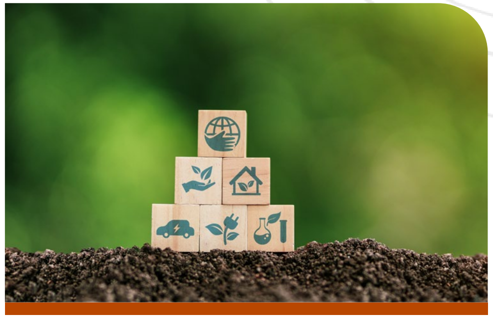
One of the **highest value REO baskets of all projects** in development today

33% magnet REOs used in EVs and wind turbines **(Nd, Pr, Dy, Tb)** plus another 10% used in other magnetic applications (**Sm, Gd, Ho**)

44% Heavy REOs **(Sm to Y)**

93% of forecast value derived from magnet REOs plus Y

Major future source of **Scandium** production



Sustainable REO Production, Circular Economy via Recycling

ESG drive globally to **source sustainable critical raw materials**

Development of **Ionic Technologies to accelerate supply from secondary sources via magnet recycling**

Recycling magnet REOs presently makes up **40% of global magnet REO supply chain**, dominated by China (>99%)[1]

[1] Wood Mackenzie, Global rare earths short-term outlook July 2022.

Makuutu Rare Earths Project

Low Capital, Modular, Ionic Adsorption Clay Project

Harnessing the wide appeal of the Makuutu Basket

MAKUUTU PROVIDES A UNIQUELY BALANCED BASKET RICH IN MAGNET AND HEAVY RARE EARTHS

MLA on RL 1693 – Stage 1

Greater Makuutu **MRE currently 532 mt @ 640 ppm TREO, with over 400mt Indicated Resource**

Indicated Resource on RL 1693 presently ~ 259mt @ 740 ppm TREO

Strategic importance of Makuutu (51% IonicRE ownership moves to 60% on completion of FS ~ Oct 2022)

IonicRE has **pre-emptive right on remaining 40% of Project**

Makuutu is unique and receiving global interest due to **high quality balanced** (magnet + HREO) basket

Proven IAC, classified as **medium Yttrium, high Europium deposit**

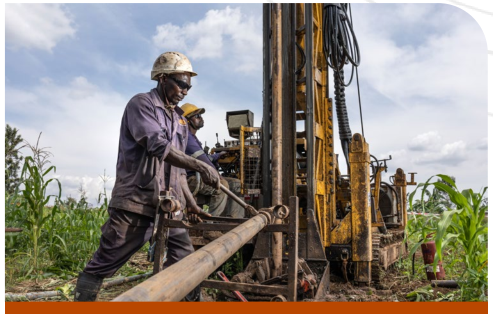
Discussions continue with other groups looking to secure long-term magnet and heavy REO supply

Potential feed to **standalone Rare Earth Refinery**

One of less than a handful of global projects that can produce the molecules needed

Existing Infrastructure at Makuutu

- Highway and road access to site plus rail
- Nearby 132 kV power infrastructure with readily available low-cost hydropower
- Cell phone communications available across site
- Water available



Significant Exploration upside at Makuutu still to be realised

Already one of **worlds largest Ionic Adsorption Clay (IAC) deposits**

Highly prospective licence EL00147 recently tested via RAB drilling with **assays confirming clay hosted REE mineralisation present**

Exploration Target revised demonstrating **potential to double resource longer term**

New EL00257 to be tested in 2023

Significant Advantages for IAC Mining/Processing vs Hardrock

Ionic Clay Rare Earth Elements Vs Hard Rock Rare Earth Elements

Significant project and cost advantages associated with ionic clay projects like Makuutu

Mining & Processing Stages	Ionic Adsorption Clay – Hosted REE	Hard Rock – Hosted REE
Mineralisation	Soft material, negligible (if any) blasting Elevated HREO/CREO product content	Hard rock: Bastnaesite and Monazite (LREO dominant); Xenotime (HREO dominant)
Mining	Low relative operating costs: Surface mining (0-20m) Minimal stripping of waste material Progressive rehabilitation of mined areas	High relative operating costs: Blasting required Could have high strip ratios
Processing Mining Site	No crushing or milling Simple process plant Potential for static or in-situ leaching with low reagent at ambient temperatures	Comminution, followed by beneficiation that often requires expensive (flotation) reagents to produce mineral concentrate
Mine Product	Mixed high-grade Rare Earths precipitate, either oxide or carbonate (+90% TREO grade) for feedstock directly into Rare Earth separation plant, low LaCe content	Mixed REE mineral concentrate (typically 20-40% TREO grade), high LaCe content, requires substantial processing before suitable for feed to rare earth separation plant
Product Payability	60-70% payability as mixed Rare Earth oxide/ carbonate	30-35% payability as a mineral concentrate
Processing - Environmental	Non-radioactive tailings Solution treatment and reagent recovery requirements (somewhat off-set by advantageous supporting infrastructure)	Tailings often radioactive (complex and costly disposal) Legacy tailing management
Processing - Refinery (Typically, not on Mining site)	Simple acid solubilisation followed by conventional REE separation Complex recycling of reagents and water Lower Capex (~$100-$200m)	High temperature mineral "cracking" using strong reagents to solubilise the refractory REE minerals Complex capital-intensive plant (~$500m-$1B) required Radionuclide issues follow REE mineral concentrates

Ionic Adsorption Clay (IAC) deposit mineralisation is highly desirable given it produces a balanced **REO basket dominant in magnet & heavy REO with higher value and broader appeal**

Near surface IAC mineralisation translates to **lower strip ratios** with lower cost mining methods

IAC ores require much **lower CAPEX intensity to produce refined REOs**

IACs produce **value added Mixed Rare Earth Carbonate** product, **higher grade and basket value**

IAC product achieves **approx. double the payability**

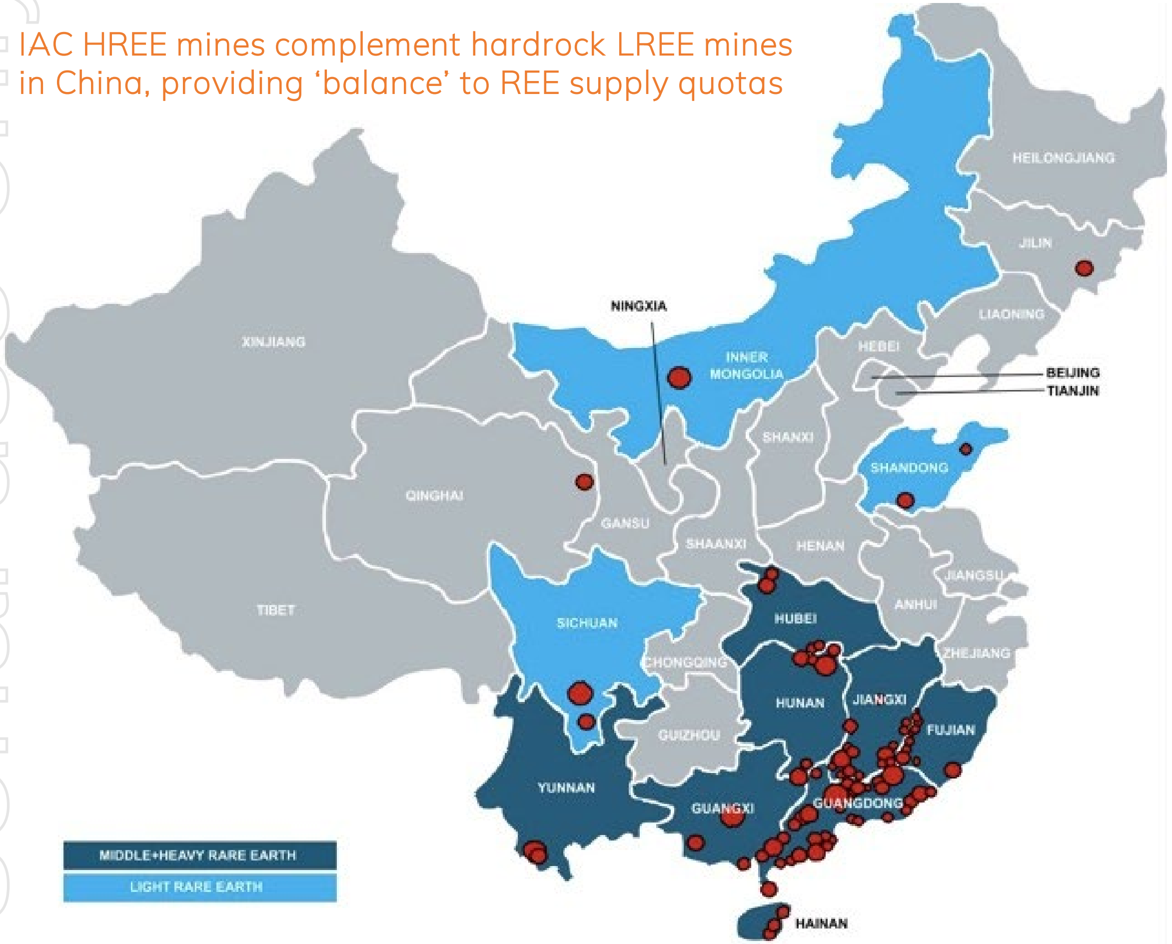
IACs experience **none of the radionuclide issues that plague hardrock LREO Projects**

IAC separation and refining much lower CAPEX requirement

The REE Basket Problem – the Solution requires HREE ‘Balance’

IONICRE THROUGH MAKUUTU CAN DELIVER UNIQUE HREE BALANCE TO WESTERN LREE PRODUCTION

IAC HREE mines complement hardrock LREE mines in China, providing ‘balance’ to REE supply quotas



Ionic Adsorption Clay (IAC) deposit mineralisation is highly desirable given it produces a balanced **REO basket dominant in magnet & heavy REO with higher value and broader appeal**

Hardrock rare earth mines typically produce basket >90-95% LREE, i.e. very low in HREE content

Very few true IAC deposits (<5) identified of scale outside of southern China, Myanmar and south east Asia

Increased LREE production to facilitate oversupply, and potentially suppress LREE prices, specifically NdPr

IAC HREE mines typically **much lower production capacity** than hardrock LREE mines, however **much higher value product**

The rare earth solution for the future requires a balance; LREE readily sourced but HREE is truly rare (hard to find)

Tier-One Infrastructure already there – supports low CAPEX Development

EXCELLENT LOCAL INFRASTRUCTURE SUPPORTS LOW CAPEX DEVELOPMENT

LOGISTICS

Approximately **10 km from Highway** 109, connecting Makuutu to both capital city Kampala and Port of Mombasa, Kenya

Approximately **20 km from rail line** connecting to Port of Mombasa

POWER

Large hydroelectric generation capacity (+810MW) within 65 km of Makuutu Project area will deliver **very low-cost power** (US$0.05/kWh), plus further capacity being developed

Existing electrical grid infrastructure immediately adjacent to site to provide stable power

WATER

Plentiful fresh water within and near project area (water harvesting)

WORKFORCE

No camp required – low-cost professional local workforce available

Makuutu Mineral Resource Estimate → Mining Lease Application

MAKUUTU MRE CURRENTLY >500 MILLITON TONNES, FOCUS FOR MLA ON MAKUUTU CENTRAL ZONE (RL 1693)

JORC MRE[1] of 532 million tonnes @ 640 ppm Total Rare Earths Oxide (TREO), at a cut-off grade of 200 ppm TREO-CeO_2

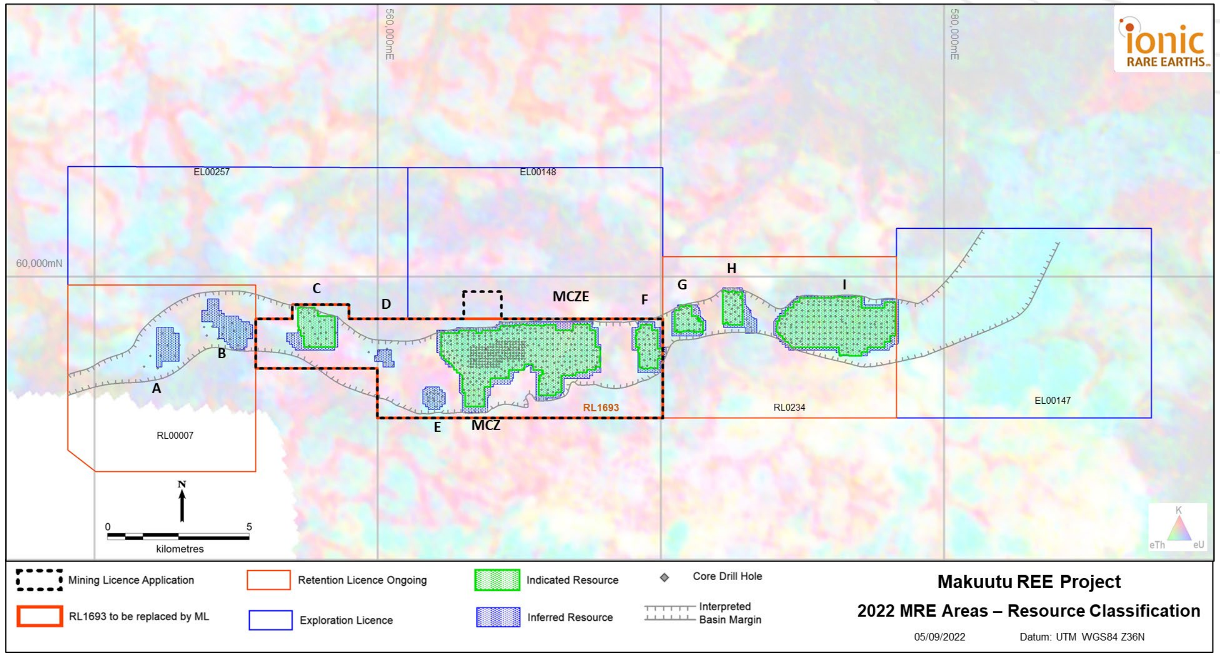
76% of Makuutu MRE now converted to Indicated Resource, at 404 million tonnes at 670 ppm TREO

Increased resource confidence at Makuutu to support **MLA focused on RL 1693 – contains 259 million tonnes an Indicated Resource of 259 million tonnes at 740 ppm TREO-CeO_2[1]**

Makuutu Central Zone (MCZ), provides a continuous resource area over **5.5km long and 3km wide for a combined 234 million tonnes** or 44% of the total resource and 52% of the total Indicated Resource

Other RLs and ELs will advance towards MLA as their Licences move to the next renewal period (RL 00007 expected to progress to MLA in Nov 2024)

Shallow, near surface IAC mineralisation, with clay layer averaging 5 to 12m thick under cover approximately 3m deep. Average hole depth ~18m, **maximum clay thickness ~29m**



Category	Estimation Domain	Tonnes (Mt)	TREO (ppm)	TREO no CeO_2 (ppm)	LREO (ppm)	HREO (ppm)	CREO (ppm)	Sc_2O_3 (ppm)
Indicated	Clay	404	670	450	500	170	230	30
Inferred	Clay	127	540	360	400	140	180	30
Total Resource	**Clay**	**532**	**640**	**430**	**480**	**160**	**220**	**30**

[1] Makuutu Mineral Resource Estimate reported to ASX on 3 May 2022.

Exploration Target Updated – Potential to Double Resource

EXPLORATION TARGET REVISED INDICATING SIGNIFICANT UPSIDE AT EL00147 PLUS NEW TARGET TO NORTH WEST (EL00257)

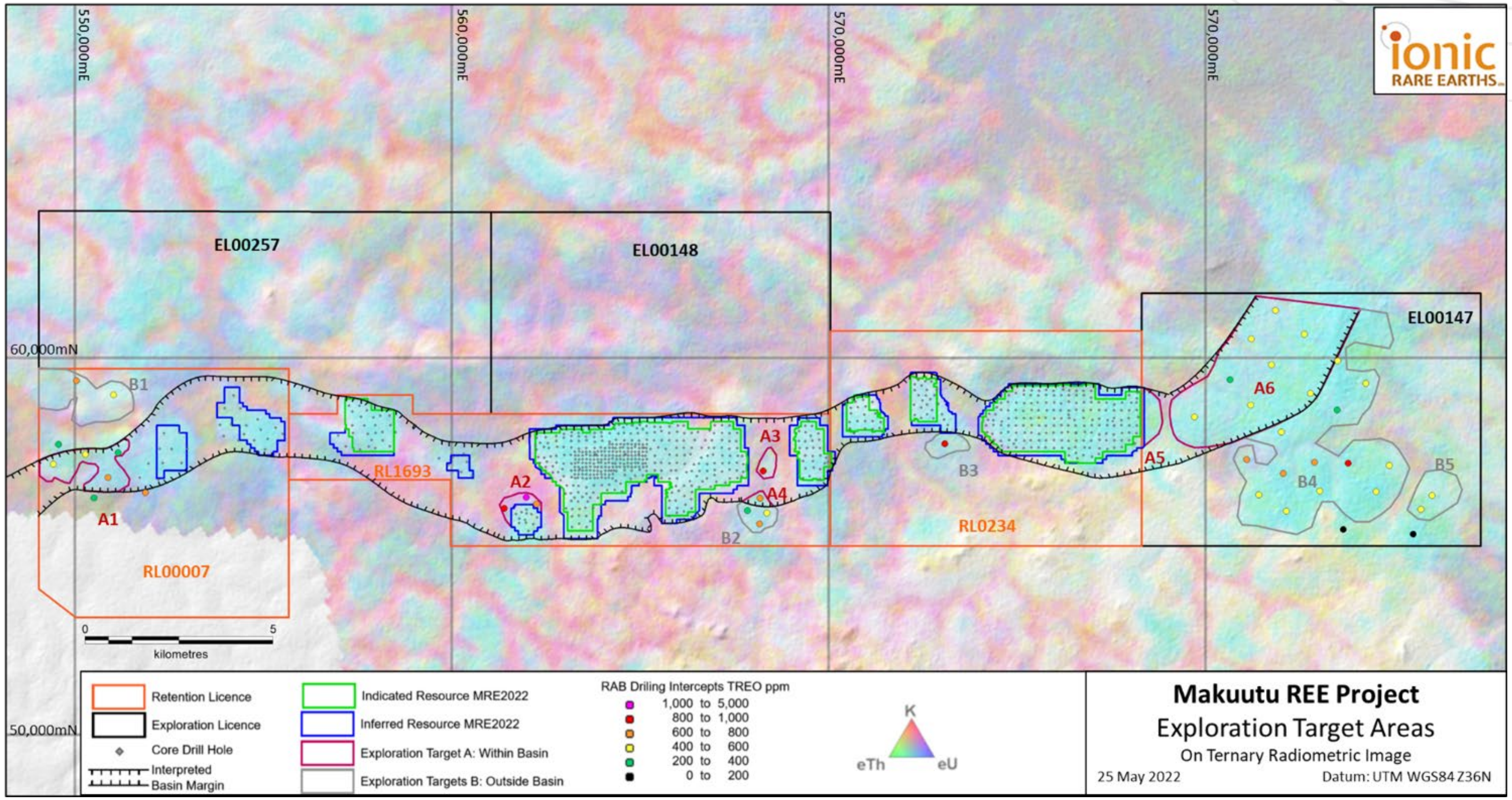
Updated Exploration Target[1] reported

216 – 535 million tonnes grading 400 – 600 ppm TREO*

*This Exploration Target is conceptual in nature but is based on reasonable grounds and assumptions. There has been insufficient exploration to estimate a Mineral Resource and it is uncertain if further exploration will result in the estimation of a Mineral Resource.

Longer term, **numerous exploration targets identified** for drilling in 2023

- 67 RAB drill holes (Phase 3) announced in July 2021 **confirmed extension of mineralisation east to EL00147, between previous identified radiometric anomalies, and to northwest (EL00257)**
- **Total tenement package ~ 300 km² across 37km of mineralisation trend**
- Completed field exploration programs in Q3 2022 and mobilising additional scout drilling later in early 2023



[1] Makuutu Exploration Target reported to ASX on 1 June 2022. [2] Phase 3 RAB results announced 15 July and 20 July 2021.

ESG initiatives advancing at Makuutu

ESG FRAMEWORK TO BUILD LASTING LEGACY, DEFINING PATH TO NET ZERO CARBON RARE EARTH FOOTPRINT

Environmental and Social Impact Assessment (ESIA) submitted in December 2021, hearings completed, approval pending

Focus on carbon footprint reduction using low cost renewable (hydro) power

Minviro engaged to complete Life Cycle Analysis (LCA)

Rehabilitation plans to ensure net positive climate legacy

Water treatment for reagent recovery and rehabilitation strategy

Rehabilitation to consider development of longer term industrial programs for employment

Aligned with Uganda's 3rd National Development Plan (NDPIII)

- Agricultural Programs to increase productivity
- Aquaculture and fish farming
- Agroforestry

Community Support Programs identified

Working together to build a future where everyone has a pathway to health and opportunity

Establishment of an Advisory Committee to coordinate community development investment priorities

Key focus being community health and education

Recently joined the UN Global Compact

Community socio-economic baseline surveys across initial project area underway

Built a Ugandan team to drive Project activity in country

Community and Stakeholder engagement ramping up

Local support for sub-district health clinics during Covid-19

Resettlement Action Plan (RAP) underway across RL 1693

Downstream Industries Empowered by IonicRE's Basket and the Supply Chain Opportunity

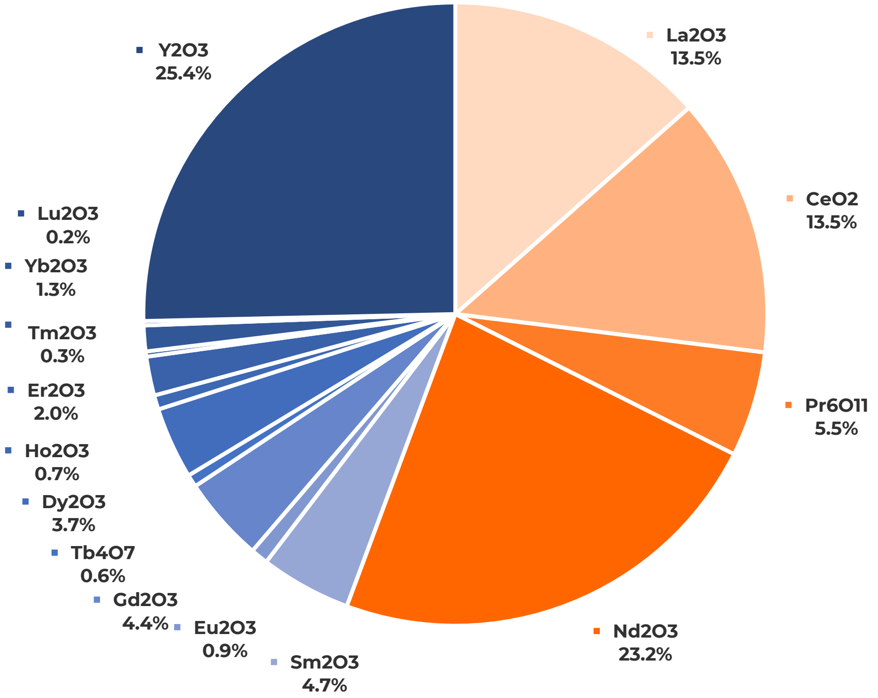
IonicRE Basket is a highly strategic basket with escalating forecast value

DOWNSTREAM PROCESSING TO REO AND VALUE ADDED PRODUCTS UNLOCKS SIGNIFICANT UPSIDE

- IonicRE progressing & evaluating downstream REE separation and refining circuit – **Scoping Study expected late Q4 2022**
- Refinery Locations have been evaluated with a **focus now on the US supply chain**
- Exploring opportunities to value add beyond REOs through **supply chain collaboration / partnerships**
  - MREC product typically has payability ~ 60-70% (presently ~ US$40-$47/kg[1]) depending upon destination
  - Refined REO payability increased to 100% (presently ~US$66/kg[1])
- Makuutu current spot REO basket price ~38% lower than highs in Feb 2022 due to current global climate and slowdown in China
- **2030** forecast pricing of Makuutu REO basket between **US$90/kg (downside case) to US$142/kg (upside case)[5] – ex. Sc**
- **2035** forecast pricing of Makuutu REO basket between **US$123/kg (downside case) to US$155/kg (upside case)[5] – ex. Sc**
- Scandium upside represents potential **increase of 20-25% additional** revenue potential from Makuutu LOM

Rare Earth Oxide		Makuutu Basket Composition	REO Pricing (China) Argus Metals 29-Sept-2022 US$/kg
La_2O_3	%	13.5%	$ 1.35
CeO_2	%	13.5%	$ 1.40
Pr_6O_{11}	%	5.5%	$ 104.50
Nd_2O_3	%	23.2%	$ 106.00
Sm_2O_3	%	4.7%	$ 2.55
Eu_2O_3	%	0.9%	$ 28.50
Gd_2O_3	%	4.4%	$ 58.50
Tb_4O_7	%	0.6%	$ 1,830.00
Dy_2O_3	%	3.7%	$ 323.00
Ho_2O_3	%	0.7%	$ 102.00
Er_2O_3	%	2.0%	$ 55.00
Tm_2O_3	%	0.3%	$ 850.00
Yb_2O_3	%	1.3%	$ 13.50
Lu_2O_3	%	0.2%	$ 805.00
Y_2O_3	%	25.4%	$ 9.20
Sum Total		100%	
Magnet REO	%	43%	
Light REO[2]	%	56%	
Heavy REO[3]	%	44%	
Critical REO[4]	%	54%	
Basket Value	US$/kg		$ 66.03

MAKUUTU BASKET CONTENT MAGNET & HEAVY REO PRODUCT

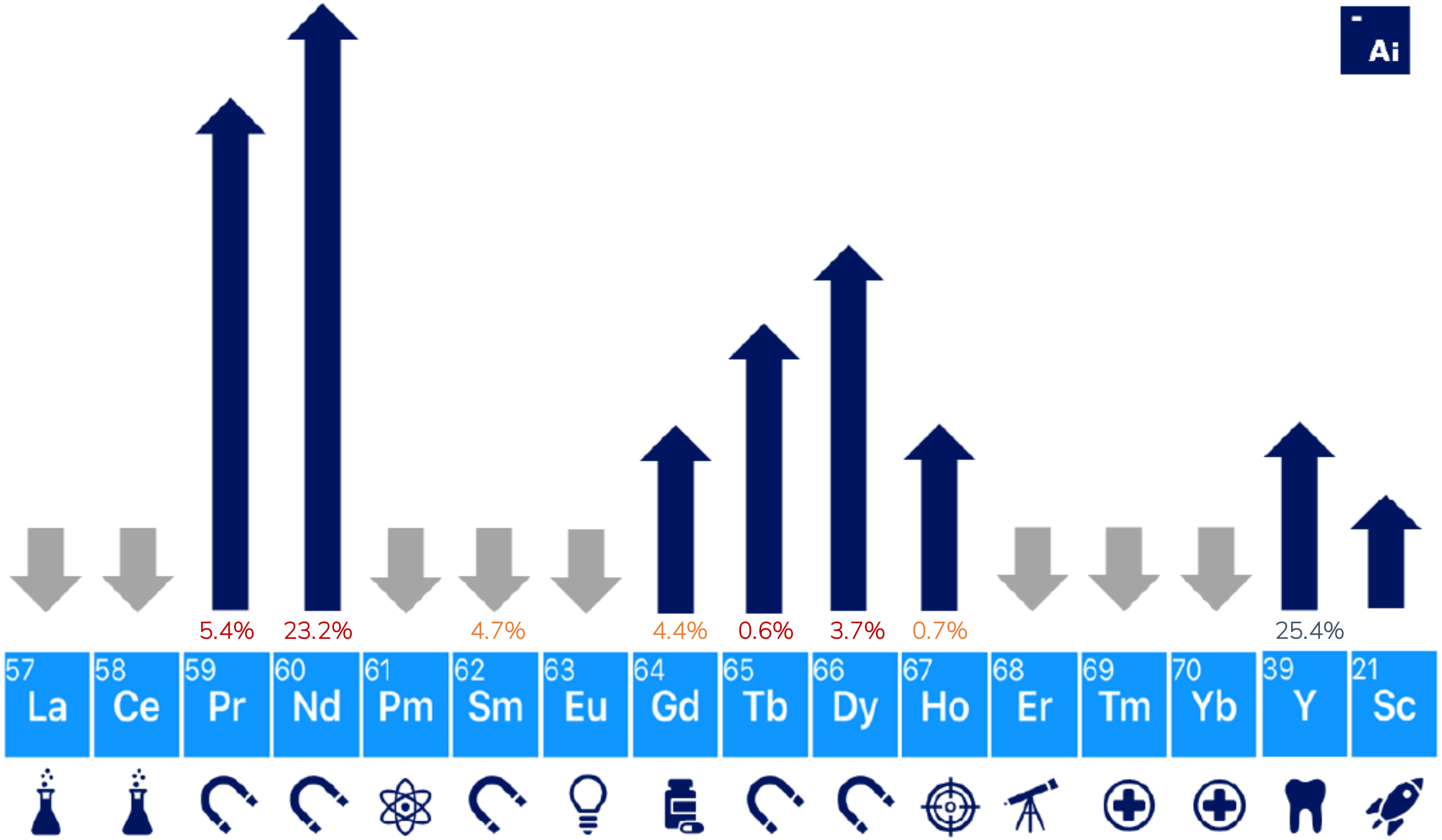


Note. Rounding Applied to nearest 0.1%.

[1] Based upon current Chinese spot REO pricing. [2] Light REO = La, Ce, Pr, Nd. [3] Heavy REO = Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Y. [4] Critical REO = Nd, Eu, Tb, Dy, Y. [5] Adamas Intelligence Rare Earth Magnet outlook to 2035, September 2022.

IonicRE Basket – Forecast Demand driving long term appreciation

Forecast demand for magnet REOs plus Yttrium driving long term pricing forecast for the Makuutu Basket



China Dominates Global REE Separation & Refining Capacity

ALL HEAVY RARE EARTH ROADS LEAD TO CHINA .... UNTIL NOW

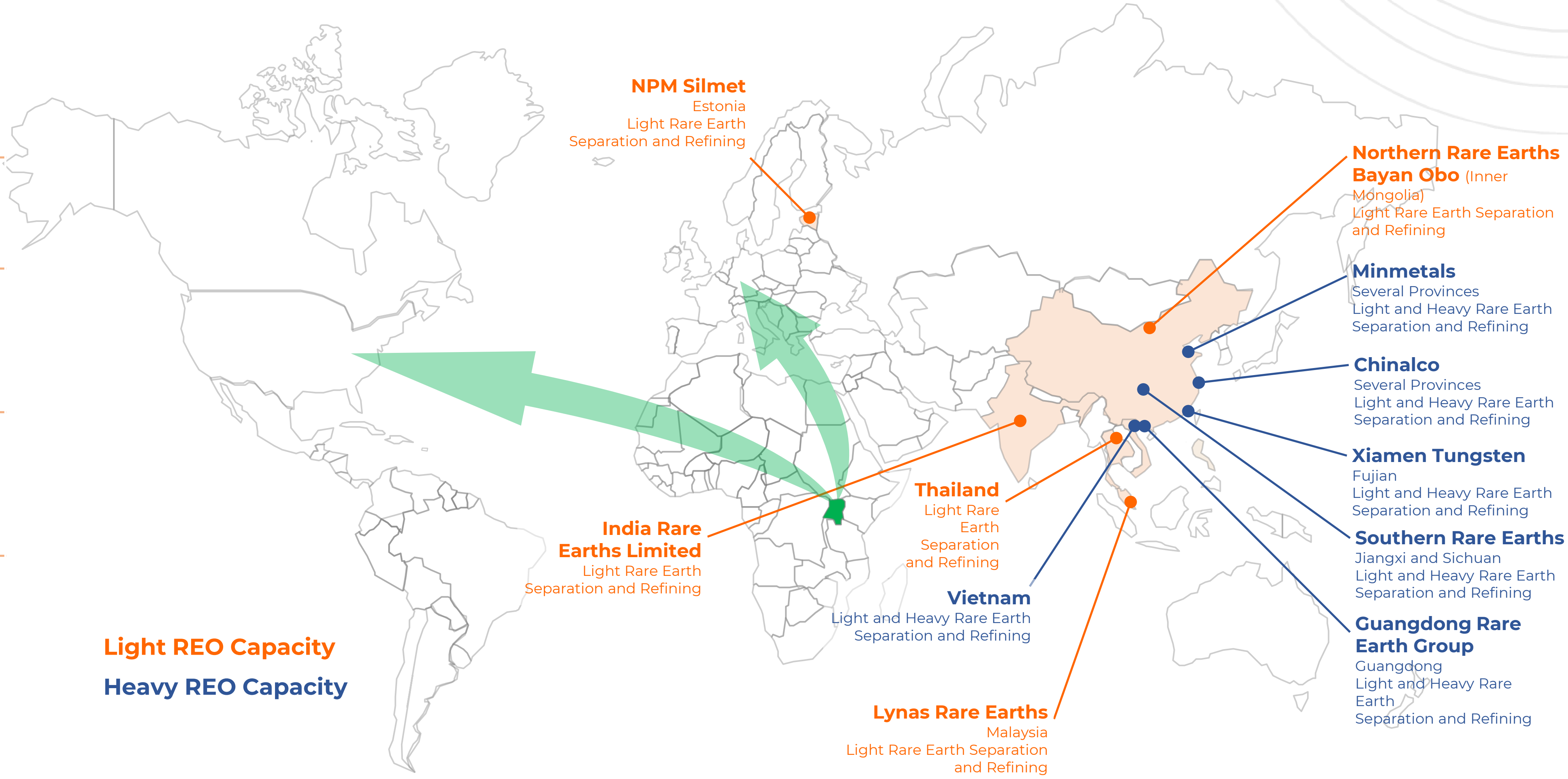
Global heavy REO separation and refining capacity operated and controlled by China[1]

Small capacity identified in Vietnam

HREO separation and refining plants under consideration but none in construction yet

IonicRE evaluated a number of global locations to base heavy rare earth refinery

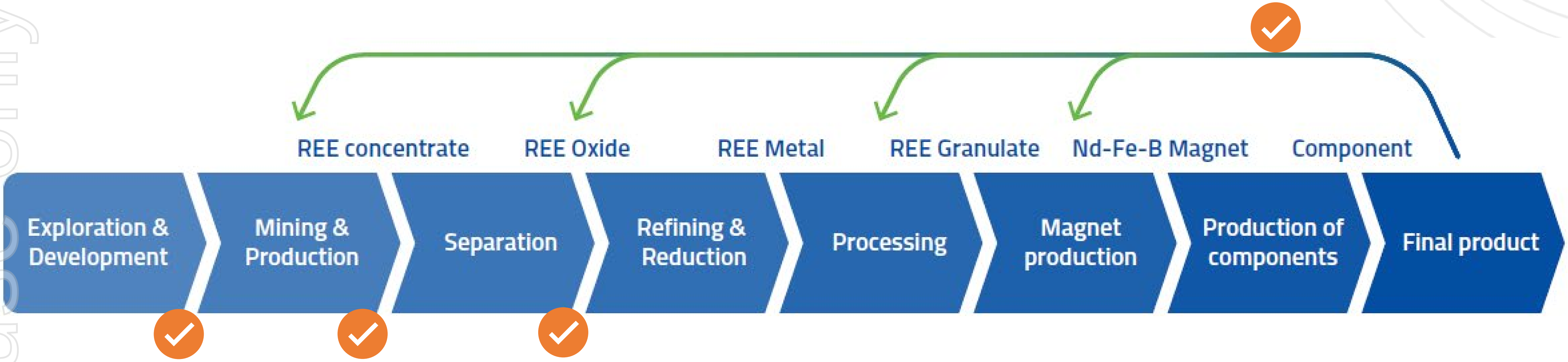
IonicRE to advance Rare Earth Refinery to Magnets Initiative (including Recycling) to sell product to partners in EU and US



[1] Argus Analytics.

REE Supply Chain and IonicRE Capability to date

IONICRE ADDING CAPACITY TO BECOME INTEGRATED IN FUTURE RARE EARTH SUPPLY CHAINS



1. Makuutu Rare Earths Project

- Low Capital, modular development enables IonicRE to bring on highly sought-after basket of REEs
- Expandable with free cash flows and growing market demand
- MLA on RL1693 planned for late 2022
- Expecting ML granted early 2023
- Commencing operations in 2024

2. IonicRE Refinery

- Under Evaluation now assessing potential economics → Scoping Study due Q4 2022
- Targeting separation of MREC from Makuutu to produce refined REOs for downstream conversion to metals and alloys through collaboration / partnerships
- Potential to receive MREC feed or HREO products from other producers

3. Magnet Recycling

- Low capital development to recycle spent magnets and swarf to produce separated and refined 99.9%+ REOs
- Near term magnet REO production capacity (Nd, Pr, Dy and Tb – potential for Sm, Gd, Ho)
- Modular recycling plants located in numerous jurisdictions

Standalone Refinery to unlock value of balanced basket REOs

DEVELOPMENT SUPPLY CHAIN TO PRODUCE REOs OF INCREASING DEMAND AND DECREASING SUPPLY

- Rare earth separation and refinery facility developed to take advantage of **long life, secure and traceable supply** source from Makuutu
    - Plan to ramp up to ~ **4,000 tonnes per annum of REO**[1]
    - **Long life potential** producing a basket with suite of individual REEs that will **appreciate** long term
    - Increase of Makuutu MRE → extension of life → increased appeal to go downstream
- Potential to **source additional REO feed stocks** (as heavy MREC products) by other REE mines for additional revenue generation
- **Inclusion of magnet recycling increased Nd, Pr, Dy and Tb** production capacity longer term
- **Facilitate the value of the refined REOs into downstream industry**
    - Opportunity for **OEMs to participate** in secure and traceable supply chain
    - Various industrial opportunities to **create JVs in new industrial applications**
- Maximise revenue upside from development of the Sc market

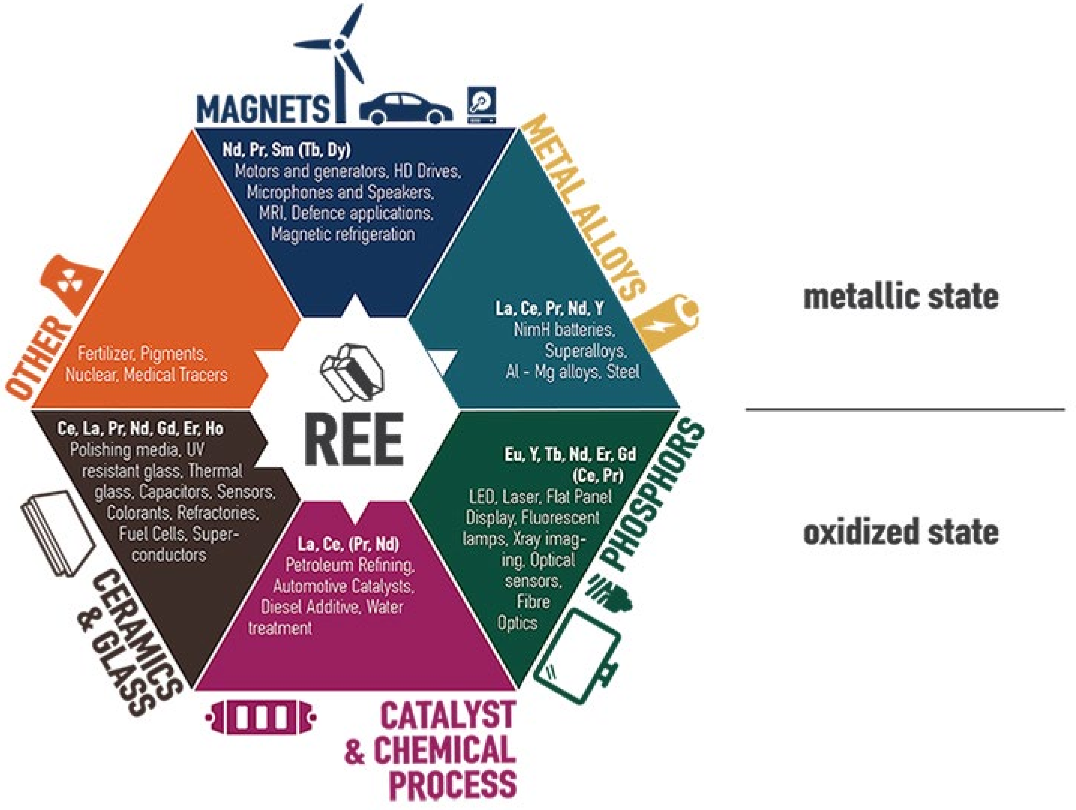
Rare Earth Element	REO Production Capacity[1] (t/annum)	Major Applications and Uses
Lanthanum (La)	580	Battery alloys, metal alloys, auto catalysts, petroleum refining, polishing powders, glass additives, phosphors, ceramics, and optics
Cerium (Ce)	550	Battery alloys, metal alloys, auto catalysts, petroleum refining, polishing powders, glass additives, phosphors, and ceramics
Praseodymium (Pr)	220	Permanent magnets, battery alloys, metal alloys, auto catalysts, polishing powders, glass additives and colouring ceramics
Neodymium (Nd)	1,000	Permanent magnets, battery alloys, metal alloys, auto catalysts, glass additives and ceramics
Samarium (Sm)	180	Magnets, ceramics, and radiation treatment (cancer)
Europium (Eu)	35	Phosphors, optical fibres, flat panel displays
Gadolinium (Gd)	170	Ceramics, nuclear energy, and medical (magnetic resonance imaging X-rays)
Terbium (Tb)	25	Permanent magnets for high temperature applications, fluorescent lamp phosphors, defence applications
Dysprosium (Dy)	140	Permanent magnets, defence
Holmium (Ho)	30	Permanent magnets, nuclear energy and microwave equipment
Erbium (Er)	75	Nuclear energy, fibre optic communications, and glass colouring
Thulium (Tm)	11	X-rays (medical) and lasers
Ytterbium (Yb)	65	Cancer treatment and stainless steel
Lutetium (Lu)	10	Age determination, medical and petroleum refining
Yttrium (Y)	1,000	Battery alloys, metal alloys, phosphors, catalytic converters, ceramics and defence
Scandium (Sc)	120	High strength, low weight aluminium scandium alloys, solid state energy storage, 3D printing, high intensity lighting

[1] Nominal capacity aligned with Makuutu Scoping Study production capacity.

IonicRE Vision – Facilitating Manufacturing

DEVELIVERING MAGNET & HEAVY REO SUPPLY CHAIN TO CREATE NEW INDUSTRY AND JV's

- Through the availability of long-life, low-cost MREC from Makuutu, IonicRE aiming to **develop relationships with key industry participants to generate EU and US based manufacturing activity**
- **Initial focus on permanent magnets** used in Electric Vehicles, Offshore Wind Turbines and Defence
  - Expanded out shortly after to cover other magnet REO applications with Sm, Gd and Ho
- Longer term **focus in heavy rare earth growth opportunities**
  - Niche heavy rare earth applications and high-end technologies – communications, medical, laser optics
- Providing a secure and traceable supply of magnet and heavy rare earths – **Seeds of Technology** – to **facilitate new R&D to propagate new applications and innovations with partners**
- Development of **new age alloys for new technologies - Aluminium-Scandium alloys** in light weighting transportation
- Facilitating **Life Cycle ownership of Rare earth processing**
  - Magnet recycling and redeployment of magnet REOs back to new high quality, high intensity applications



Magnet Recycling and the Circular Economy of Rare Earths

Ionic Technologies – NdFeB Magnet Recycling

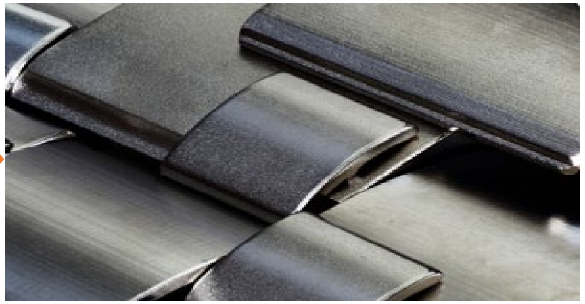
DEVELOPING CAPACITY ON RARE EARTH SEPARATION, REFINING AND RECYCLING

- IonicRE advancing **Ionic Technologies** (formerly Seren Technologies), **a leading magnet recycling technology company**, based in Belfast UK, a spin out from Queen University Belfast (QUB)
- Unique recycling technology that can **hydrometallurgically extract, separate and refine magnet REOs from spent magnets and swarf to high purity 99.9%+ oxides – Nd_2O_3, Pr_6O_{11}, Dy_2O_3 and Tb_4O_7**
- Recently awarded **grant of £1.72 million (~ A$2.9 million) from the UK Government's Innovate UK Automotive Transformation Fund Scale up Readiness Validation (SuRV) program**, to develop a demonstration scale magnet recycling plant, a significant step towards securing the UK supply of critical rare earth metals for EV manufacture
- 16,000 tonnes of rare earth permanent magnets are exported from China to Europe each year, **representing approximately 98% of the EU market**
- Provide springboard to accelerated rare earth production capacity, with potential to **commence magnet REO production at small scale in 2023** whilst Makuutu is being developed and ramped up and in parallel to the development of the Refinery
- Potential to **facilitate collaboration / partnership agreements on downstream supply chain** from REOs → RE metals → RE alloys → NdFeB magnets

ionic TECHNOLOGIES
RARE EARTHS FOR LIFE

MIXED GRADES OF WASTE PERMANENT MAGNETS

100% RECYCLED INDIVIDUAL RARE EARTH OXIDES



HIGH SPECIFICATION PERMANENT MAGNETS FOR E-DRIVES

Ionic Technologies – NdFeB Magnet Recycling

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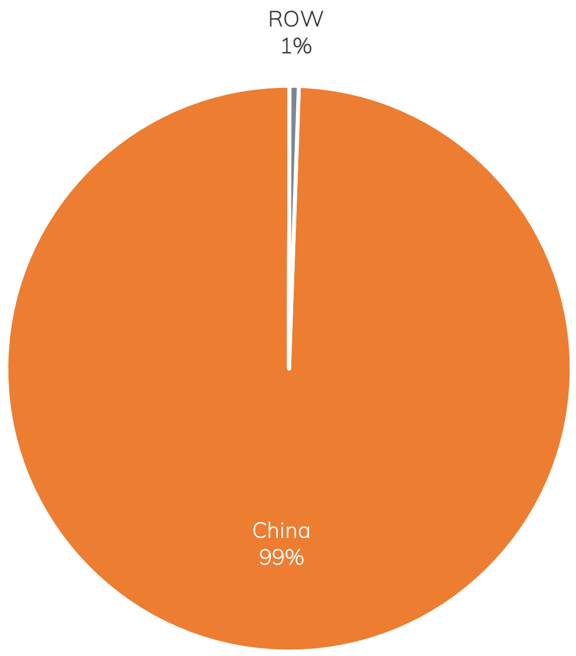
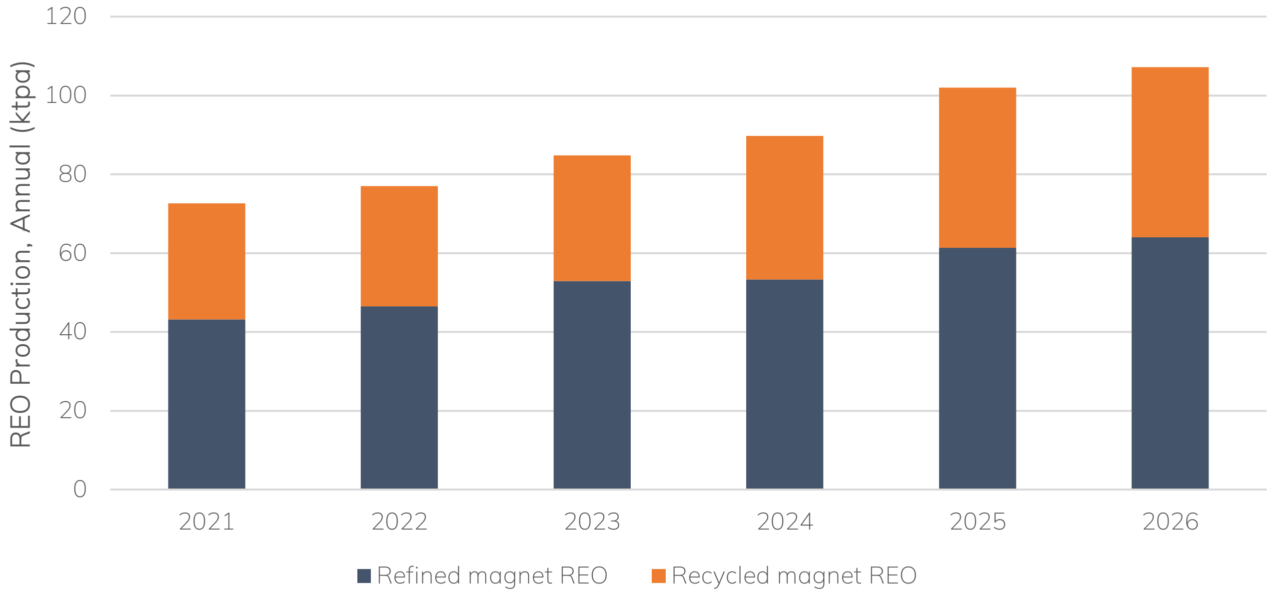
RARE EARTHS FOR LIFE

RECYCLING OF MAGNET REO DOMINATED BY CHINA, MAKES UP 40% OF EXISTING GLOBAL SUPPLY



Secondary sourcing (recycling) of rare earth oxides market share dominated by China



Current breakdown and forecast to 2026 of global magnet REO production by refined vs recycled sources globally

Wood Mackenzie, Global rare earths short-term outlook July 2022.

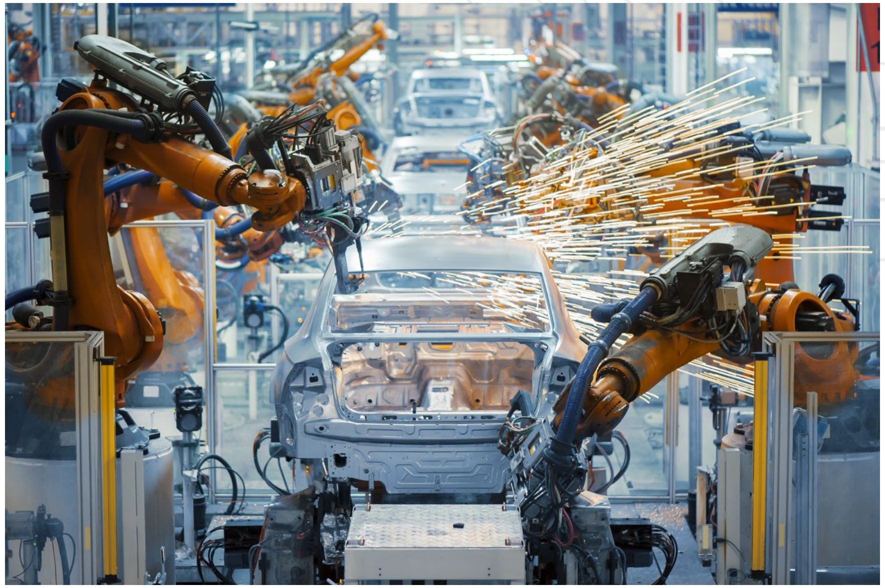
Facilitating the automotive rEVolution

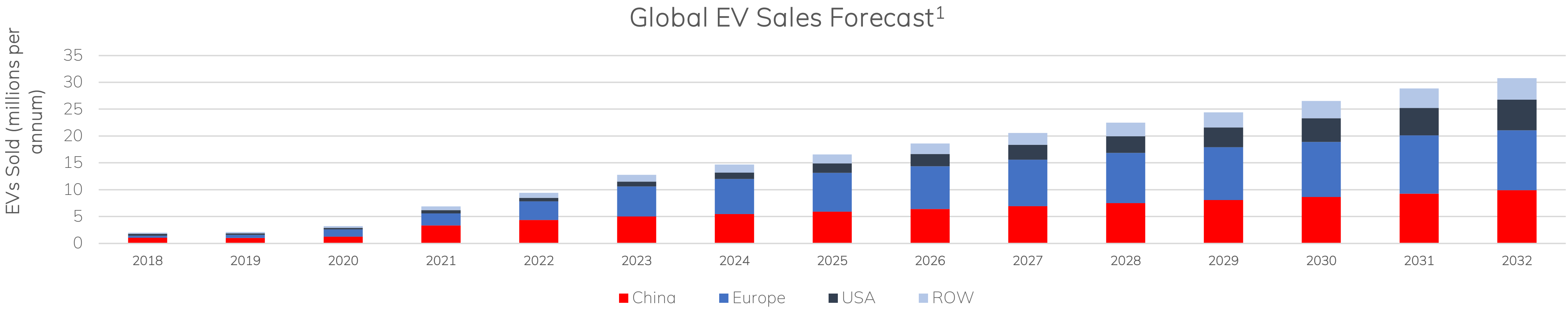
33% Magnet REOs required for Permanent Magnet drives for EVs

Electric Vehicles – Sales Ramping up Faster

EV SALES GROWING FASTER THAN PRIOR FORECAST

- Global governments mandate change with ICE to be banned in several countries from 2025, with significant changes expected in Europe where demand driven by government incentives will see it overtake China by 2030 as largest market for EVs
- US announced target of 50% EV penetration by 2030 – ICE ban from 2035 in California
- EV sales accelerating at higher growth than previously forecast 20% CAGR to 2026 then 10% CGR to 2032[1]
- 2021 EV sales doubled that of 2020[1]
- Forecast EV Penetration[1] to grow significantly over the next 20 years
    - 1.5% in 2020 → 12.5% in 2030 → 45% in 2040
- EV fleet growth forecast at 27% per annum from 2020 (13 million EVs) to 2030 (140 million EVs), then 15% per annum to 2040 (565 million EVs)[1]





[1] Argus Analytics, April 2022;

Electric Vehicles – Driven by NdFeB Magnets

PERMANENT MAGNETS USED IN EV's REQUIRE ~4-8% DyTb TO OPERATE AT CONDITIONS REQUIRED

- Worldwide EV demand driving insatiable appetite for NdFeB (Permanent magnets)
- NdFeB magnets are essential for producing light, compact and high efficiency traction motors. Approx. 28-32% of the NdFeB magnet is magnet NdPr, with DyTb used as a minor additive (~4-8%) to improve magnet performance at high temperatures[1]
- NdPr receives substantial focus, but DyTb largely overlooked
- Adding DyTb to the increases the coercivity of the motor, enabling the motor to operate at much higher temperatures (from 150°C to up to 240°C), and greater efficiency, than motors with only NdPr (max temp 80°C)

An exploded view of a permanent-magnet electric-vehicle traction (propulsion) motor. The rare-earth-containing magnets are embedded in the rotor.

[1] Pavel, et al., Role of substitution in mitigating the supply pressure of rare earths in electric road transport applications, 2017;
[2] David Kramer; Physics Today 74, 20-24 (2021), American Institute of Physics.

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Facilitating Offshore Wind Capability

IonicRE basket producing all the Nd, Pr, Dy and Tb required for offshore wind turbines

Land Constrained – Go Offshore

COUNTRIES ADOPT OFFSHORE WIND TURBINES TO REACH CO_2 TARGETS

2021 world offshore wind turbine capacity was 48 GW[1]

Argus[1] estimates an additional 235 GW of installed offshore wind turbine capacity to be added by 2030 → 25% CAGR for the remainder of the decade

In its 2019 World Energy Outlook, the International Energy Agency (IEA) Sustainable Development Scenario has up to 570GW of offshore wind in 2040. If achieved, the world would be on track to reach about 1000GW in 2050[2].

The International Renewable Energy Agency (IRENA) also has a 1000GW ambition by 2050.

McKinsey Global Energy Perspective 2021 estimated that to reach the Accelerated Energy Transition target of limiting global warming to 1.5ºC, over 1,240 GW of offshore wind capacity to be installed by 2050.[3]

Ambitious target announced in December 2020, Ocean Renewable Energy Action Coalition (OREAC) calling on governments to up their offshore renewable energy ambition to achieve the coalition's vision of 1,400 GW of offshore wind by 2050.

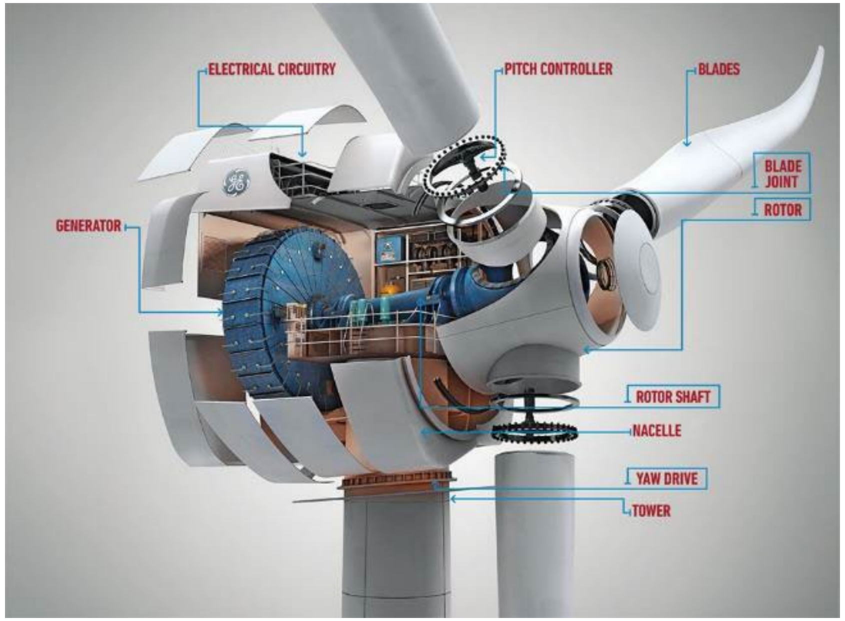
[1] Argus analytics, October 2021; [2] Ocean Renewable Energy Action Coalition, The Power of our Ocean, December 2020; [3] McKinsey Global Energy Perspective 2021.

No DyTb – No Offshore Wind Turbine Capacity

THE BASICS – HOW MUCH REO IS REQUIRED PER MW OF OFFSHORE TURBINE CAPACITY?

Rare earth elements and boron (B) are essential for turbine designs that employ permanent magnets (NdFeB). The HREOs Dy_2O_3, Tb_4O_7 and in some cases Ho_2O_3, can be substituted to improve the operability of the NdFeB magnets. Adding these HREOs helps the high temperature direct drive turbines maintain their magnetic characteristics[1]. Substitution is not an option.

Most direct-drive turbines, but also to different extents certain technical designs with gearboxes, are equipped with permanent magnet generators, which contain NdPr and smaller quantities of DyTb. On average, a permanent magnet contains 28.5% NdPr, 4.4% DyTb, 1% B and 66% Fe and weighs up to 4 tonnes for a 6MW offshore direct drive wind turbine[2].



HALIDE* 150-MV OFFSHORE WINE TURBINE

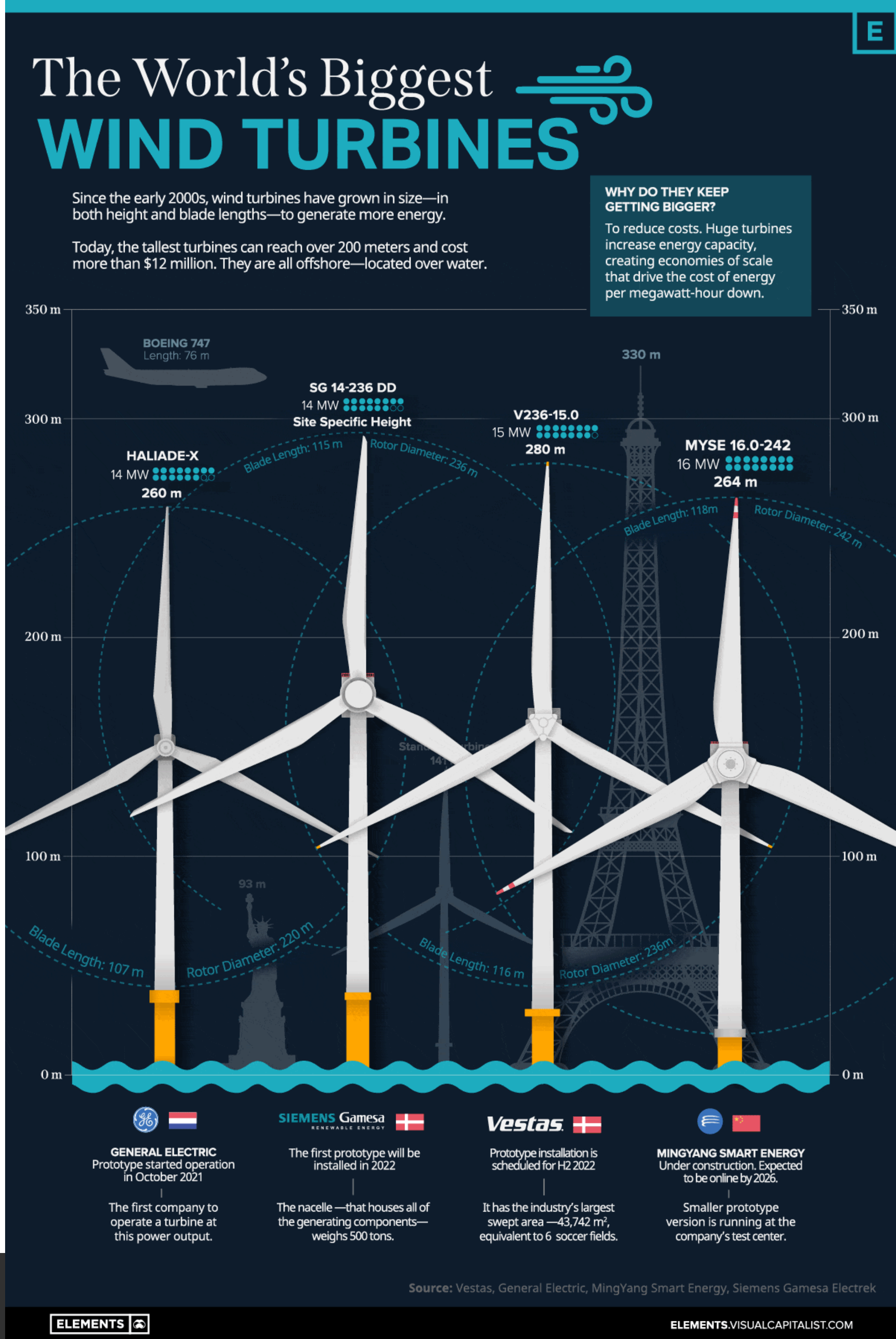
- Each 6 MW[4] of offshore direct drive wind turbine capacity requires ~ 1,700 kg magnet REOs;
  - ~210 kg/MW Nd_2O_3 x 6 MW = 1,260 kg Nd_2O_3
  - ~42 kg/MW Pr_6O_{11} x 6 MW = 254 kg Pr_6O_{11}
  - ~20 kg/MW Dy_2O_3 x 6 MW = 117 kg Dy_2O_3
  - ~8 kg/MW Tb_4O_7 x 6 MW = 49 kg Tb_4O_7

[1] Roskill, Rare Earths: Outlook to 2030, January 2021; [2] European Commission, Raw materials demand for wind and solar PV technologies in the transition towards a de-carbonised energy system, 2020; [3] Li et al., One Earth 3, Critical Rare-Earth Elements Mismatch Global Wind Power Ambitions, 2020; [4] Haliade 150-6MW turbine by GE Renewable Energy @GErenewables;

Wind Turbines keep getting BIGGER!

BIGGER TURBINES TO GENERATE MORE POWER, INCREASE CAPITAL EFFICIENCY

- Direct Drives have become the technology of choice for offshore wind turbines, where low maintenance cost is crucial, and where lower wind speed locations are now being explored
- Application of Direct Drive turbines do not use a gearbox, and are cheaper to make, lighter, more reliable and have lower maintenance costs
- Direct Drive turbines achieve a better conversion of the spinning blades and rotor to electrical energy, especially in lighter winds
- The adoption of low-speed Direct Drive turbines is dependent upon NdFeB permanent magnets (PM), essential for producing light, compact and high efficiency generators
- Larger turbines in development to increase overall power generated from wind farms
- Increase in Offshore Wind Turbine unit capacity is driven by an overall desire to improve overall economy of scale → driving down cost for each MW or power produced



Facilitating Defence Capability

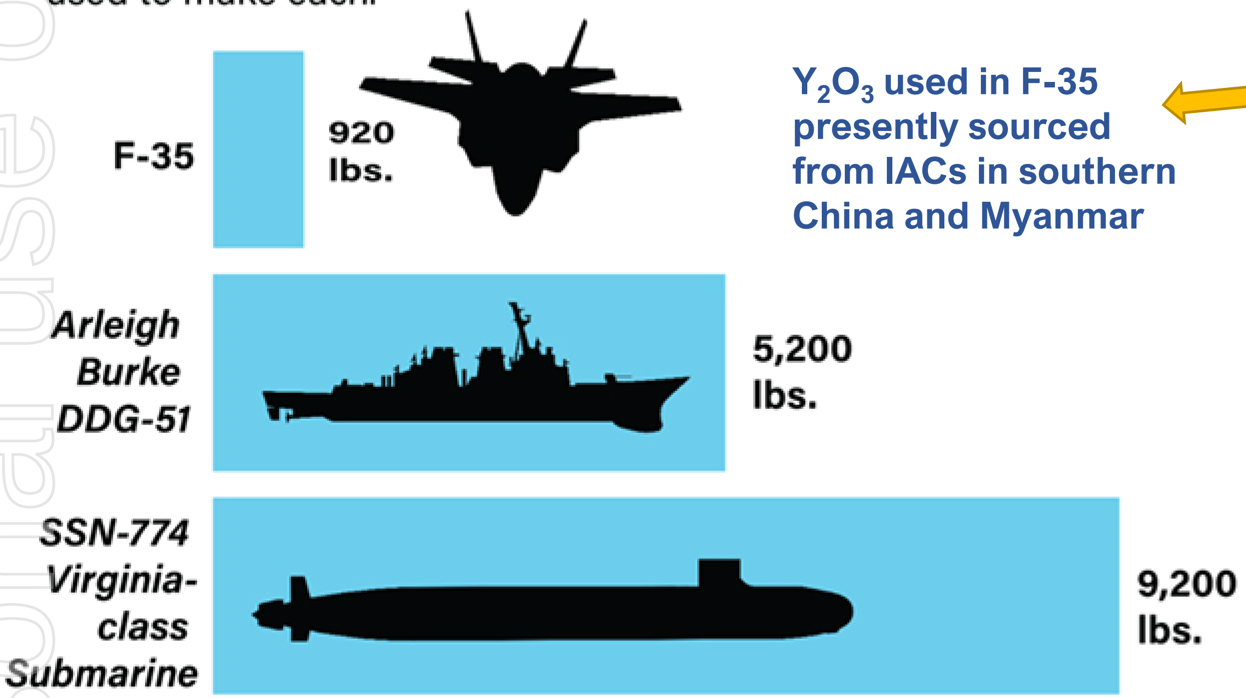
IonicRE basket – Heavy Rare Earth Strategic Appeal for Defence Applications

Magnet & Heavy REO crucial in Defence Applications

DEFENCE HREO SUPPLY CHAIN – PROVIDING SECURE SOURCE OPTION TO FACILITATE BUILDING STOCKPILES

Rare Ingredients

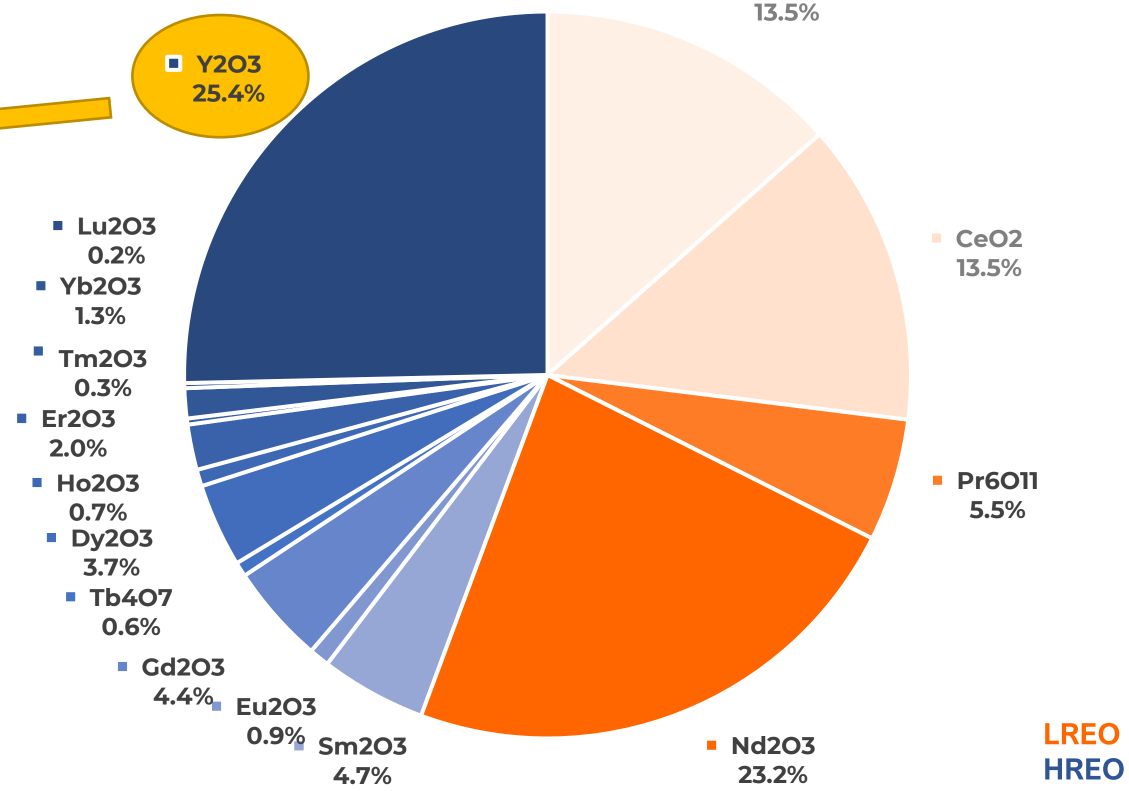
Here is the breakdown of rare-earth materials used to make each.



Source: Congressional Research Service

Y_2O_3 used in F-35 presently sourced from IACs in southern China and Myanmar

Makuutu Basket ~73% used in Defence Applications



Magnet & Heavy REO crucial in Defence Applications

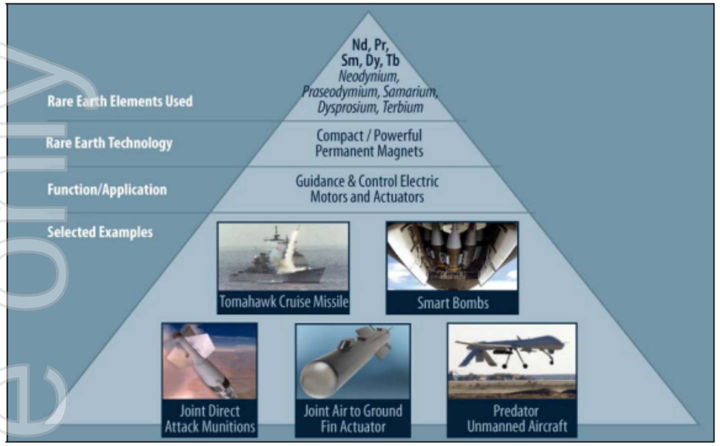
DEFENCE HREO SUPPLY CHAIN – MAKUUTU POTENTIALLY SUPPLIES IT ALL

- Numerous Magnet & HREO materials are used in defence applications in the engines, disk drive motors, radar of the aircraft, fin actuators in missile guidance and control systems, control devices in tanks, missile systems, command and control centres; lasers, interrogators, underwater mines, countermeasures, satellite communications, radar, and sonar on submarines and surface ships, optical equipment and speakers, components in anti-missile defense systems, satellites and night vision devices among others.
- REE metals used in F-35 fighter (417kg); Virginia-class submarine (4,170kg); and Arleigh-Burke guided missile destroyer (2,360kg).
- Terfonal-D is a rare earth alloy made of Tb, Fe and Dy that is used in high-power sonar on ships and submarines.
- Stealth helicopters also use Terfenol-D speakers in their noise cancellation technology blades and NdFeB magnets.

PRODUCT / APPLICATION	RARE EARTH ELEMENT (REE)	USAGE
F-35 Lightning II joint strike fighter	Y	Jet engine
ATHENA laser weapon system	Er, Yb, Nd	Optical fibres in fibre laser module
Tomahawk missile	Combination of Nd, Pr, Dy, Tb, Sm	Fin actuators in missile guidance and control systems, GPS, sensors
Joint Direct Attack Munition (JDAM) guided bombs	Combination of Nd, Pr, Dy, Tb, Sm	Fin actuators in missile guidance and control systems, GPS, sensors
AN/ALQ-184 Electronic Attack Pod	Y	Electronic jamming devices, storage batteries
Zumwalt-class destroyer	Nd, Pr, Dy, Tb, Sm	Electric motors
HUMVEE military truck	Y, Eu, Tb	Humvee-mounted Laser Avenger
F-16, F-15, F-22	Er, Sm	Jet engine, Electric systems- permanent magnets
M1A2 Abrams tank	Sm, Eu, Nd, Tb, Y	Navigation system, Laser-equipped computer main gun sight
Stinger MANPAD	Combination of Nd, Pr, Dy, Tb, Sm	Fin actuators in missile guidance and control systems, GPS, sensors
Precision-guided munitions	Combination of Nd, Pr, Dy, Tb, Sm	Fins attached to fuselage, special magnets
PATRIOT missile air defence system	Gd, Sm, Y	Radio frequency circulators
MQ-9, MQ-1 Predator drones	Y, Tb	Laser Weapon System

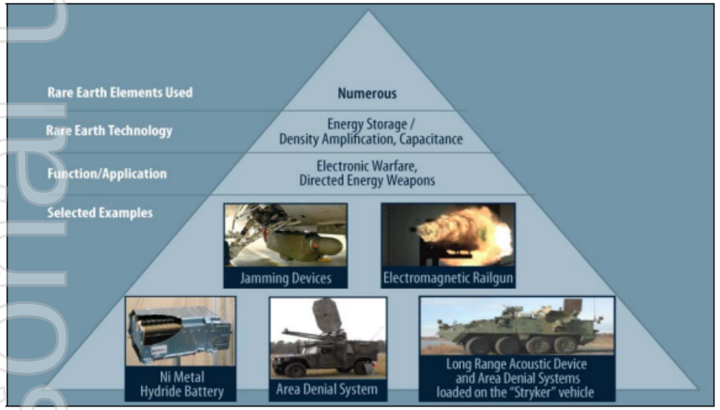
Magnet & Heavy REO – IonicRE Production Delivers Every Need

Figure 1. Rare Earth Elements in Guidance and Control Systems



Source: Compiled from presentations by the Rare Earth Industry and Technology Association, the United States Magnet Manufacturing Association, and David Pineault, "Global Rare Earth Element Review," Defense National Stockpile Center, Spring 2010.

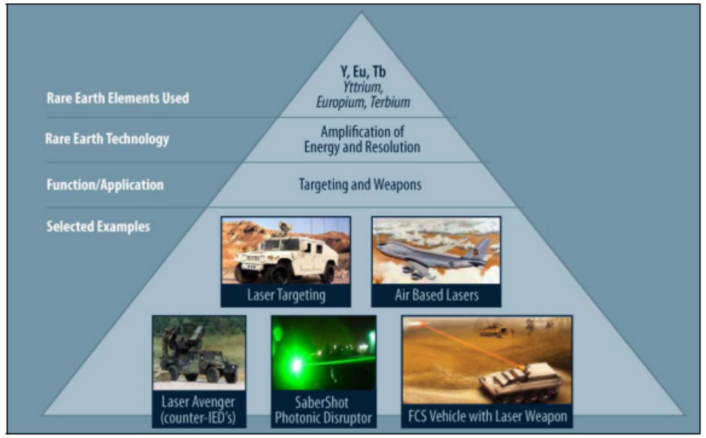
Figure 2. Rare Earth Elements in Defense Electronic Warfare



Source: Compiled from presentations by the Rare Earth Industry and Technology Association, the United States Magnet Manufacturing Association, and David Pineault, "Global Rare Earth Element Review," Defense National Stockpile Center, spring 2010.

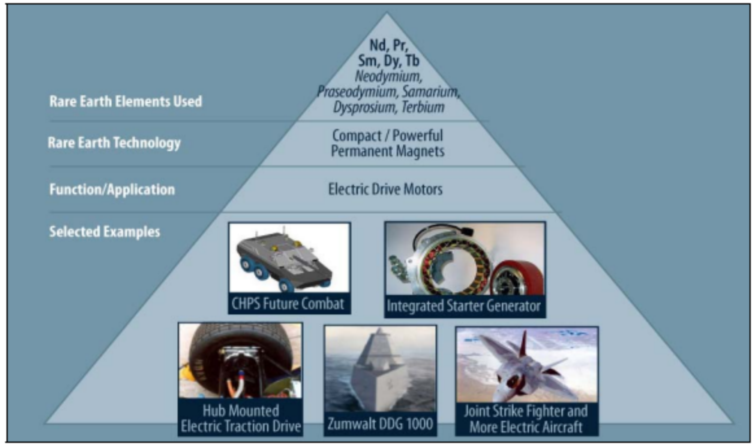
✓ La ✓ Sm ✓ Tb
✓ Pr ✓ Eu ✓ Lu
✓ Nd ✓ Dy ✓ Y

Figure 3. Rare Earth Elements in Targeting and Weapon Systems



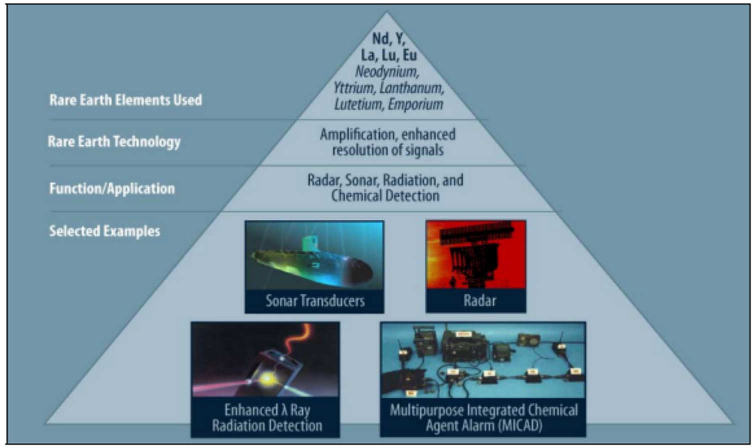
Source: Compiled from presentations by the Rare Earth Industry and Technology Association, the United States Magnet Manufacturing Association, and David Pineault, "Global Rare Earth Element Review," Defense National Stockpile Center, spring 2010.

Figure 4. Rare Earth Elements in Electric Motors



Source: Compiled from presentations by the Rare Earth Industry and Technology Association, the United States Magnet Manufacturing Association, and David Pineault, "Global Rare Earth Element Review," Defense National Stockpile Center, spring 2010.

Figure 5. Rare Earth Elements and Communication



Source: Compiled from presentations by the Rare Earth Industry and Technology Association, the United States Magnet Manufacturing Association, and David Pineault, "Global Rare Earth Element Review," Defense National Stockpile Center, spring 2010.

Rare Earth Elements in National Defense: Background, Oversight Issues, and Options for Congress, 23 December 2013 (https://sgp.fas.org/crs/natsec/R41744.pdf)

Heavy Rare Earth Dominant

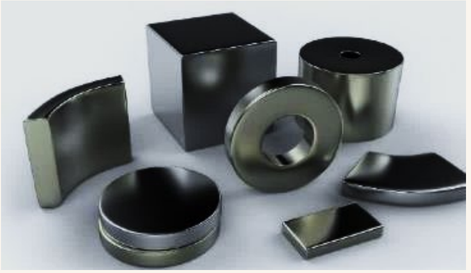
IonicRE basket – 44% Heavy Rare Earths deployed in high end applications

Key HREO Applications without Substitute – New Supply Required

HREO USED IN HIGH END FOR NICHE APPLICATIONS – NO SUBSTITUTION FOR REOS IN SPECIFIC APPLICATIONS

MRI Machine

PET Scan



NdFeB and SmCo permanent magnets

Erbium is a key input into enabling 5G technology

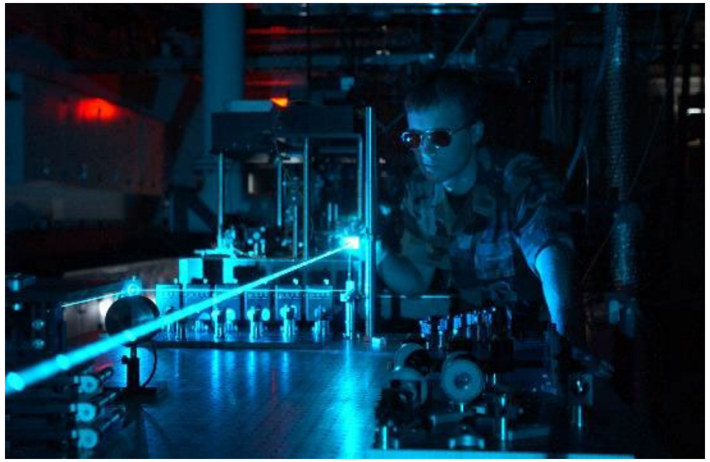
- IAC mines in southern China and Myanmar produce approximately 95% of the worlds production of HREO
- Export Control Ban implemented by China on 1 December 2020 now focused on prioritising Chinese consumption and strategic stockpiling
- High-value niche medical applications such as
  - Magnetic Resonance Imaging (MRI) machines using Gd;
  - Positron Emission Tomography (PET) imaging using Lu;
  - X-rays, Solid-state lasers, optical isolators and microwave equipment using Er, Ho, Tm, Yb, Y;

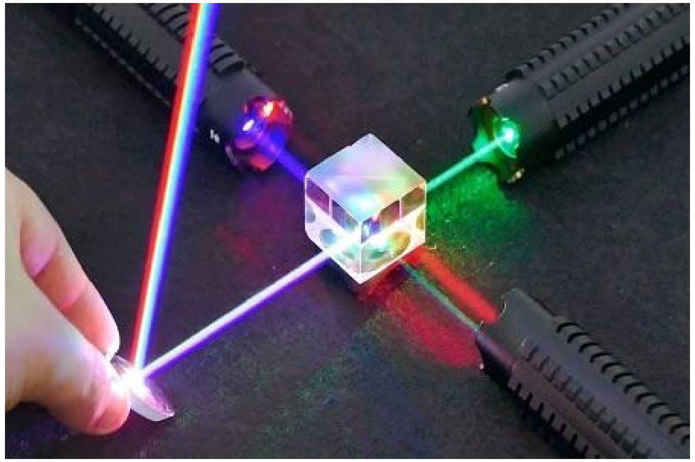
- Critical applications REE are essential for electronic devices as permanent magnets (PM) in speakers, computer components, global positioning systems (GPS), sonar, defence systems and lasers – will start to see this flow through to consumer item availability and cost
- Er is a key input into enabling 5G technology – Erbium doped fibre amplifiers (EDFA) are used to compensate the loss of an optical fibre in long-distance optical communication and can amplify multiple optical signals simultaneously. No Erbium, No 5G.
- Nuclear power plant use Sm-Co permanent magnets, and Dy & Er in neutron-absorbing control rods, plus other applications using Eu, Gd and Ho

Key HREO Applications – Fibre Laser outlook to 2030

GLOBAL FIBRE LASER MARKET VALUE ESTIMATED TO REACH US$8.42 BILLION BY 2030 (CAGR 14.5%)

- Global fiber laser market value estimated to be US$2.23 Billion in 2020
- Optical fibers used in the fiber laser are doped with rare earth metals such as Yb, Er, Nd, Tb and Eu.
- Fibre lasers are optically pumped devices mostly used with laser diodes (uses REE) amplify the produced light. Fiber lasers has a large surface-to-volume ratio (heat dissipation is relatively easy). Laser is comparatively smaller and lighter in weight than traditional lasers
- Widely used in number of industrial manufacturing processes: marking, metal cutting and welding of automotive and aircraft components. Technological advancements, rapid improvement in infrastructure coupled with research and development in this field have contributed to the growth of the market.
- Automotive industry (growing demand of EVs) vital for the growth of fibre laser market.
- Growing demand for compact, cost-effective lasers along with widespread adoption of fibre lasers into numerous new industries are also anticipated to propel the market growth.





Scandium Upside

IonicRE basket – Scandium to unlock new industries and 'Blue Sky'

Makuutu is one of the largest global Scandium resources… and growing

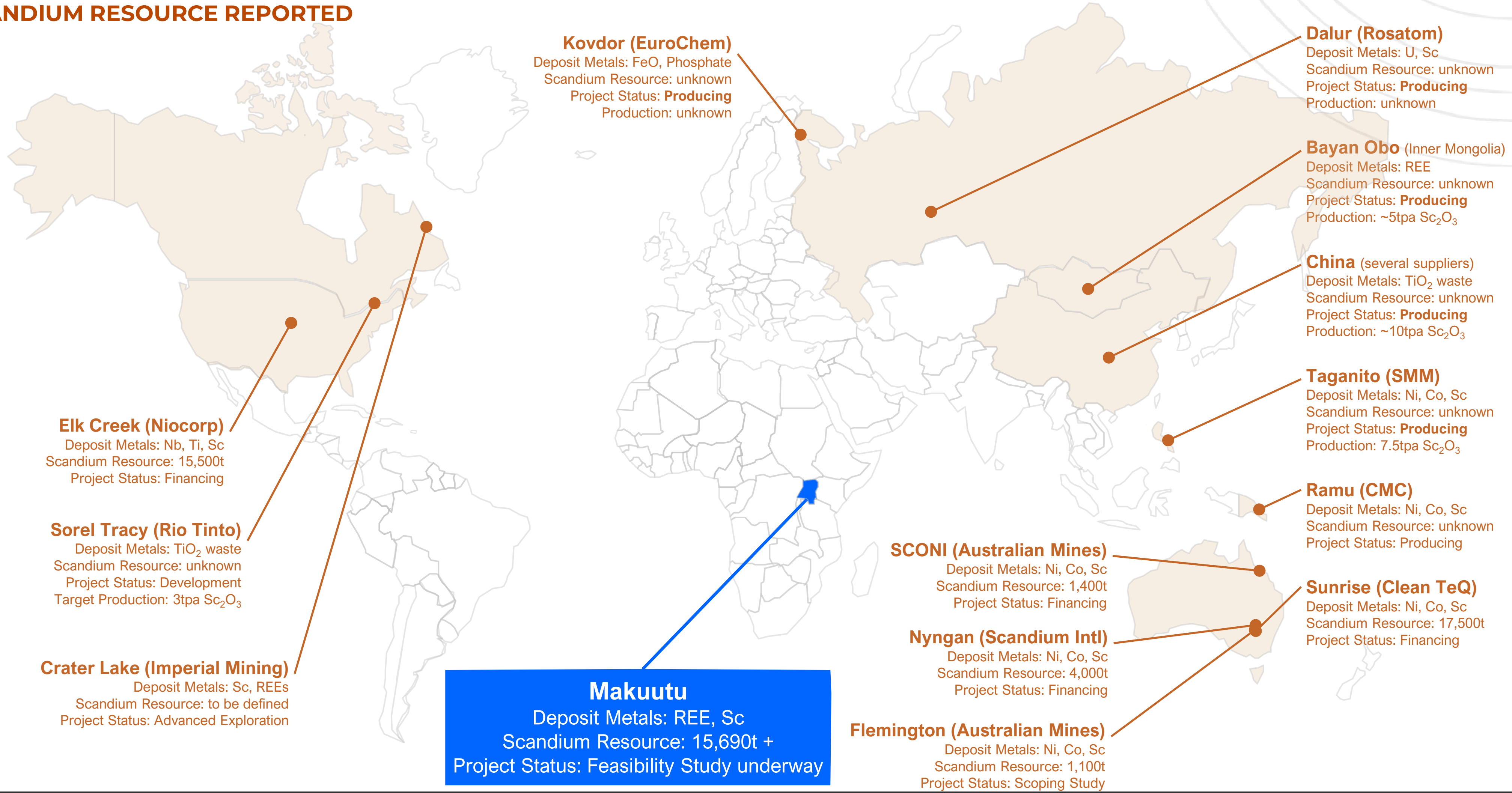
2^{ND} LARGEST GLOBAL SCANDIUM RESOURCE REPORTED

Key to the success of the scandium industry is a diverse and reliable supply chain

While historically the scandium market has been dominated by Chinese supply, there are companies producing scandium or actively developing scandium supply

The Makuutu Rare Earths Project's scandium endowment and time to market make it a key future global player in the scandium market

Scandium market expected to grow very quickly once stable supply is demonstrated



Applications with Aluminium in Light-weighting Transportation

The need for light-weighting solutions has dramatically increased the adoption of aluminium alloys in transportation. Stricter efficiency standards, the advent of the electric vehicle and the emergence of new sectors are accelerating uptake, generating new opportunities for aluminium alloys, like Al-Sc alloys, to strengthen its position as a key material for the future

AUTOMOTIVE

Aluminium content in vehicles has been steadily increasing, driven by stricter efficiency and emissions requirements

Aluminium is displacing high-strength steel (HSS), a lower cost and heavier competitor, in several components

The electric vehicle (EV) revolution is dramatically accelerating aluminium's market share through new parts (e.g. battery boxes) and the need to increase vehicle range. EVs have 35-50% more aluminium than internal combustion engine vehicles[1]

AEROSPACE

Aluminium is well-established in aerospace, with most airplanes constructed of aluminium alloys. While carbon fibre materials are lighter, they are more expensive, have a higher maintenance cost and require costly metals (such as titanium) to be used in concert. More advanced aluminium alloys can provide comparable low-cost alternative to composites

The next aerospace aluminium alloys will be strong and weldable, removing the need for rivets, providing enormous weight saving

SPACE

While historically niche sub-sector of aerospace, the commercial space industry represents a fast-growing sector where aluminium has a long, deep-rooted history

Rockets use a range of aluminium alloys in propellant tanks, providing a strong, lightweight material which can operate over large temperature ranges

Advanced aluminium alloys, combined with 3D printing, provide the space industry a unique opportunity to mass produce reusable rockets and satellites

MARINE

Due to its high strength and high corrosion resistance, aluminium alloys are a growing material of choice for shipbuilding

'Marine grade' aluminium is 100 times less prone to corrosion than its steel counterpart[2]

'Marine grade' aluminium alloys are both strong and weldable, which mean large sections of ships can be constructed with no joints or bolts, which reduce corrosion and the risk of water ingress

RAIL

Like aerospace, aluminium has had a long history with rail, widely used in both freight and passenger cars

Aluminium provides ~30-35% weight reduction over steel and does not corrode, leading to a much longer service life

High-speed trains realise the greatest benefit from aluminium, which require low weight and high-strength to minimise friction loss

[1] Aluminium Content in European Passenger Cars, Ducker Frontier presentation prepared for European Aluminium, Oct 2019, range depending on vehicle category
[2] Aluminium in Transport, www.aluminiumleader.com/application/transport

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