ionic
RARE EARTHS LTD

Makuutu Rare Earths Project

Substantial potential for future long-life, low-cost, Scandium supply

Cautionary Statement

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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 March 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.

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

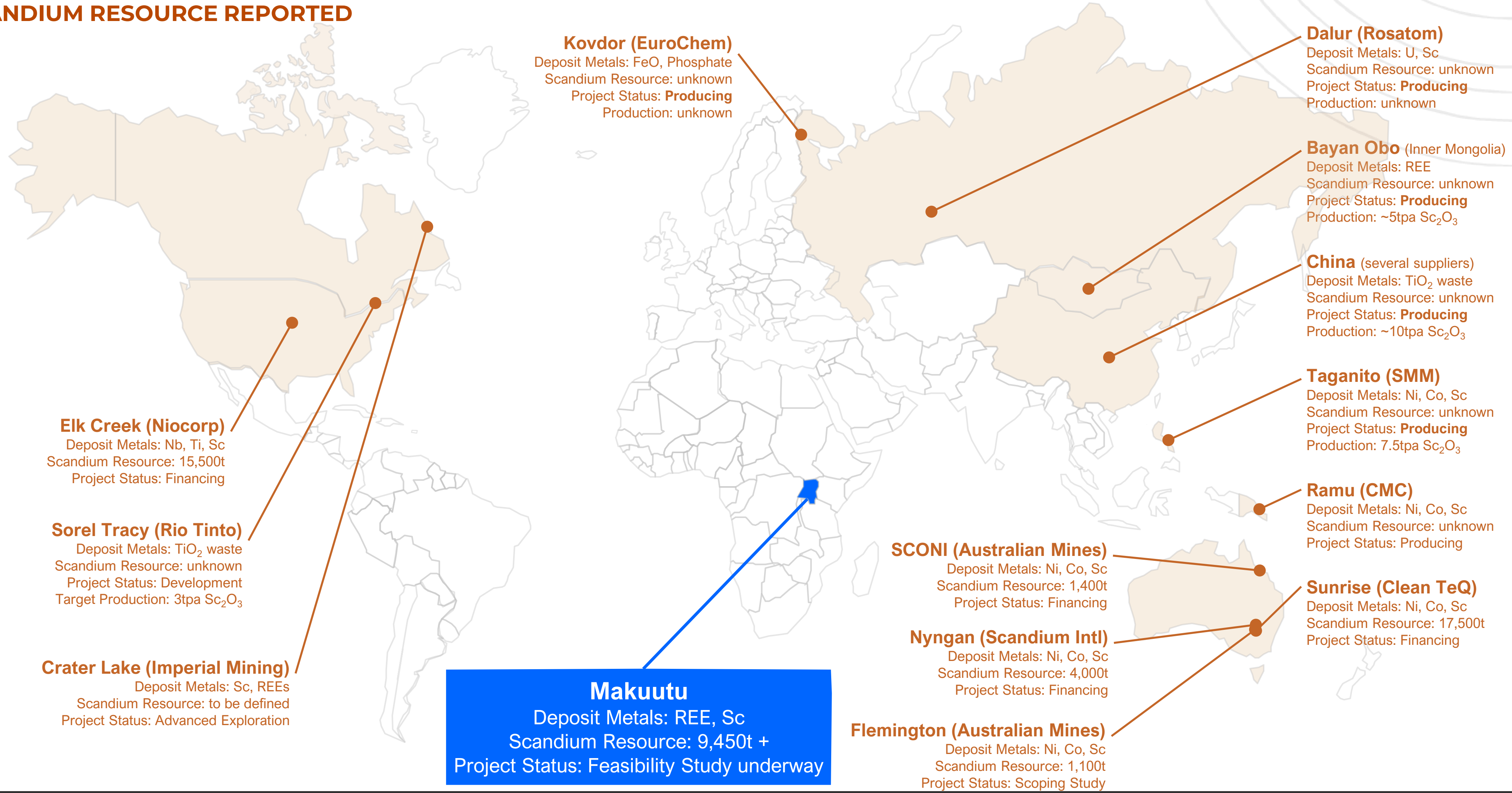
3RD LARGEST GLOBAL SCANDIUM RESOURCE REPORTED

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

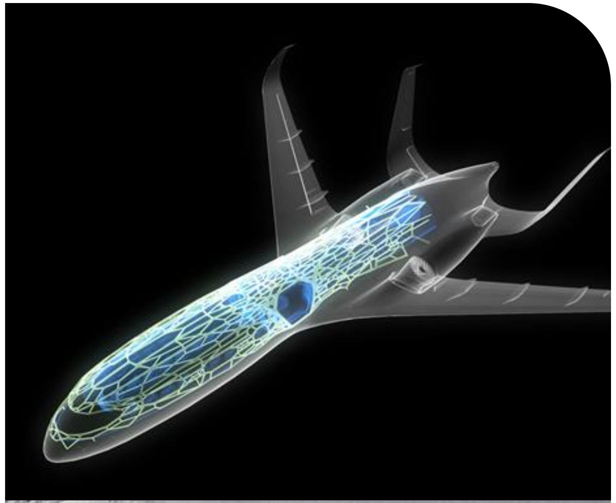
While historically the scandium market has been dominated by Chinese supply, there are companies producing scandium or actively developing scandium supply

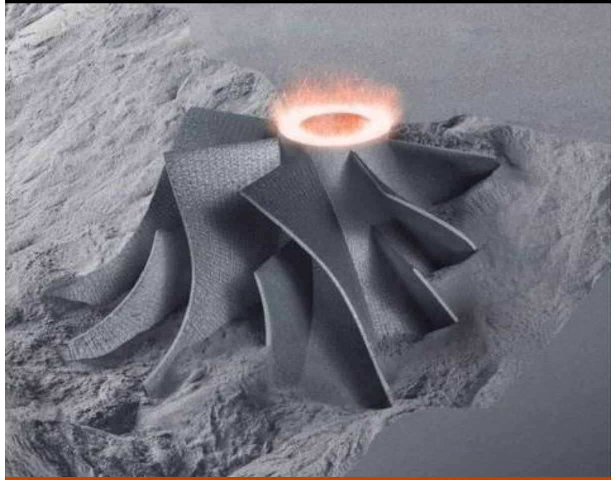
The Makuutu Rare Earths Project's scandium endowment and time to market make it a key future global player in the scandium market

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



Scandium Market Overview





AN EMERGING STRATEGIC METAL WITH LARGE POTENTIAL MARKETS IN THE GLOBAL TRANSPORT SECTOR AND AEROSPACE

- The Makuutu Rare Earths Project is positioning itself to become a key player in the Sc_2O_3 market via low cost production, planning to initially produce 20-25 tpa Sc_2O_3 initially and progressively ramp up production over 10 years to approx. 90-100 tpa Sc_2O_3
- While scandium is abundant in the earth's crust, it is very uncommon to find it in economically recoverable concentrations
- Historically, it tended to be a minor or ignored potential by-product of mining, namely: rare earths, uranium, nickel-cobalt laterite, ilmenite (titanium dioxide)
- Almost all the current world's production of scandium oxide (Sc_2O_3), or scandia, is re-processing titanium dioxide wastes or as a by-product from rare earth production
- Despite several large mineral endowments globally, Sc_2O_3 is predominantly produced by multiple small producers in China (approximately 15-20 tpa) with recent production capacity also being developed via processing of nickel laterite ores
- Most of this Sc_2O_3 is used in Solid Oxide Fuel Cells (SOFC), with Bloom Energy being the main consumer
- This small fragmented market has led to the belief that scandium is rare and expensive, which has hindered its growth, even with decades of technical development and use in aluminium alloys

3D printing using AP Works Scalmalloy® for the Airbus A320 https://www.airbus.com/newsroom/news/en/2016/03/Pioneering-bionic-3D-printing.html.
Selective laser sintering using Scalmalloy® https://beamler.com/3d-printing-capabilities/processes/sls-selective-laser-sintering/.

Scandium Market Overview

AN EMERGING STRATEGIC METAL WITH LARGE POTENTIAL MARKETS IN THE GLOBAL TRANSPORT SECTOR AND AEROSPACE

- The light-weighting revolution occurring in the global transportation industry, combined with a growing global sector of mined supply, is unlocking a large new market for scandium
- Key applications identified in 3D printed rockets and components for space applications, such as the Terran-R from Relativity Space (right)
- Recently Rio Tinto and RUSAL have announced entry into Sc_2O_3 market, with a key focus being applications in 3D printing specialty components
- The Makuutu Rare Earths Project is positioning itself to become a key player in the Sc_2O_3 market via low cost, scalable production over a life exceeding 27 years

Mikoyan MiG-29

- Al-Sc alloys were first used in the 1980s for structural purposes in Soviet aircraft and missiles.
- The strength that Scandium alloys brought to weldable alloys, allowed the USSR to build aircraft (MIG-29) and utilise welded structures. This gave these planes tremendous weight, maneuverability and range advantages.
- Russia has even stockpiled scandium for strategic reasons because several parts for advanced MiG jet fighters (pictured) are manufactured from this alloy.

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 alternative, 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

Applications with Aluminium in Light-weighting Transportation

A LITTLE SCANDIUM GOES A VERY LONG WAY

While the push to light-weighting provides a significant opportunity:

- Functional demands are driving aluminium companies to develop new alloys and processes to compete with HSS
- This increases the cost, which increases the substitution risk of composite materials

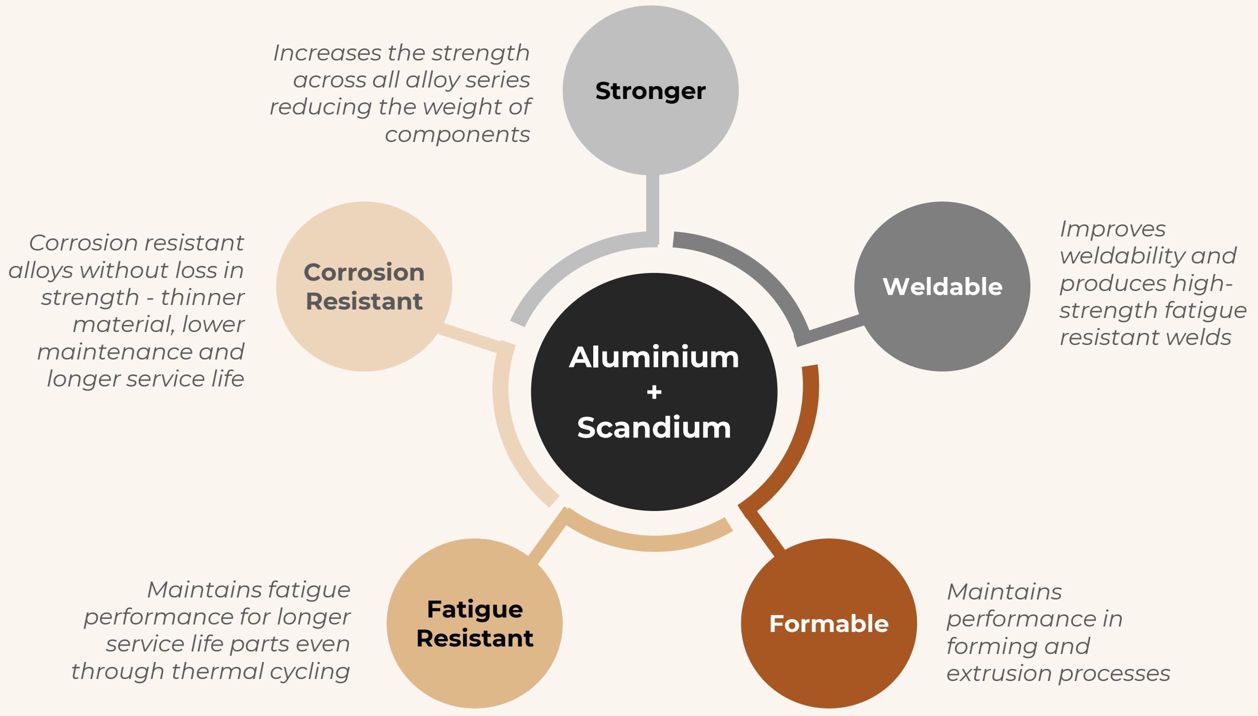
Scandium can solve both these issues for the aluminium industry:

- Adding trace amounts of scandium (0.05-0.1%) will significantly improve performance of aluminium alloys
- The addition of scandium avoids alloying and processing costs, keeping the material economically attractive compared to composites

This watershed moment in the scandium market is supported by:

- A strong history and continued focus on research and commercial development by the alloy companies and transport sectors; and
- A reliable, multiple-source supply chain of low-cost scandium

Scandium has several key functional benefits across all alloy series which make's it the most potent alloying element. As little as 0.05-0.1% of scandium in aluminium alloys can significantly improve its performance



Research & Development to Commercialisation of Al-Sc Alloys

- There are decades of research and development on the use of aluminium-scandium alloys.
- While historically, scandium has been used in military aerospace, focus is shifting to the broader transport industry, including automotive and space.
- Scandium's entry point into these sectors is likely to be in smaller applications (i.e., cargo doors, welding wire, etc.) and higher end products (luxury vehicles, commercial space), with continued consumption and growth (albeit modest) in Solid Oxide Fuel Cells (SOFC) applications

ALUMINIUM-SCANDIUM COMMERCIAL DEVELOPMENTS

AIRBUS

Airbus has developed an aluminium-scandium powder (Scalmalloy®) for use in 3D printing applications

Airbus has combined Scalmalloy® with its in-house design capability to produce a "bionic" partition for aircraft

Aleris sonaca AIRBUS

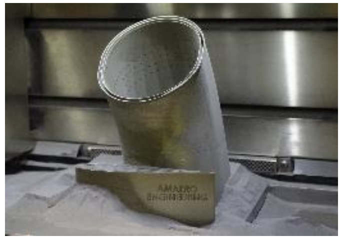
Aleris has developed a scandium-containing alloy (5028) for use in aerospace applications.

In conjunction with Airbus and Sonaca, Aleris is qualifying the material for use on cargo doors on commercial aircraft

Relativity CLEAN TEQ

Relativity Space is developing the world's first 3D printed rockets for commercial orbital launch services.

Relativity has partnered with Clean TeQ to develop the scandium-containing alloys for 3D printing.

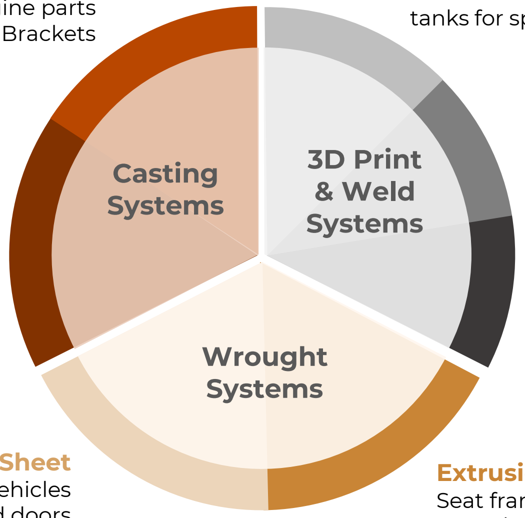


AMAERO ADDITIVE MANUFACTURING RioTinto

Amaero International is a market leader in metal additive manufacturing for use in 3D printing.

Amaero has partnered with Rio Tinto to collaborate to develop the supply chain for Amaero's high performance, High Operating Temperature Aluminium Alloy.

ALUMINIUM-SCANDIUM POTENTIAL APPLICATIONS



Die & Investment Cast
Cylinders & engine parts for vehicles Brackets

Sand Cast
Pistons for vehicles

Sheet
Radiators for vehicles
Car panels and doors
Fuselage panels for aircraft

Wire Feed
Launcher and cryogenic tanks for space

Weld
Welding wire for non-weldable alloys Al-Sc weldable alloys for aircraft

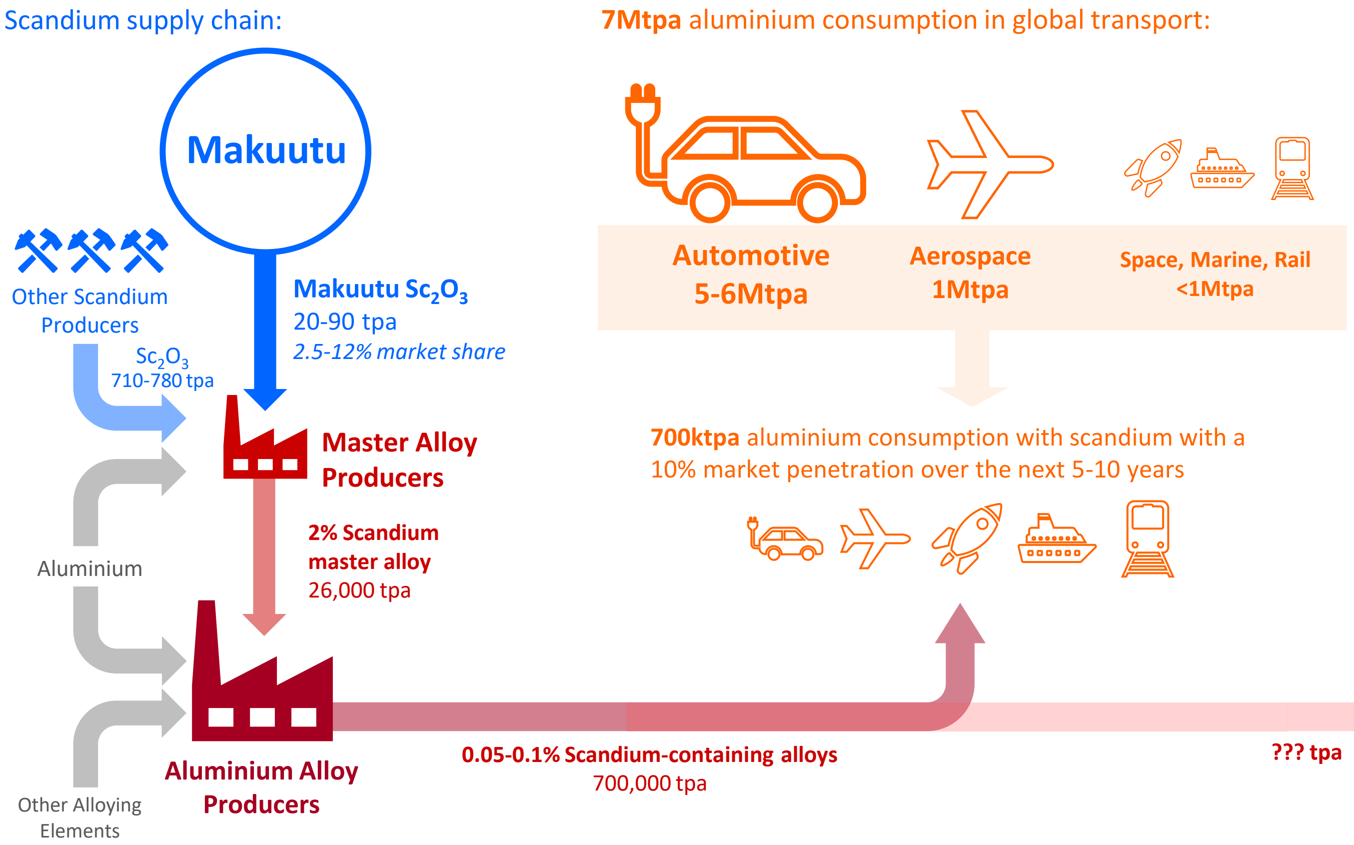
Powder Feed
Bionic partitions
Highly complex geometric parts

Extrusions
Seat frames for vehicles
Extruded parts for aircraft

Scandium Market Potential

SIGNIFICANT POTENTIAL FOR SCANDIUM MARET TO GROW RAPIDLY IN GLOBAL TRANSPORT SECTORS

While the current scandium (Sc) market is 15-20 tonnes per annum scandium oxide (Sc_2O_3), the global transportation industry has the potential to turn scandium into a billion-dollar market

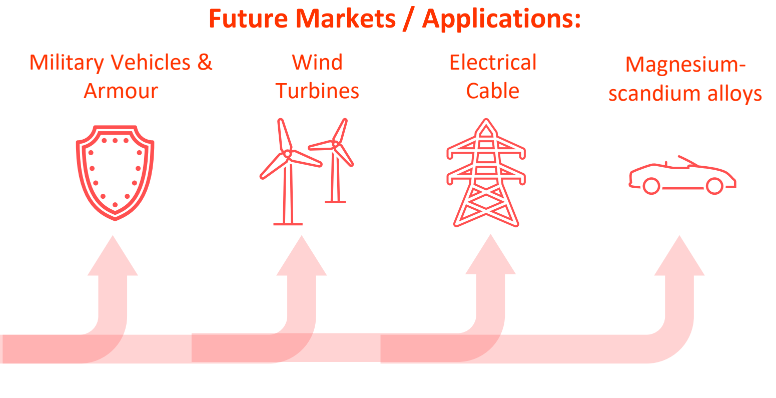


Contestable Scandium Market

The adoption of scandium will be heavily dependent on its price-point. As the market grows, the scandium price will decrease as economies of scale for production can occur. This will allow aluminium-scandium to be used in an increasing number of applications.

While the initial price of scandium could be US$1,000/kg Sc_2O_3 at low tonnages, this will likely drop to ~US$700/kg with increased volumes

Scandium Market Value	Makuutu Scandium
• Avg Sc content: 0.075% • Required Scandium: 525tpa (800tpa Sc_2O_3) • Sc price range: US$700-1,000/kg Sc_2O_3 • Market: US$560-800M p.a.	20-90+ tpa Sc_2O_3 (2.5-12% total market share) US$20-63M+ p.a. Revenue



ADDITIONAL SLIDES

Harnessing the wide appeal of the Makuutu Basket

MAKUUTU PROVIDES A UNIQUELY BALANCED BASKET WITH 73% CRITICAL AND HEAVY RARE EARTHS

Scoping Study confirms **robust economics** for Base Case CREO and HREO production with **potential to extend beyond 27 + years Life of Mine (LOM)**

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 the Project

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

Non-binding MOU signed with Chinalco subsidiary **China Rare Earths Jiangsu** to accelerate Makuutu mine development to production

Discussions continue with other groups looking to secure long-term CREO/HREO supply, and **potential feed to standalone IonicRE Rare Earth Refinery**

Infrastructure in close proximity to Makuutu

- Existing 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

Potential for **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**

Phase 4 drilling program underway to increase Indicated and Measured resource base

315 Mt Ionic Adsorption Clay (IAC) Mineral Resource Estimate with Upside

FURTHER IAC TARGETS IDENTIFIED AT MAKUUTU

279 drill holes (4,754 metres) completed between October 2019 and October 2020 defining **JORC MRE[1] of 315 Mt @ 650 ppm** Total Rare Earths Oxide (TREO), at a cut-off grade of 200 ppm TREO-CeO_2

67 RAB drill holes (Phase 3) announced in July **confirmed extension of mineralisation east to EL00147, between previous identified radiometric anomalies, and to northwest (application TN03573 pending)**

Phase 4 infill drilling program now underway (7,800 m approved) to be completed by November to feed into next **MRE update planned for Q1 2022**

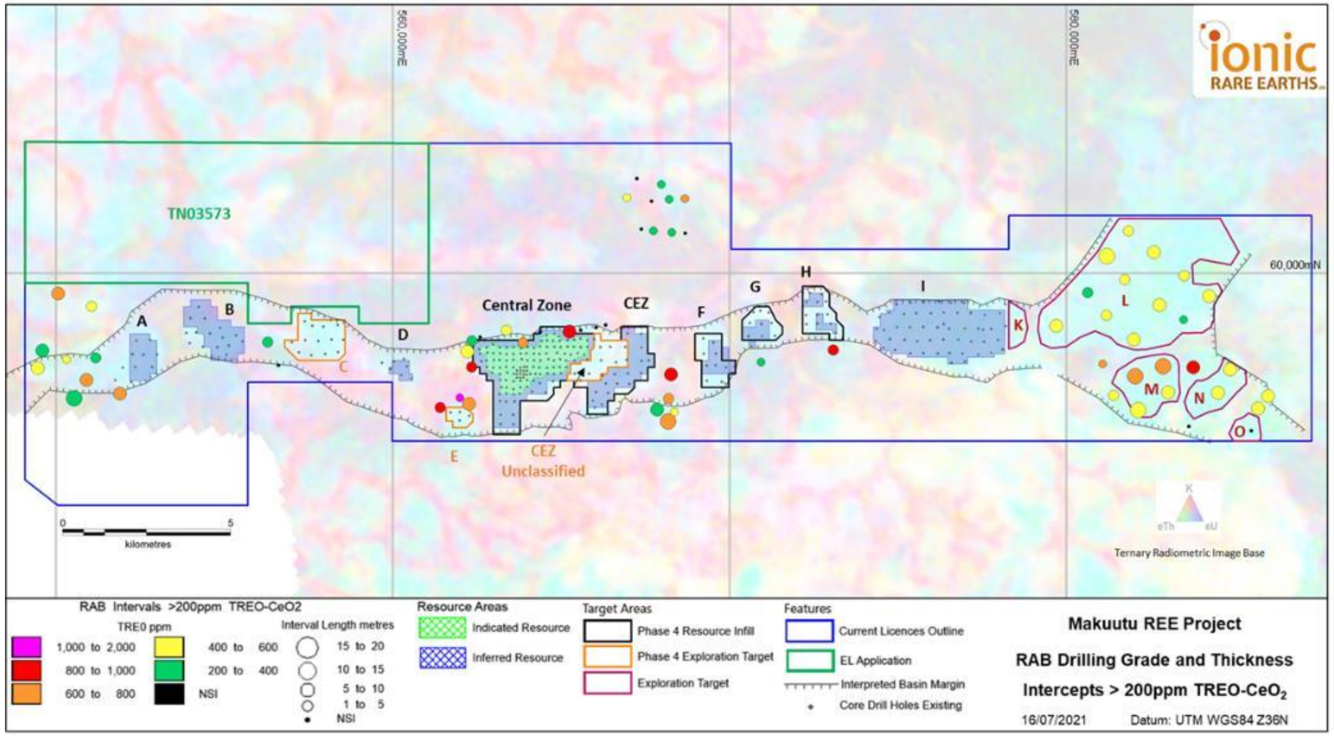
Objective to **increase Indicated and Mineral Resource classifications** to support Feasibility Study in 2022

Near term exploration extension from areas that haven't yet converted (Areas C, E, Central Eastern Zone) so expecting total MRE will increase

Shallow, near surface IAC mineralisation, with clay layer averaging 5 to 12m thick under cover approximately 3m deep. Average hole depth ~17m

Longer term, **numerous exploration targets identified** for drilling in 2022

Scandium currently not included in cut-off grade determination



Category	Estimation Domain	Tonnes (Mt)	TREO (ppm)	TREO no CeO_2 (ppm)	LREO (ppm)	HREO (ppm)	CREO (ppm)	Sc_2O_3 (ppm)
Indicated	Clay	66	820	570	590	230	300	30
Inferred	Clay	248	610	410	450	160	210	30
Total Resource	Clay	315	650	440	480	170	230	30

[1] Makuutu Mineral Resource Estimate reported to ASX on 3 March 2021. [2] Phase 3 RAB results announced 15 July and 20 July 2021.

Makuutu Rare Earth Project Highlights

STRATEGIC VALUE DERIVED BY THE UNIQUE CREO/HREO DOMINANT BASKET

Ionic Adsorption Clay (IAC) deposit mineralisation is highly desirable given it produces a balanced **REO basket dominant in CREO & HREO**

Globally one of the largest IAC deposits discovered outside of southern China and SE Asia & one of less than a handful of economic size and scale

High margin basket potential, approx. **73% of basket is CREO+HREO, magnet REOs make up 43% of basket**

Scoping Study[1] completed in April 2021 defined a **very robust base case** with Highly attractive Scoping Study (11-year Base Case) economic parameters[1]

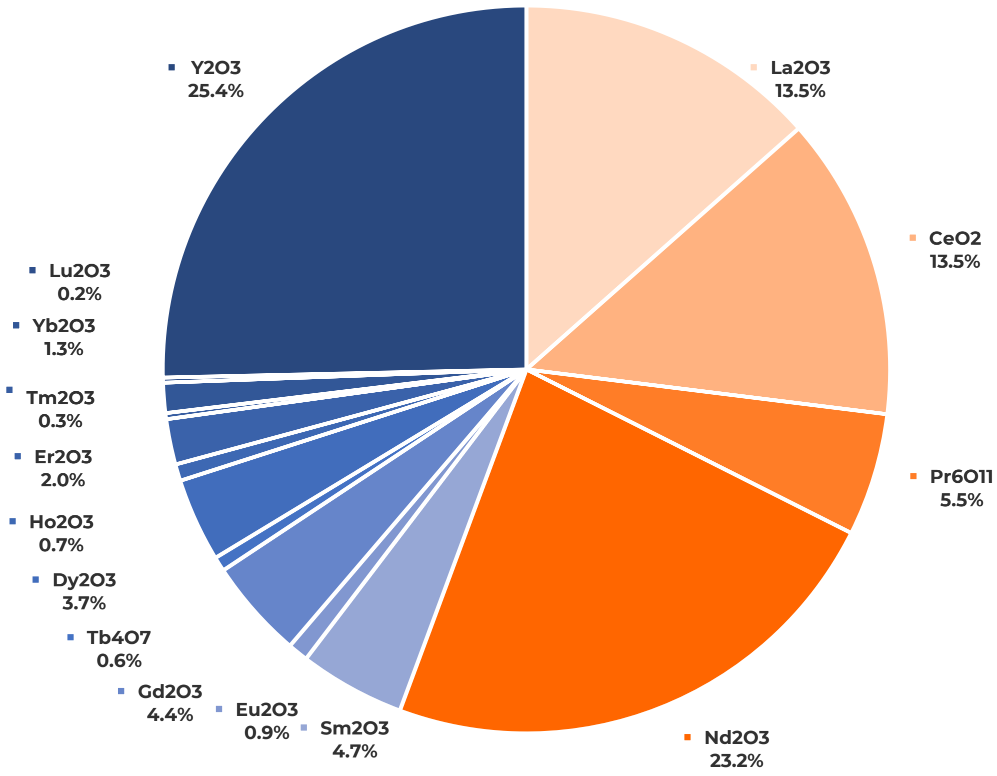
- Post-tax long term free cash flow **US$766 million** over 11 years
- EBITDA of **US$1.28 billion**
- Post-tax Net Present Value (8) of **US$321 million**
- Internal Rate of Return of **38%**
- Pre-production CAPEX requirement of **US$89 million**
- Expansion CAPEX of $212 million funded by Project free cash flow
- Potential upside out to 27 years with inclusion of Inferred resource

315 Mt Mineral Resource Estimate[2] with **significant exploration upside** confirmed with mineralisation stretching across 37 km trend

Global Appeal – Strategic importance of Makuutu product basket seen as critical for governments to **deliver carbon neutral policy objectives** & major appeal to **key defence applications**

Scandium upside is significant with MRE containing ~9,450 tonne Sc_2O_3, potential annual production from 25 to ~100 tonnes per annum

MAKUUTU BASKET
HIGH VALUE CREO / HREO PRODUCT



[1] Makuutu Rare Earths Project Scoping Study reported to ASX on 29 April 2021. [2] Makuutu Mineral Resource Estimate announced 3 March 2021.

REE Hard Rock Mining/Processing vs IAC Mining/Processing

IONIC CLAY RARE EARTH ELEMENTS VS HARD ROCK RARE EARTH ELELEMENTS PROJECTS

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

MINING/PROCESSING STAGES	IONIC ADSORPTION CLAY-HOSTED REE	HARD ROCK-HOSTED REE
Mineralisation	Soft material, negligable (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 (0-20 m) 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 consumption at ambient temperature	Comminution, followed by benefication 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 LeCe content, requires substantial processing before suitable for feed to rare earth separation plant
Product Payability	70-80% payability as mixed Rare Earth oxide/ carbonate/chloride	35-40% payability as a mineral concentrate
Processing - Environmental	Non-radioactive tailings Solution treatment and reagent recovery requirments (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	High temperaturte mineral "cracking" using strong reagents to solubilise the refractory REE minerals Complex capital-intensive plant 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 CREO & HREO 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 from IAC deposits, **higher grade and basket value**

IAC product achieves **nearly double the payability**

IACs experience **none of the radionuclide issues the plague hard rock LREO Projects**

IAC separation and refining much lower CAPEX requirement

Tier-One In-Country 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 (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

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