



(ASX:ABX)

Delivering Materials for a Cleaner Future

31 October 2023



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Prices for aluminium fluoride (AlF₃) were sourced from Asian Metals, China Customs and verified by comparison with prices from Bloomberg. The price actually achieved will depend upon market conditions at the time of sale.

Competent Person Statement

The information in this report that relate to Exploration Information and Mineral Resources are based on information compiled by Ian Levy who is a member of The Australasian Institute of Mining and Metallurgy and the Australian Institute of Geoscientists. Mr Levy is a qualified geologist and a director of ABx Group Limited.

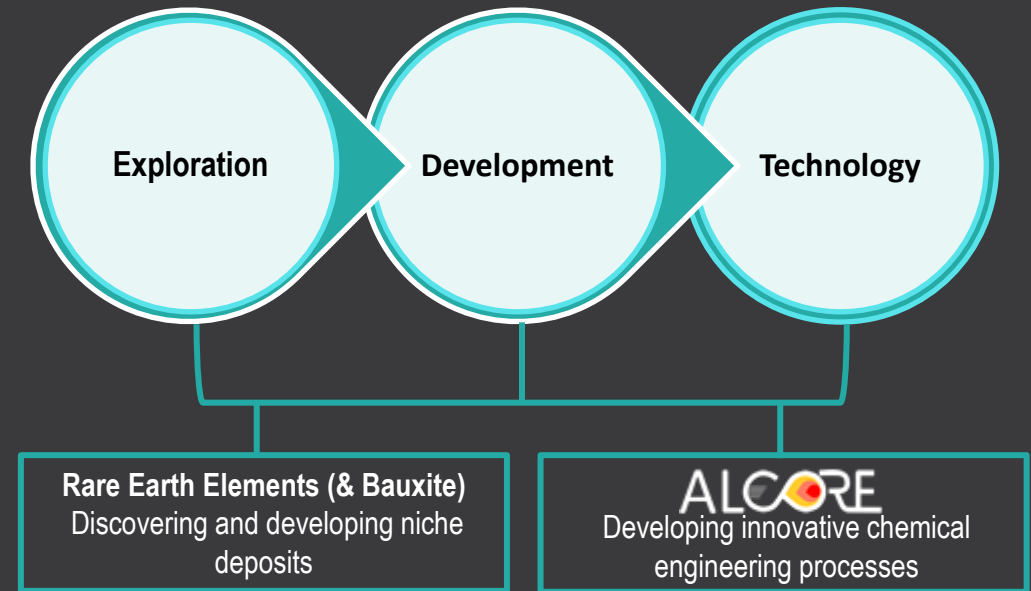
Mr Levy has sufficient experience, which is relevant to the style of mineralisation and type of deposit under consideration and to the activity, which he is undertaking to qualify as a Competent Person as defined in the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. Mr Levy has consented in writing to the inclusion in this report of the Exploration Information in the form and context in which it appears.

Delivering materials for a cleaner future

- Discovering and developing an ionic adsorption clay rare earth project in northern Tasmania
- Establishing a plant to produce hydrogen fluoride and aluminium fluoride from recycled industrial waste, to replace imports (ALCORE)

Legacy business

- Mining and enhancing bauxite resources for the cement, aluminium and fertiliser industries



Board of Directors

Hon Paul Lennon AO (Chair)



- Premier of Tasmania 2004-2008
- Deputy Premier and Minister for Infrastructure, Energy & Resources 1998-2004
- Principal Paramul Pty Ltd 2009-

Dr Mark Cooksey (Managing Director and CEO)



- More than 20 years with Rio Tinto and CSIRO
- Worked closely with aluminium and other metal industries
- Significant experience in commercialising new technologies and processes
- PhD in Chemical & Materials Engineering

Ian Levy (Director)



- 30 years of senior management and geological experience with multiple commodities, including at WMC and Pancontinental Mining
- Previously CEO of Allegiance Mining and Director of Gloucester Coal
- Member of JORC for 11 years (4 years as Vice Chairman) and Federal President, Australian Institute of Geoscientists

Ken Boundy (Non-Executive Director)



- 20 years leading companies and divisions in wine, food, building materials and tourism industries
- Chair and Non-Executive on 21 private and public boards
- Executive experience in corporate development, M&A and marketing

Corporate Overview

ASX code: **ABX**

Listed	Issued shares	Options	52-week range	Average daily volume (3 months)	Market cap (@\$0.07)	Cash @ 27 Oct 2023	Shareholders
24 Dec 2009 @ \$0.20	242.3m	11.0m	\$0.07- \$0.16	170,000	\$17m	\$6.5m	2,527

Major Shareholders	Shares	%
Peter Palan and Clare Palan	9.2 m	3.8
Afron Pty Ltd	7.2 m	3.0
Shareholders Mutual Alliance	7.0 m	2.9
Justevian Pty Ltd	5.8 m	2.4
Yarraandoo Pty Ltd	5.6 m	2.3
HSBC Custody Nominees	5.6 m	2.3
Top 20 shareholders	73.0 m	30.1
Remainder	169.4 m	69.9



Resources: **27 million tonnes rare earths and 130 million tonnes bauxite**

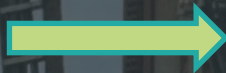
ESG

- ABx Group has commenced disclosing environmental, social, and governance (ESG) metrics, using the internationally accepted Stakeholder Capitalism Metrics developed by the World Economic Forum
- ABx Group has subscribed to Socialsuite's reporting platform to assist with monitoring and disclosing progress¹
- It is intended to release a baseline ESG disclosure report during the December quarter

¹ ABX ASX Release, 12 October 2023



Segments



Rare earth discoveries in northern Tasmania



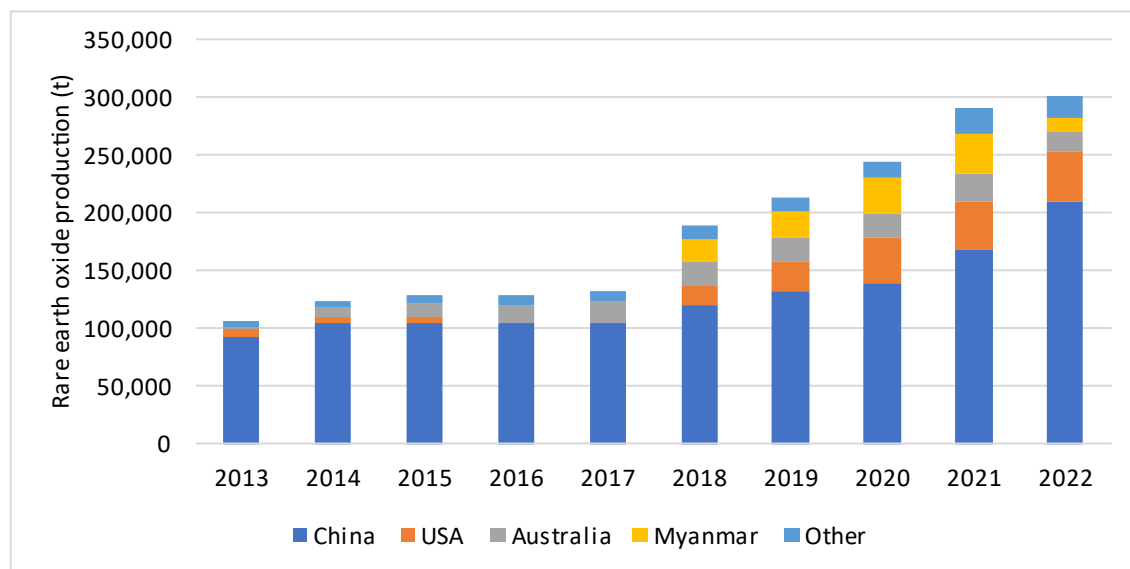
ALCORE Aluminium fluoride production technology



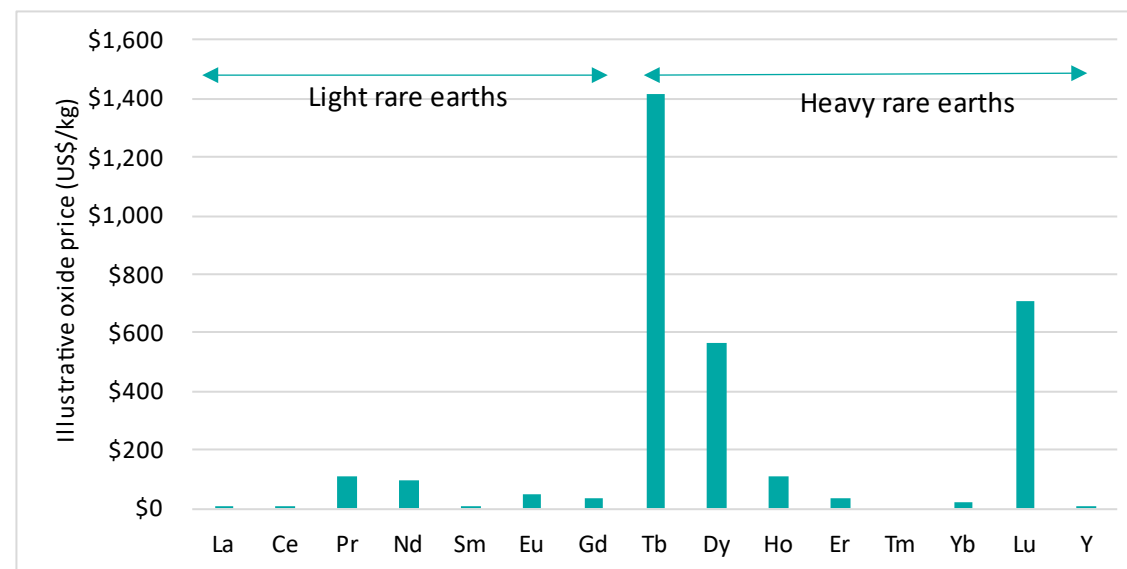
Bauxite operations in Queensland and Tasmania

Rare earth elements (REE) market

- 15+ rare earth elements (REEs) used in wide variety of applications, with demand growing rapidly
- China dominates rare earths markets
- Prices of different rare earths vary significantly because:
 - Proportions of supply do not match proportions of demand
 - Rare earths difficult to substitute



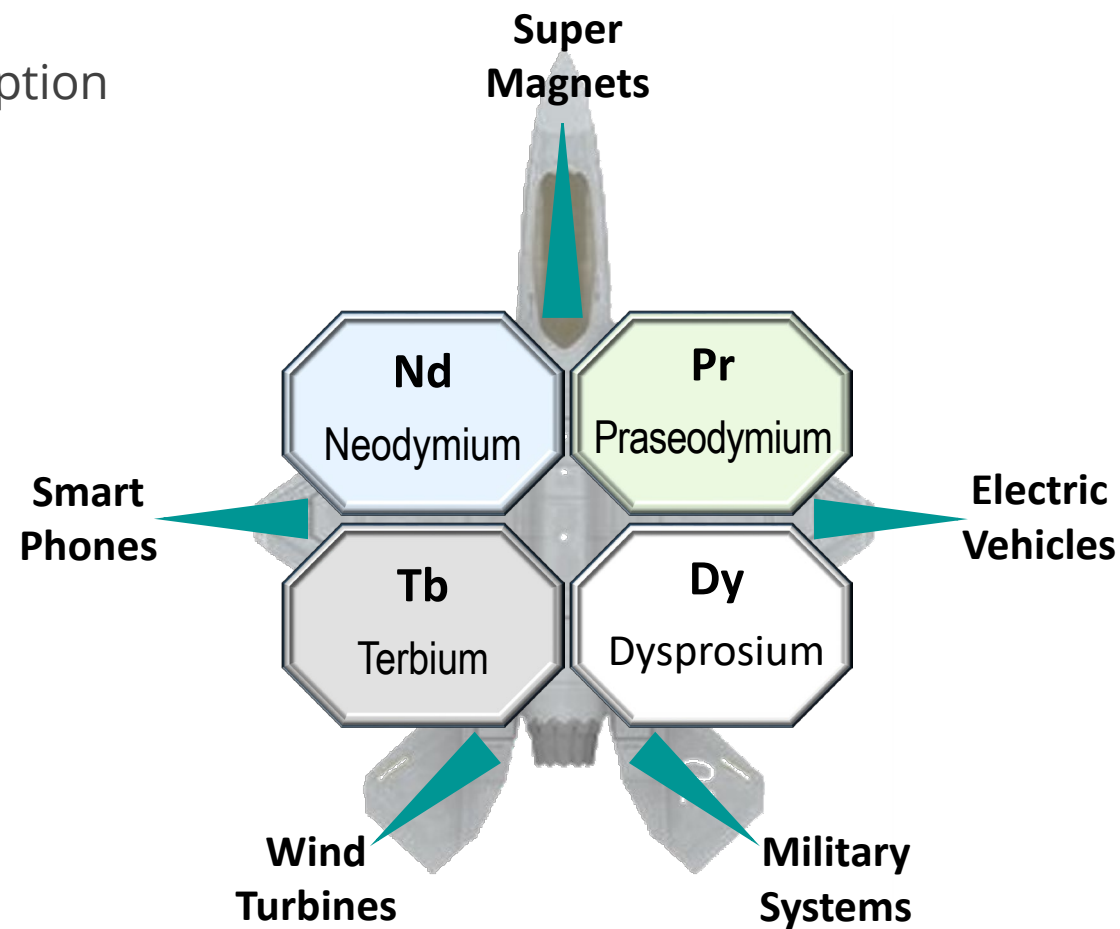
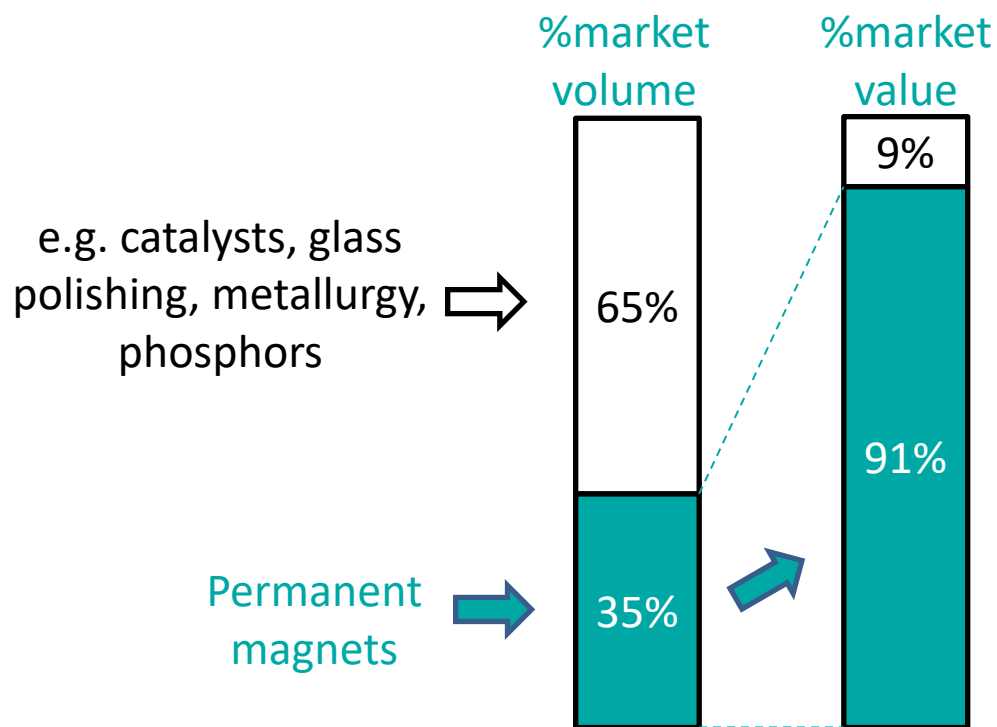
Source: USGS (excludes unregulated production in China)



Source: NI 43-101 Technical Report: Prelim. Economic Assessment for Penco Module Project, 2021

Permanent magnet rare earths (PREE)

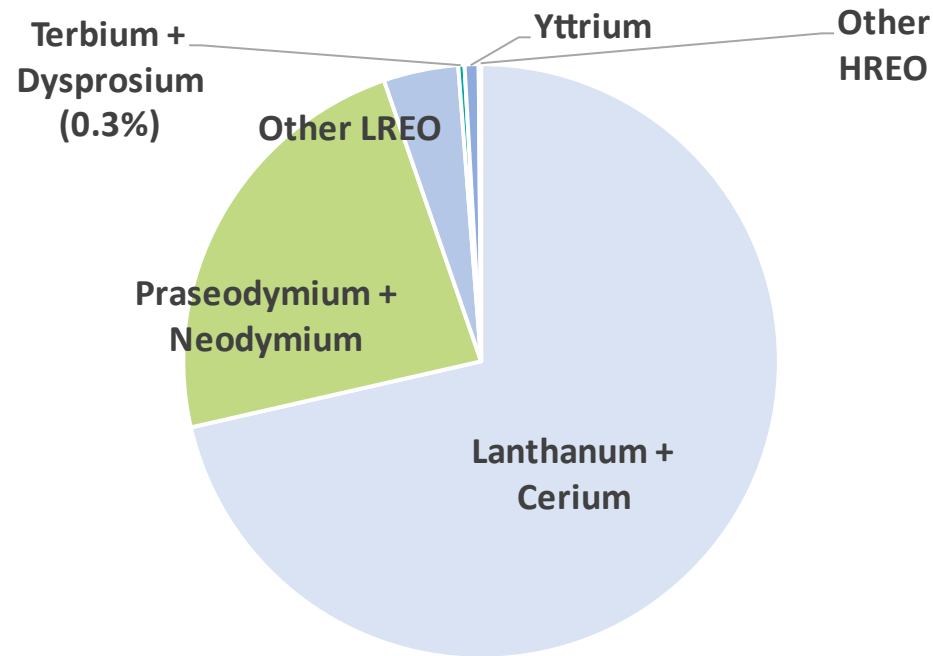
- Essential for electric vehicles and wind turbines
- Represent over 90% of value of rare earths consumption
- Forecast to grow at 7% per year to 2040



Source: Rare Earth Industry Association (<https://www.global-reia.org/about-rare-earth/>)

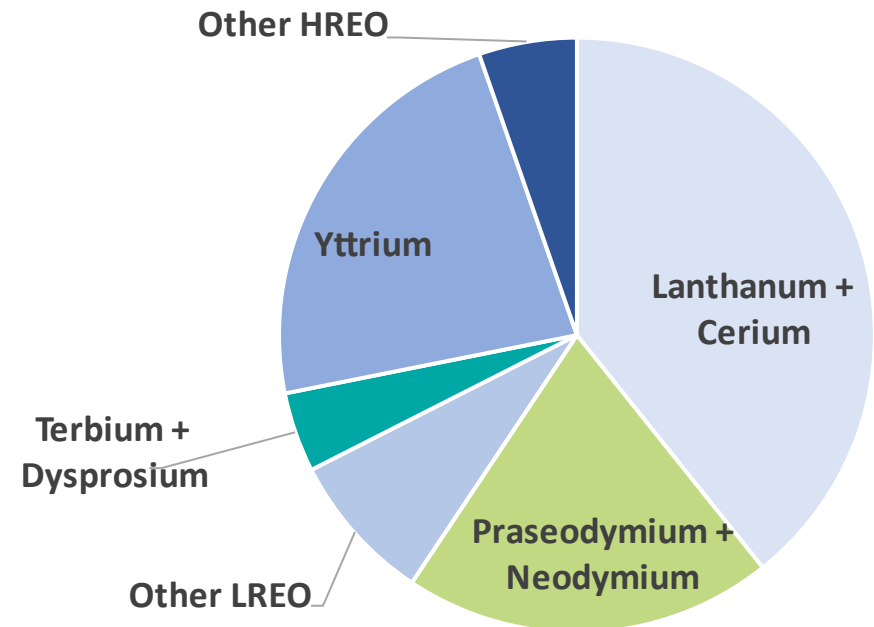
Character of a clay-hosted rare earth deposit

- Exist on a spectrum from 'REE mineral'-clay mixtures to REE-ions adsorbed on/in clays
- Higher contained value than most hard rock deposits due to high (relative) heavy rare earth content



Hard rock: Mount Weld (Lynas)

Source: D.J. Packey and D. Kingsnorth, Resources Policy, 48(2016) 112-116



Deep Leads 

Source: ABX ASX Release, 18 July 2023

Requirements for an ionic clay rare earth project

Feature	Aspects
Mineral Resource	Size, grade, strip ratio, radionuclides
Process	Reagent consumption, yield, product quality
Infrastructure	Transport, energy, water
Jurisdiction	Regulatory approval, community support, government support, supply chain security
Resources	People, finance, intellectual property, partnerships

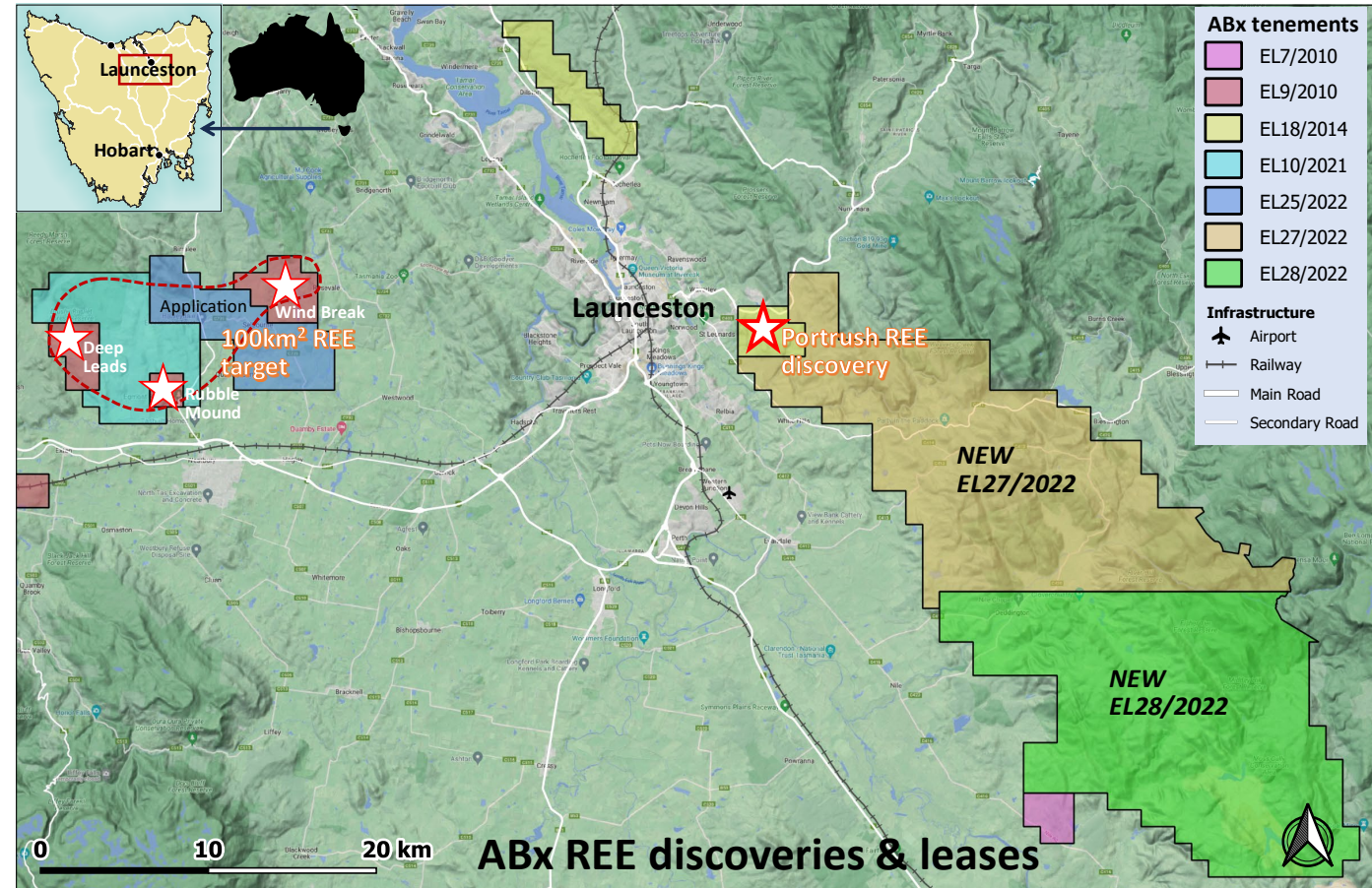
ABx rare earth discoveries in Tasmania

ABx is the first company to discover rare earths in Tasmania

- Four discoveries spanning 100 km² ⁽¹⁾
- Newly granted tenements add >482 km² ⁽²⁾

¹ ABX ASX Release, 16 March 2022

² ABX ASX Release, 26 September 2023



Source: ABX ASX Release, 27 September 2023

Rare Earths Resource Estimate

- Most recent upgrade announced 18 July 2023¹
- Six-fold increase since maiden estimate in November 2022²

Size	Cut-off (ppm TREO-CeO ₂)	Mean TREO (ppm)	Mean TREO-CeO ₂ (ppm)	DyTb ⁴ (%TREO)
27 Mt ³	250	803	603	4.3%

Holes drilled	Metres drilled (m)	Metres assayed (m)	From (m)	To (m)
681	6,728	3,145	4.5	12.1

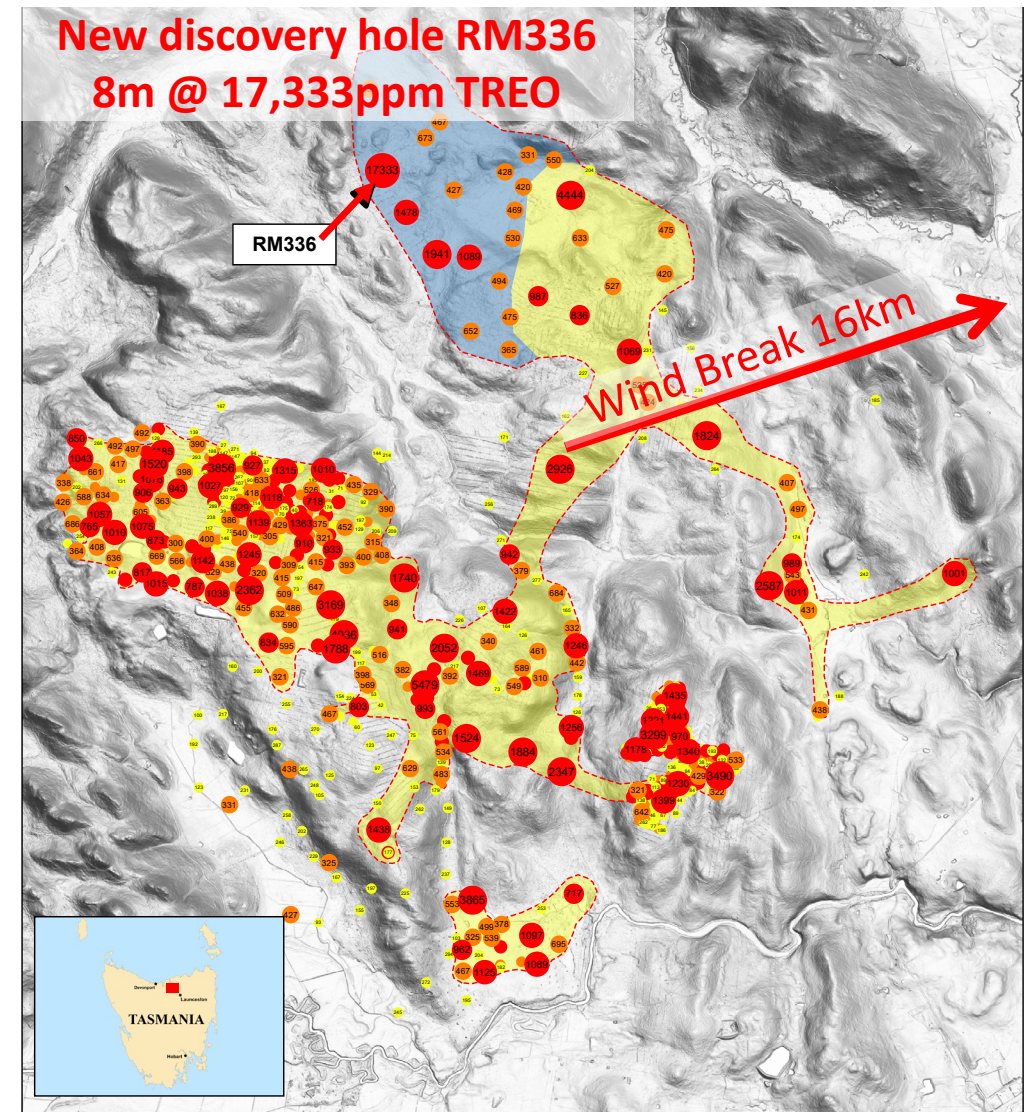
Resource based on only 22% of current estimated mineralised area

¹ABX ASX Release, 18 July 2023

²ABX ASX Release, 23 November 2022

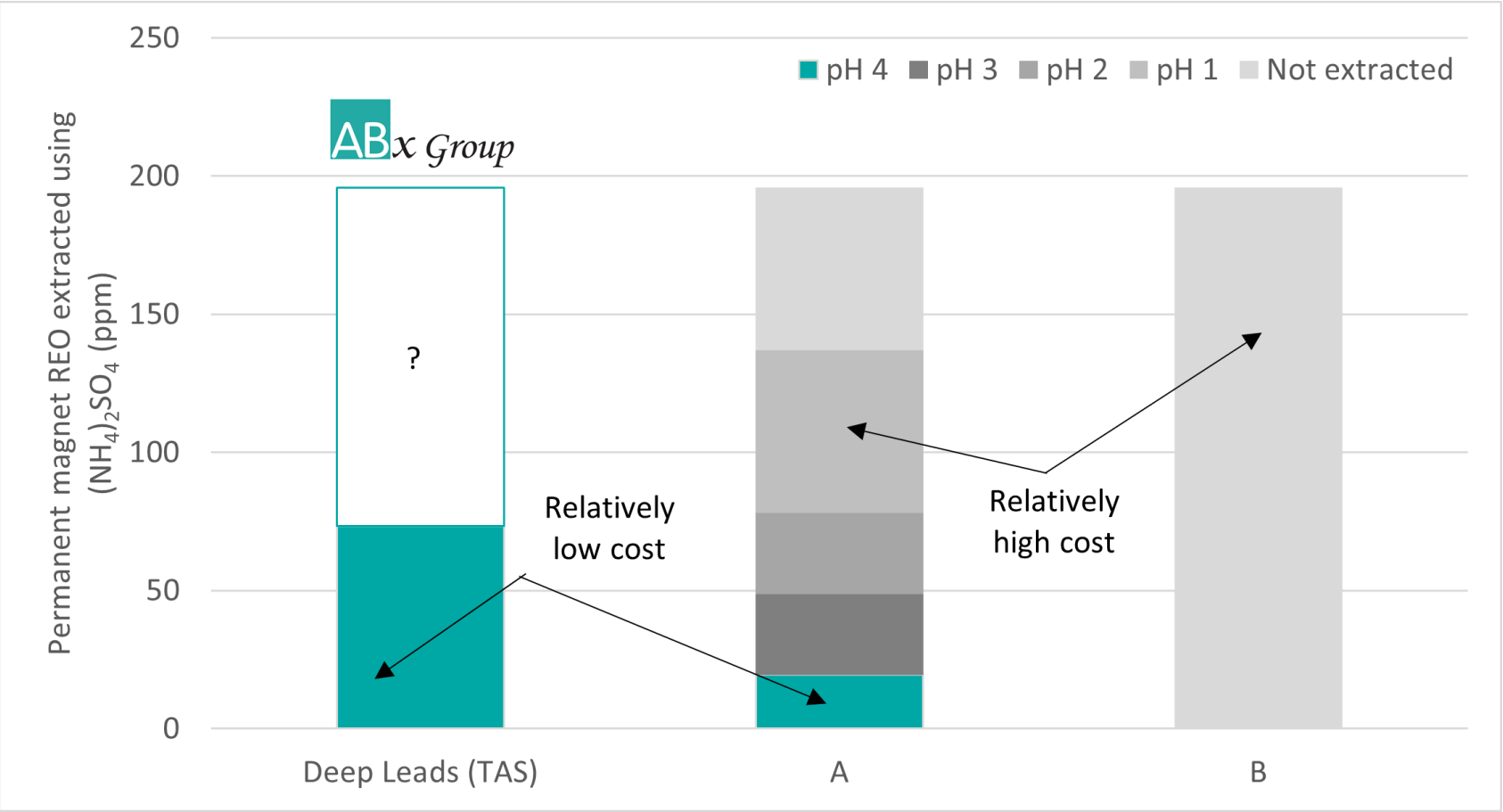
³24 Mt inferred and 4 Mt indicated

⁴DyTb = Dy₂O₃ + Tb₄O₇



Extraction: not all clays are created equal

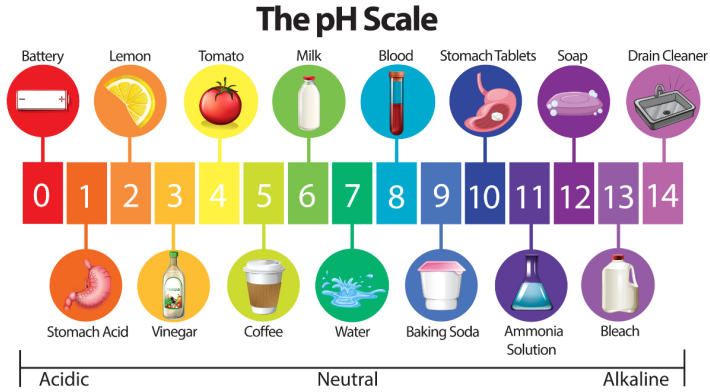
pH is king



Permanent magnet REO = Pr_6O_{11} + Nd_2O_3 + Tb_4O_7 + Dy_2O_3

Source: ABX ASX release, 2 February 2023

- Deposits A and B are hypothetical (same grade)
- Processing cost increases significantly as pH decreases

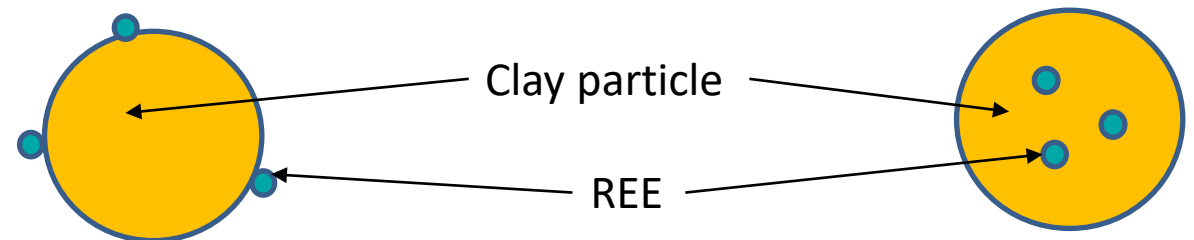
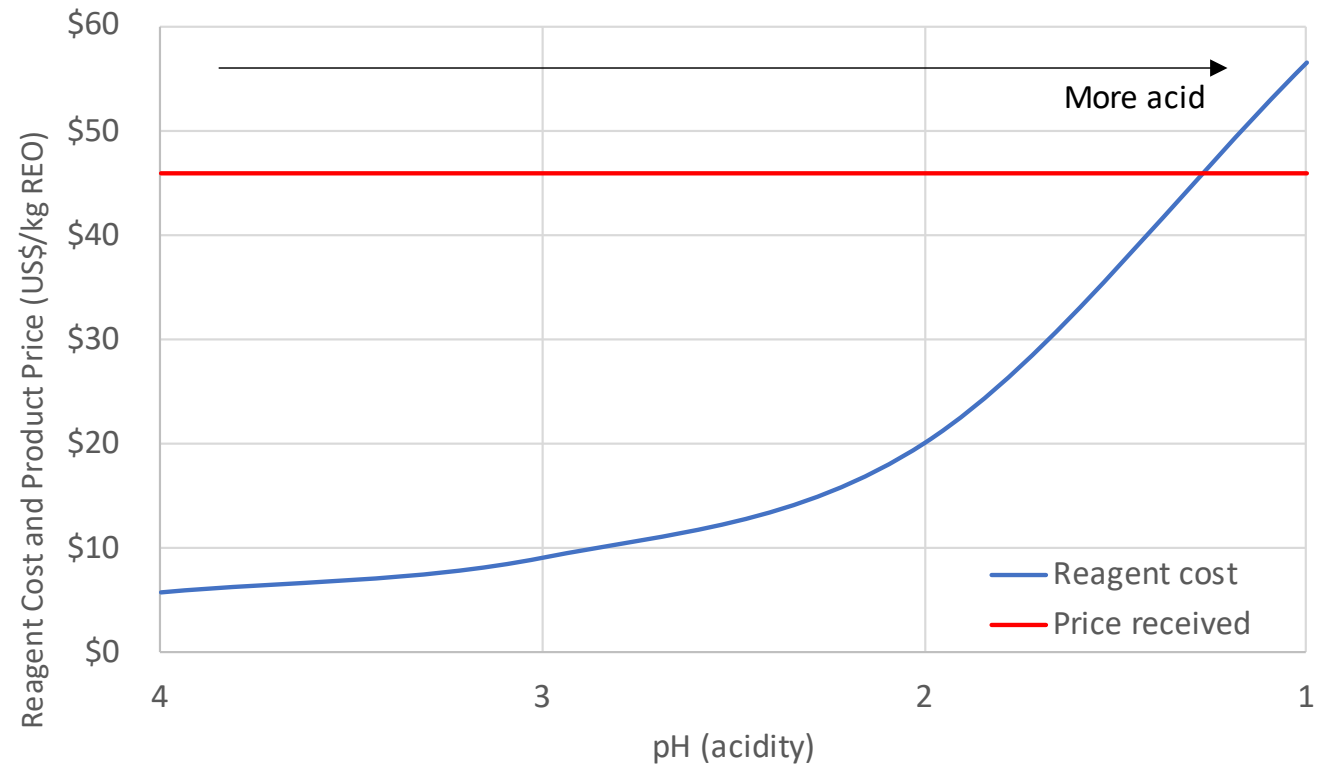


Not all clays are created equal

pH is king

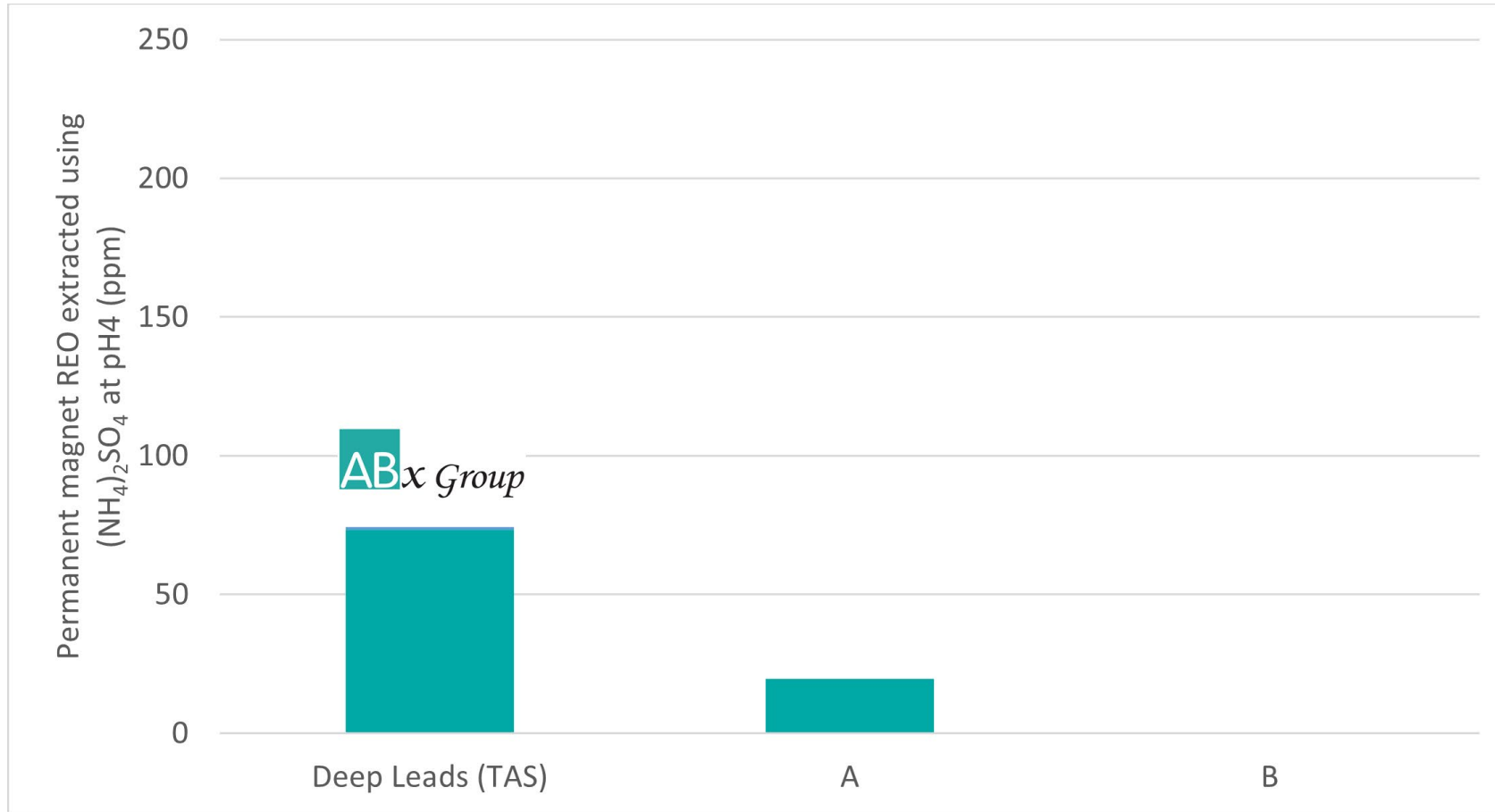
- Charts shows indicative reagent cost and product prices, based on published data
- As pH decreases, reagent cost alone can be higher than product price

- Position on cost curve heavily dependent on pH required to achieve significant extraction
- There is a threshold pH below which the production cost is likely to be higher than revenue



Not all clays are created equal

'Desorbable grade' varies enormously



Deep Leads has the highest 'desorbable grade' (REE extractable at pH 4)

Permanent magnet REO = Pr₆O₁₁ + Nd₂O₃ + Tb₄O₇ + Dy₂O₃

Infrastructure

Transport

- <20 km to major highway
- <100 km to deepwater Bell Bay port

Labour

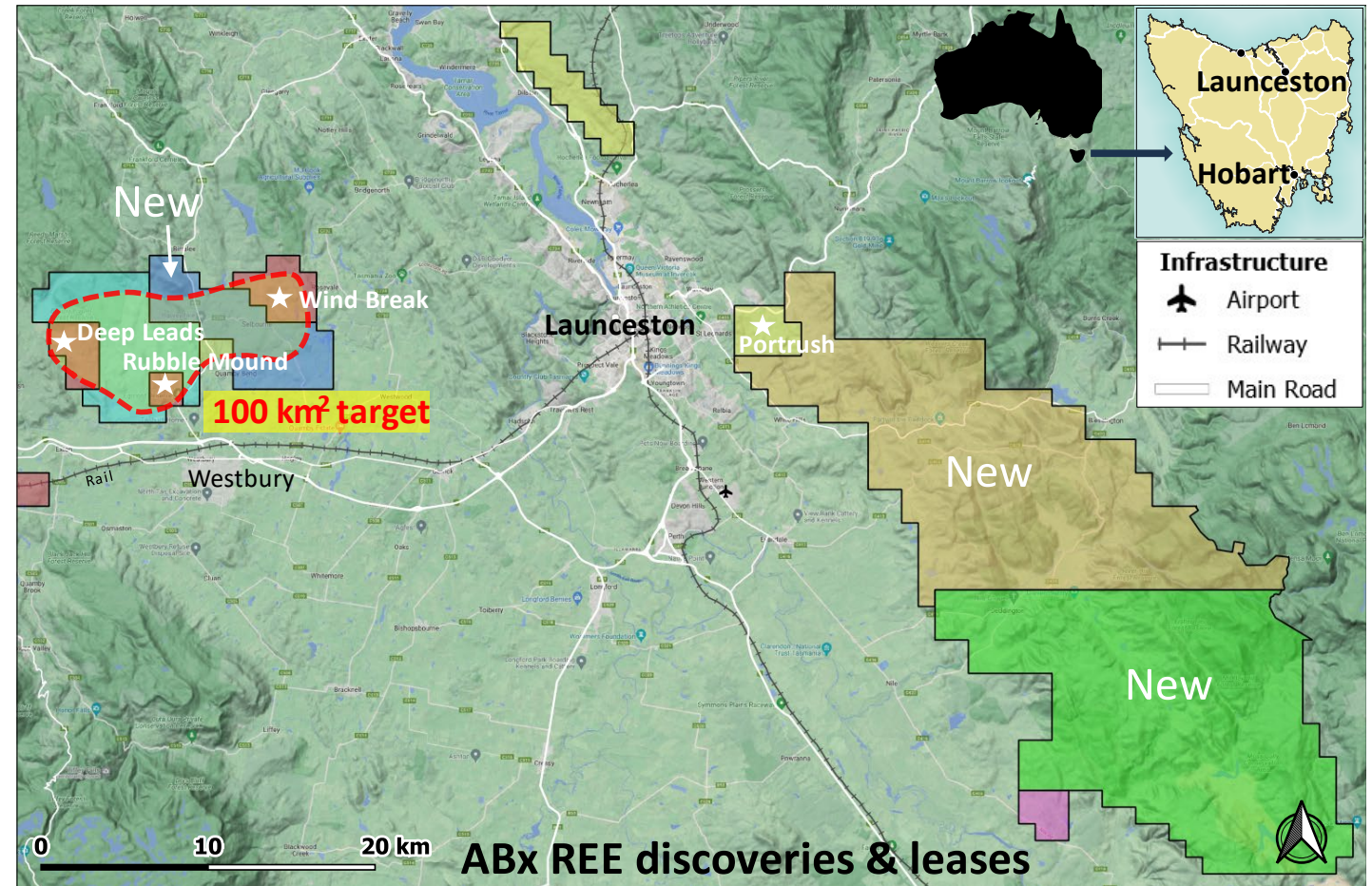
- <50 km to Launceston (pop 65,000)

Water

- High availability in Tasmania

Energy

- Close to major transmission lines



Jurisdiction

Australia

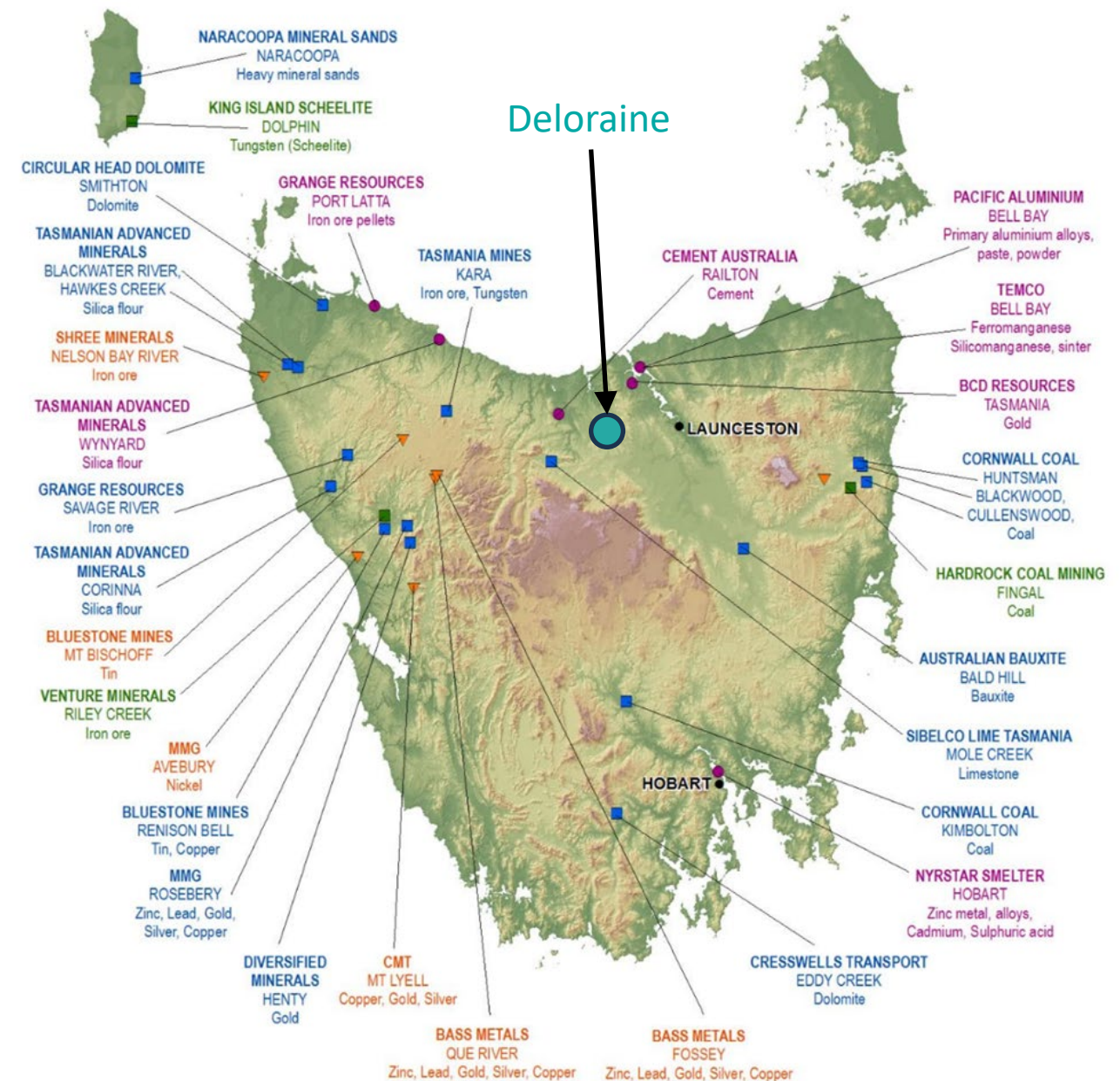
- NATO partner
- Major mining jurisdiction

Tasmania

- Extensive mining history: tin, copper, zinc, lead, gold
- Supportive regulatory environment

Deloraine region

- Mostly commercial forest plantations



Resources People

- High calibre geologists and engineers, with experience in resource development, process development, and production
- ABx active in Tasmania since 2010
 - Excellent reputation with landholders, regulators and government
 - Mined bauxite 2015 to 2020, now fully rehabilitated
 - Mine lease application in progress for second bauxite mine

Ian Levy (geology)



- 30 years of senior management and geological experience with multiple commodities, including at WMC
- Previously CEO of Allegiance Mining and Director of Gloucester Coal
- Member of JORC for 11 years (4 years as Vice Chairman) and Federal President, Australian Institute of Geoscientists

Dr Mark Cooksey (chemical engineering)



- More than 20 years with Rio Tinto and CSIRO
- Significant experience in developing and commercialising new processes in minerals and metals industry
- PhD in Chemical & Materials Engineering

Dr Daniel Jewell (chemical engineering)



- 15 years in senior technical roles including at the University of Cambridge, CSIRO, and in industry
- Strong focus on extractive scale-up technologies for metal production for titanium, magnesium, & lithium
- PhD in Chemical Engineering

Requirements for an ionic clay rare earth project

ABx strengths

Feature	ABx
Mineral Resource	<ul style="list-style-type: none">• 27 Mt with good prospects for growth• 800 ppm TREO with high proportion of DyTb• Low strip ratio
Process	<ul style="list-style-type: none">• pH4: low cost
Infrastructure	<ul style="list-style-type: none">• Close to all major infrastructure, with good access to water
Jurisdiction	<ul style="list-style-type: none">• Mining-friendly region, in NATO partner country
Resources	<ul style="list-style-type: none">• High calibre people, with strong partnerships

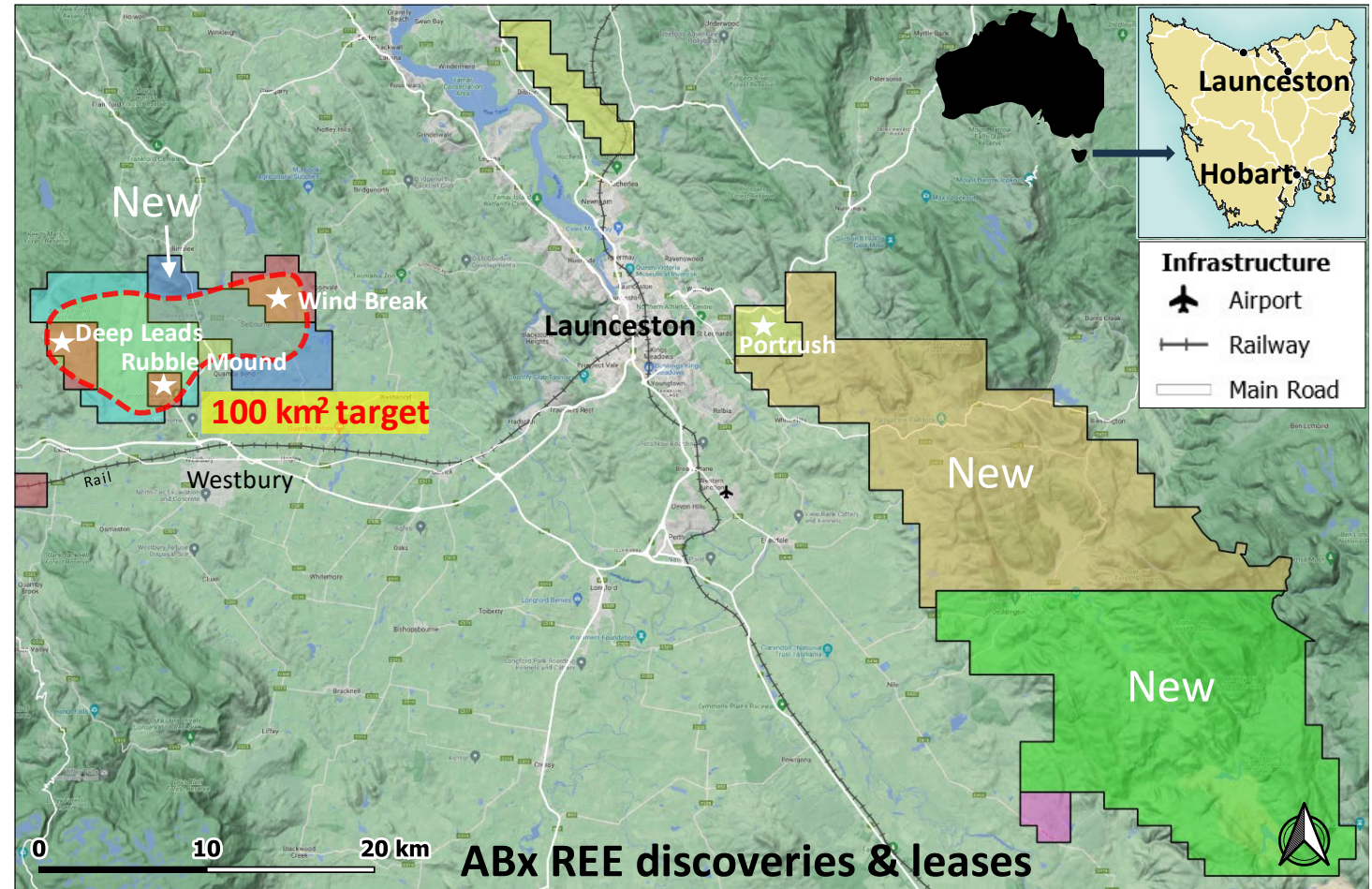
ABx rare earths strategy

Strategy

- Rapidly develop low-cost production of mixed rare earth carbonate
- We operate only where welcomed

Plan

- Further investigations of metallurgical processing steps and conditions
- Estimate CAPEX and OPEX
- Deepen engagement with potential customers
- Enhance ABx's exploration technology to find more rare earths
- Further drilling campaigns



Segments



Rare earth discoveries in northern Tasmania



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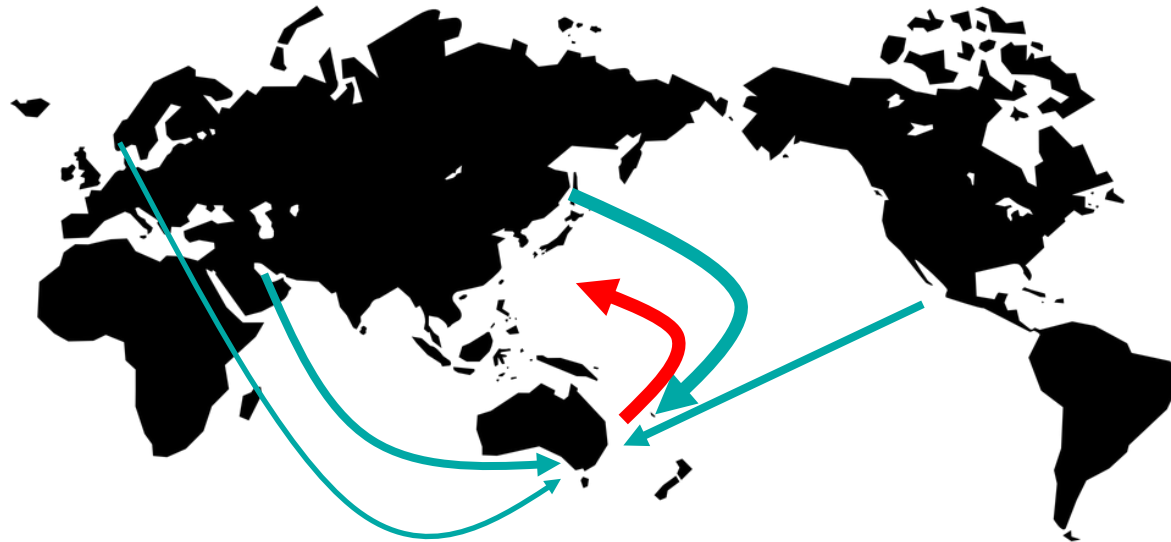
Bauxite operations in Queensland and Tasmania

Aluminium fluoride from aluminium smelter waste

Aluminium fluoride (AlF_3): essential for aluminium smelting

- 1.2 million tonnes produced globally per year worth US\$1.5 billion (US\$1,000-1,800 per tonne)
- 50% produced in China, mainly for Chinese smelters
- Australia imports 100% of requirements, mostly from China

- Traditionally produced from high-cost aluminium hydroxide and fluorspar
- Achievable specification – product purity risk is low
- Mature market – dozens of customers globally



→ Aluminium fluoride → Tapped bath

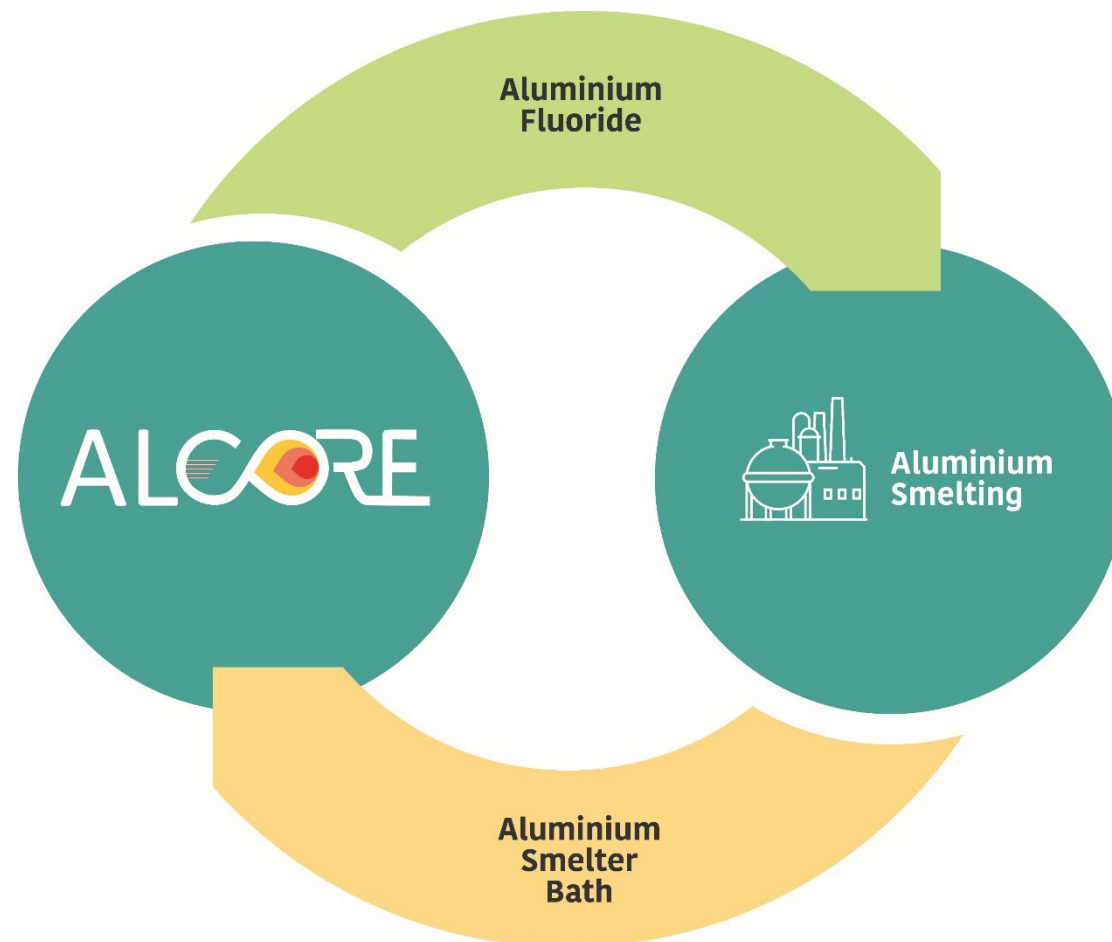
Current imports/exports

ALCORE Process to produce aluminium fluoride

- Exemplary illustration of circular economy

- ABx's 83%-owned refining technology subsidiary
- Developing processes to produce aluminium fluoride using¹:
 - Fluorine from tapped bath (an aluminium smelter waste)
 - Aluminium from dross (an aluminium smelter waste) or bauxite

¹ABX ASX Release, 7 June 2022



ALCORE Process economics

- Based on long term aluminium fluoride prices and exchange rates, and estimated costs
- For 20,000 t/y aluminium fluoride (80% of Australian demand)
- Attractive margins under all scenarios

Aluminium source	Scenario	AlF ₃ price (US\$/t)	FX rate USD:AUD	AlF ₃ price (A\$/t)	Estimated operating cost (A\$/t AlF ₃)	Estimated operating margin* (A\$/t AlF ₃)	Estimated EBITDA* (A\$m)
Aluminium hydroxide	Baseline	\$1,220	0.75	\$1,630	\$1,250	\$730	\$15m
Dross	Baseline	\$1,220	0.75	\$1,630	\$1,050	\$930	\$19m
Aluminium hydroxide	Optimistic	\$1,400	0.70	\$2,000	\$930	\$1,450	\$29m
Dross	Optimistic	\$1,400	0.70	\$2,000	\$770	\$1,600	\$32m

*Includes revenue from co-products

ALCORE Technical progress

- Critical processing steps have been demonstrated in laboratory
- Initial operating conditions for the pilot plant reactor have been selected¹
- Bath pilot batch reactor fully installed, and commissioning is in progress²
- For continuous pilot plant, technical requirements for oleum production module and bath reactor module finalised with two international suppliers

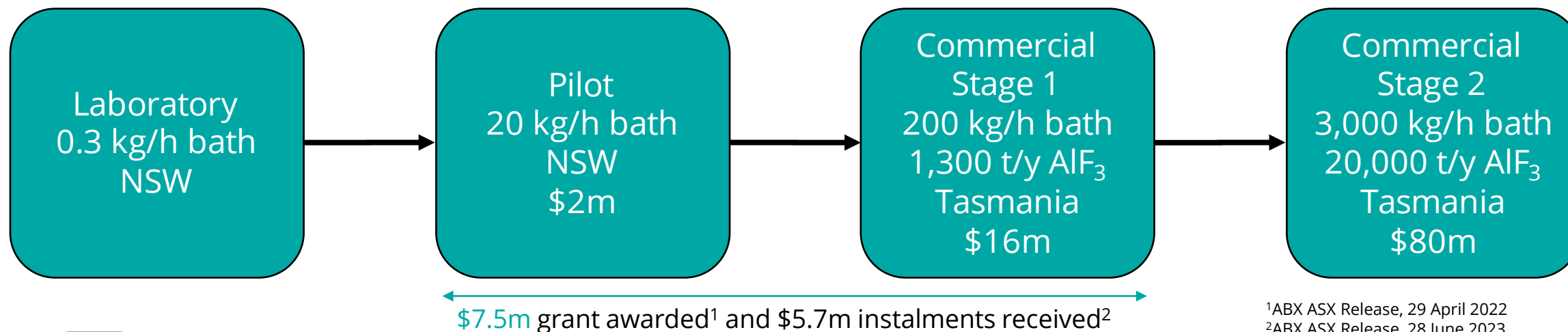


Bath pilot batch reactor (centre)

¹ABX ASX Release, 24 October 2022
²ABX ASX Release, 13 September 2023

ALCORE Process scale-up

- Rigorous scale-up to reduce technical risk
- First aluminium fluoride plant planned for Bell Bay, Tasmania, near existing hydro-powered aluminium smelter. Planned production 20,000 t/y
- High potential for plants in other major aluminium smelting regions
- Potential expansion into other markets, including fluorine chemicals

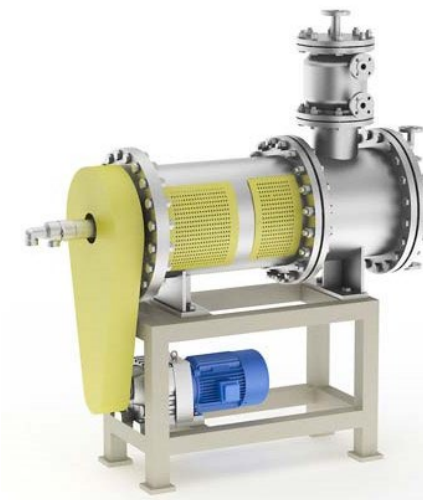


¹ABX ASX Release, 29 April 2022

²ABX ASX Release, 28 June 2023

ALCORE Technical plan

Reactor	Purpose	Commissioning
Bath pilot batch reactor	<ul style="list-style-type: none"> Confirm preferred reactor design Demonstrate that can achieve high fluorine yield from bath Produce metal sulfate residue suitable for further process development 	August 2023
Bath continuous pilot plant	<ul style="list-style-type: none"> Demonstrate quality of hydrogen fluoride produced at pilot scale Determine design and operating parameters for commercial plant 	Q2 2024



Illustrative images

Segments



Rare earth discoveries in northern Tasmania



ALCORE Aluminium fluoride production technology

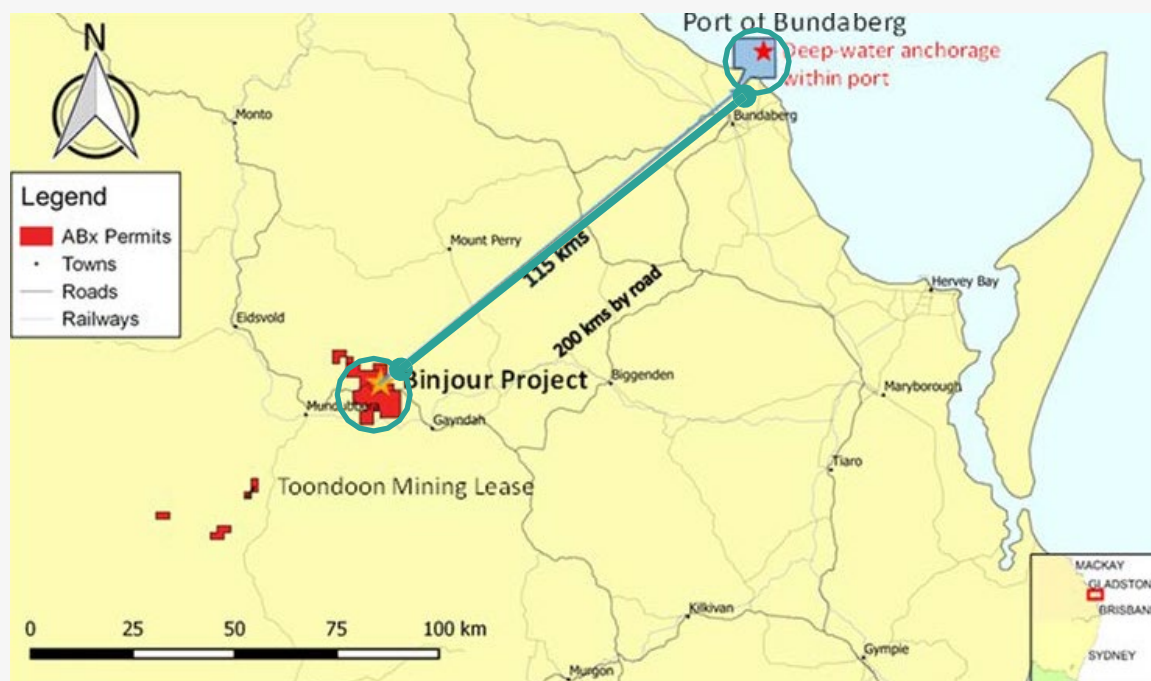


Bauxite operations in Queensland and Tasmania

ABx bauxite operations

Sunrise Bauxite project

Queensland



¹ABX ASX Release, 28 February 2022

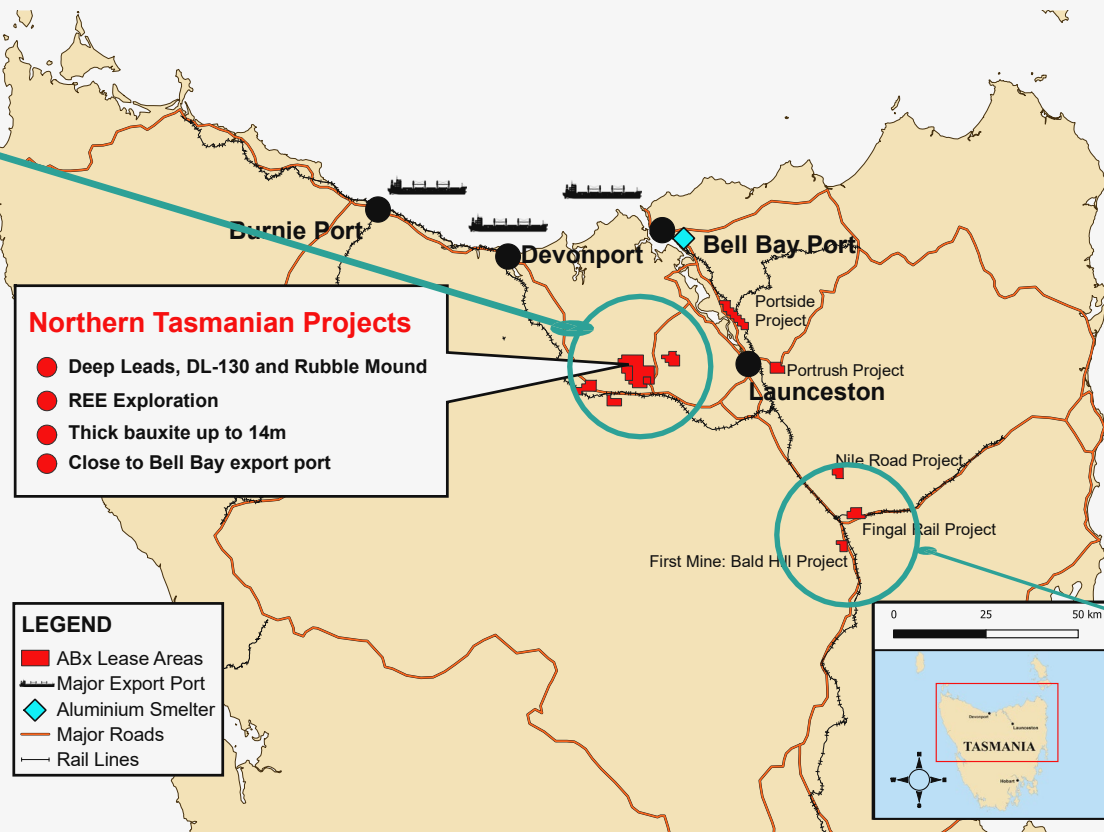
²ABX Quarterly Report to 30 September 2023, 31 October 2023

- 50:50 joint venture with Alumin Pty Ltd, an Australian special purpose vehicle company associated with our strategic marketing partner, Rawmin India¹. ABx is operator
- Mining lease application on the Binjour deposit (37 million tonnes resource), 115km southwest of Bundaberg Port.
- Alumin will contribute up to \$18m (for 49.9% equity), which is anticipated to fund mine and port development
- Next stage of environmental studies at mine and port locations scheduled for Q4, 2023²
- Production planned to commence H1 2025
- Full production anticipated to be 1.5 mt/y

ABx bauxite operations

Northern Tasmania

✓ Environmental Effects Report for DL130 reviewed by EPA¹



- Five-year cement-grade bauxite supply agreement signed with Adelaide Brighton Cement Limited¹
- Mining planned to commence at Q2 2024²
- Bauxite mining at DL130 may accelerate development of the Deep Leads REE discovery

✓ First mine at Bald Hill fully rehabilitated

¹ABX ASX Release, 11 September 2023

²ABX Quarterly Report to 30 September 2023, 31 October 2023



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