



A uniquely positioned  
Australian company  
delivering materials for a  
cleaner future

**Mark Cooksey**  
**Managing Director**

Bell Bay Major Projects Conference  
Hotel Grand Chancellor, Launceston  
Wednesday 20 November 2024, 12:00pm





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Prices for aluminium fluoride (AlF<sub>3</sub>) 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

Rare earths: Supplying light and heavy rare earths from Tasmania



Fluorine waste recycling: Producing industrial chemicals from aluminium smelter waste



Bauxite: Mining & enhancing bauxite resources for the cement, aluminium & fertiliser industries



# Investment Proposition

Low cost hydrogen fluoride production using aluminium smelter bath waste

Will enable hydrogen fluoride production in Australia, to reduce 100% reliance on imports

## Team

Experienced and capable



## Supply shortage

No hydrogen fluoride produced in Australia  
Limited global supplies of fluorspar



## Process is low risk

Adaptation of existing commercial process



Strongly increasing demand for fluorine  
Batteries



New fluorine source available at low cost  
Aluminium smelter bath waste



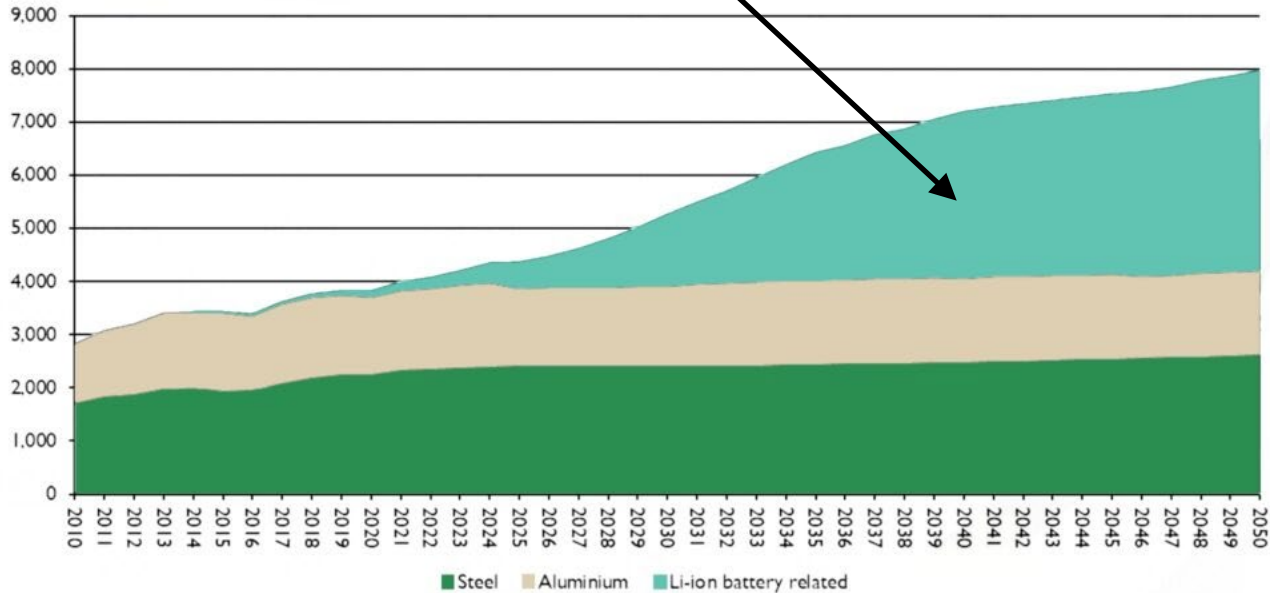
Pathway to production  
First mover, at pilot plant stage



# Strongly increasing demand for fluorine

Most demand growth due to lithium-ion batteries

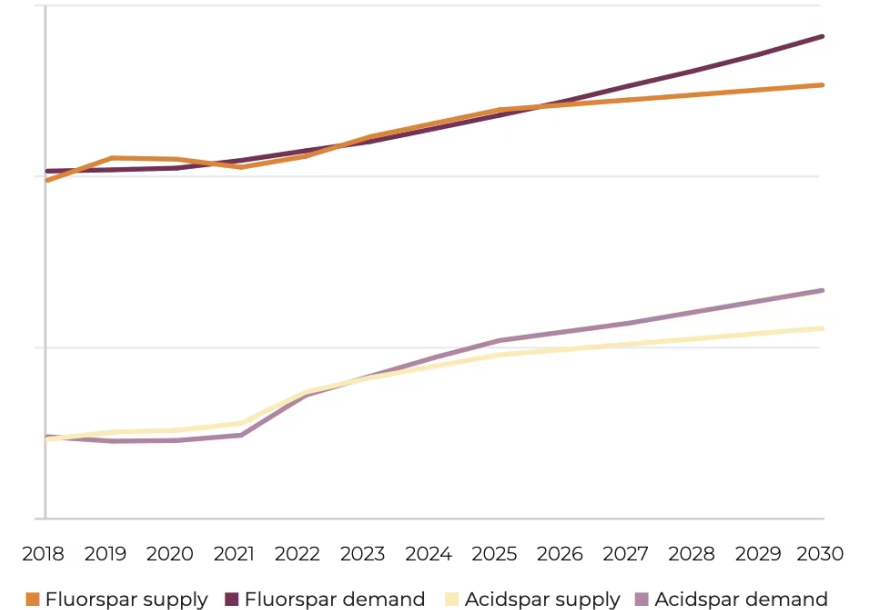
**Lithium-ion battery value chain to become fluorspar's largest end-user market**



Source: ProjectBlue

**Bottlenecks to emerge in fluorspar products that the lithium ion supply chain requires**

Upstream: global fluorspar supply and demand

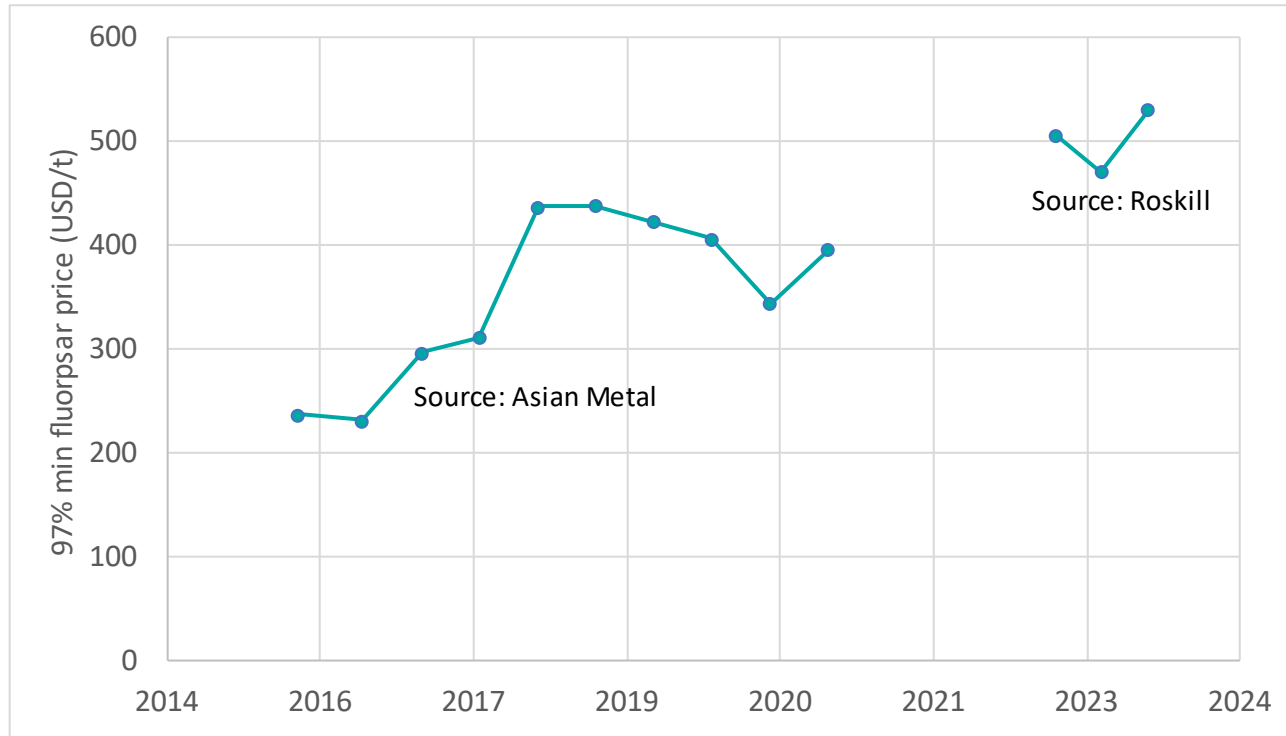


SOURCE: BENCHMARK FLUORSPAR MARKET OUTLOOK

BENCHMARK

# Supply shortage: limited supplies of fluorspar

## Increasing fluorspar prices



- Most hydrogen fluoride is produced from fluorspar

## Government recognition

### Critical Minerals Lists

|           |                                  |
|-----------|----------------------------------|
| Fluorspar | USA<br>Europe<br>Japan<br>Canada |
| Fluorine  | Australia                        |

- Global fluorspar market projected to move into pronounced deficit by 2025

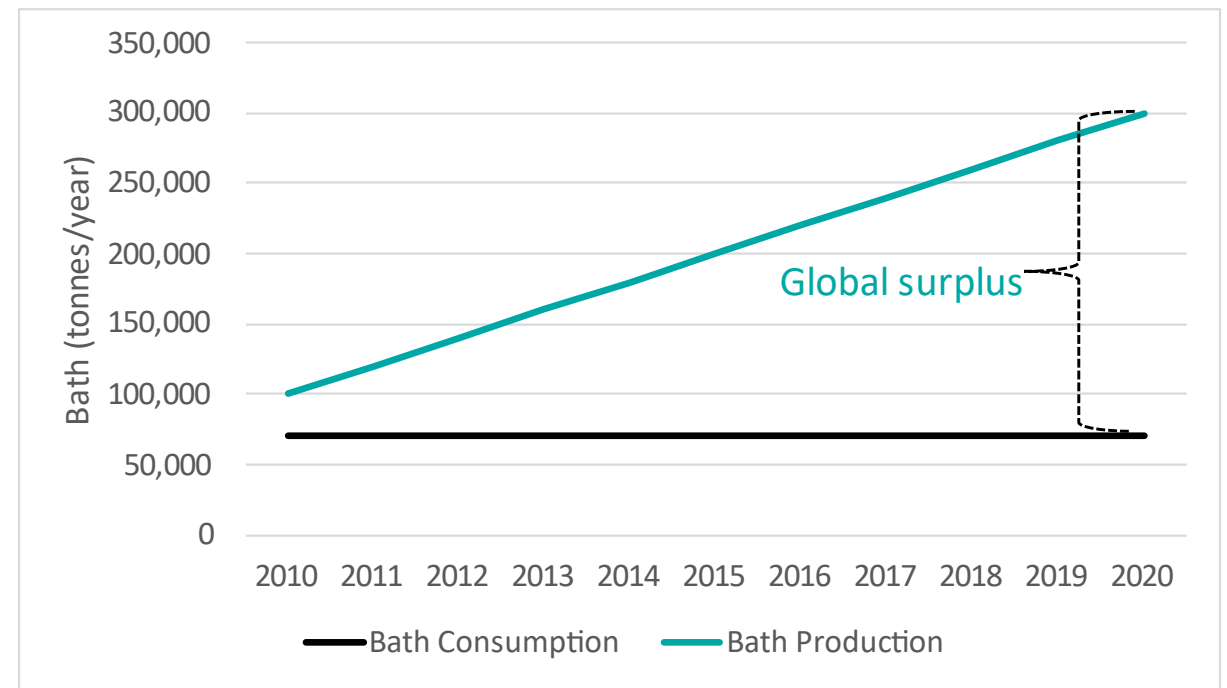
# New fluorine source available: aluminium smelter bath waste

## Aluminium fluoride ( $\text{AlF}_3$ )

- Essential chemical for aluminium smelting
- 1.2 million tonnes produced globally per year worth US\$1.5 billion (US\$1,000-1,800 per tonne)
- Australia is the largest aluminium producer without local aluminium fluoride production, and imports mostly from China
- Results in production of aluminium smelter bath – controlled waste containing 50% fluorine

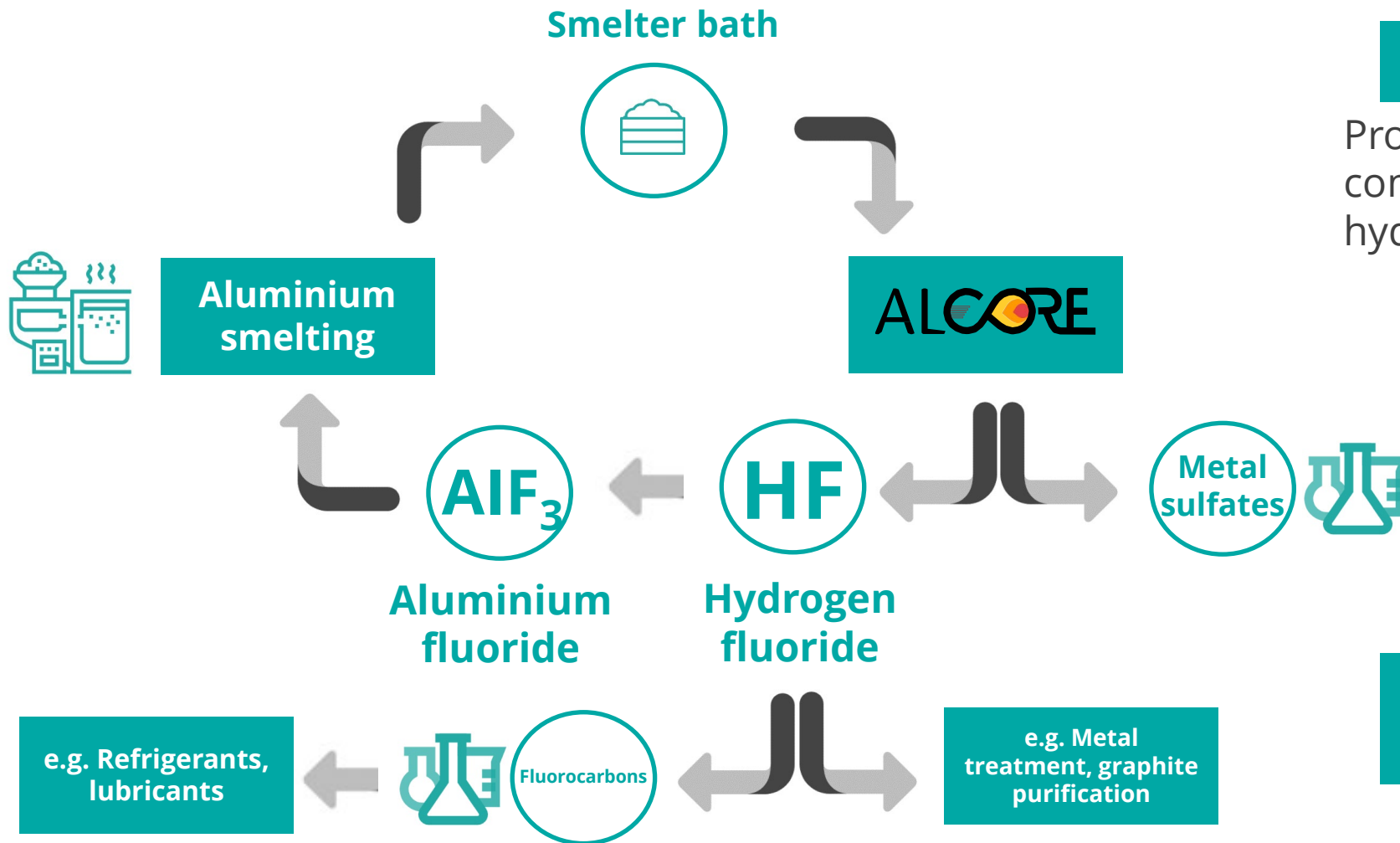


## Increasing surplus of aluminium smelter bath



Source: S.J. Lindsay, Bath generation and management, 10th Australasian Aluminium Smelting Technology Conference, 2011

# Process is relatively low risk



Relatively low technical risk

Process is adaptation of existing commercial process to produce hydrogen fluoride from fluorspar

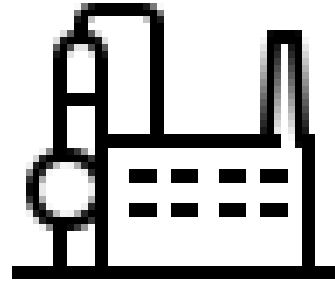
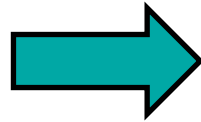
Exemplary demonstration of circular economy

# Pathway to production: Vision for fluorine recycling business



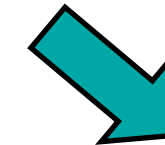
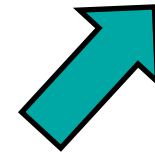
## Demonstration

Demonstrate chemical process for recycling aluminum smelter waste



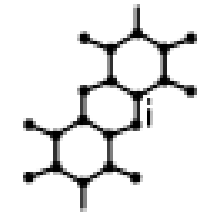
## Production

Construct plant to produce hydrogen fluoride and aluminium fluoride from aluminium smelter waste



## Expansion

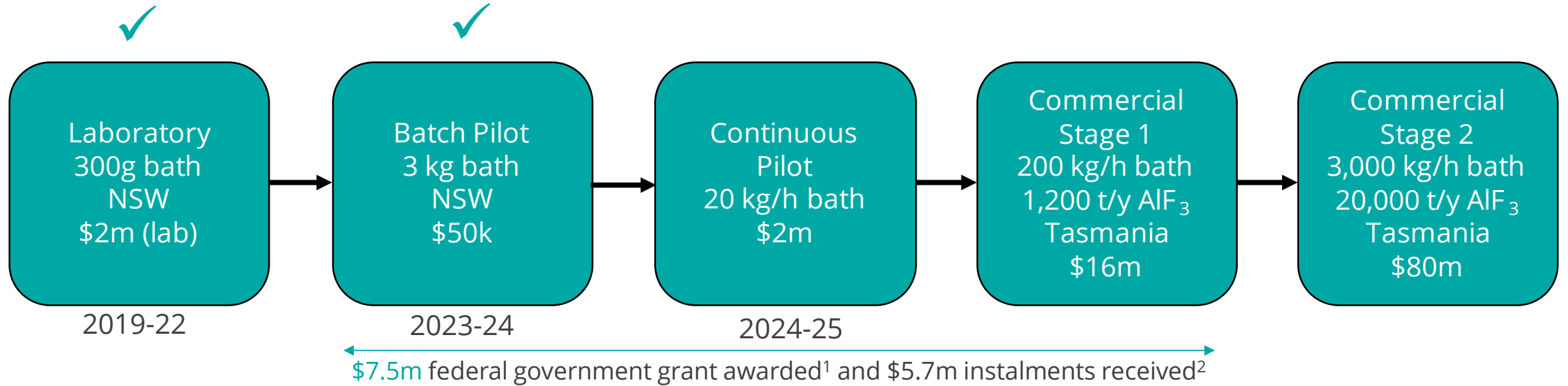
Recycle smelter waste from the global aluminium industry



## Diversification

Enable Australian fluorochemical industry

# Pathway to production: Project development



Critical process steps demonstrated<sup>3</sup>



Achieved target fluorine recovery<sup>4</sup>

Basic engineering design package being finalised

Produce saleable hydrogen fluoride for evaluation by customers

Determine design and operating parameters for commercial plant

First plant planned for Bell Bay, Tasmania

<sup>1</sup>ABX ASX Announcement, 29 April 2022

<sup>2</sup>ABX ASX Announcement, 28 June 2023

<sup>3</sup>ABX ASX Announcement, 24 October 2022

<sup>4</sup>ABX ASX Announcement, 4 June 2024

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Highest proportion of Dy+Tb of any clay-hosted resource in Australia

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## Supply Shortage

Massive demand growth for rare earths



## Mineralogy and REE Distribution

No acid required for processing  
Balance of light and heavy REE



## Pathway to Production

Bauxite mining is enabler



## Jurisdiction

Commercial forest plantation in Australia



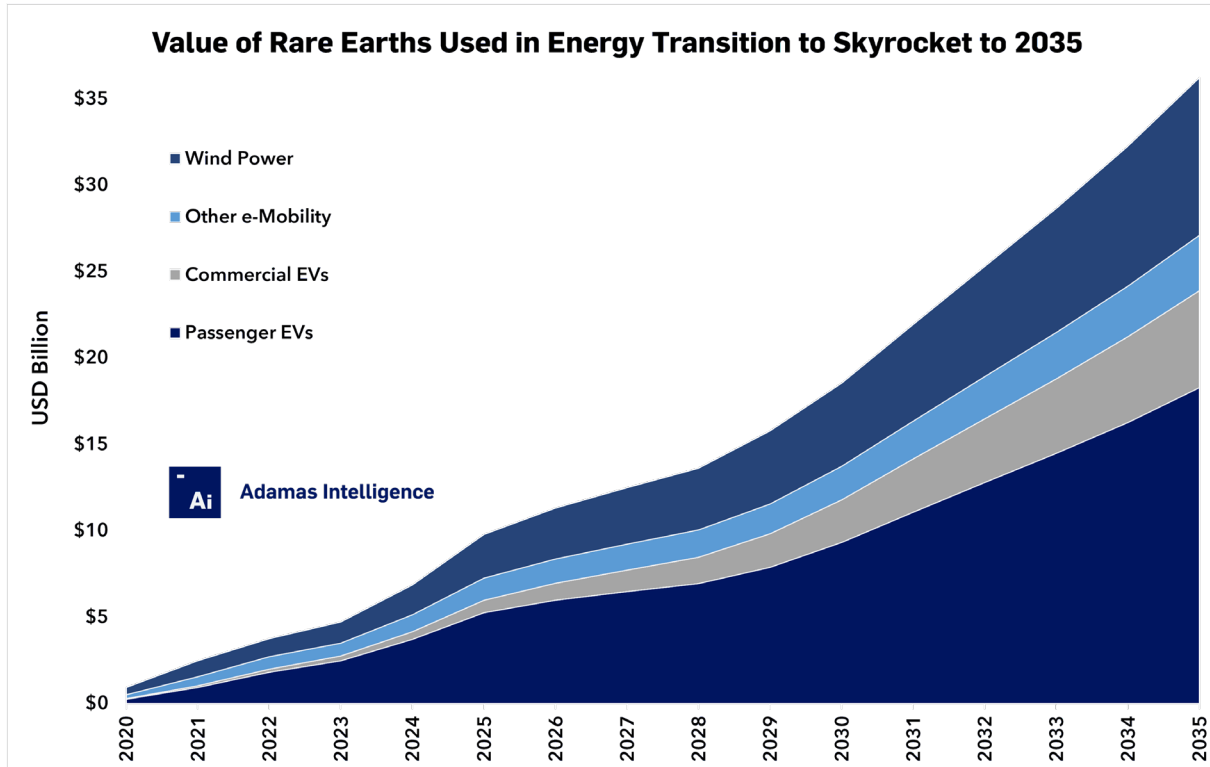
## Infrastructure

Less than 50 km to industrial centre and enabling infrastructure

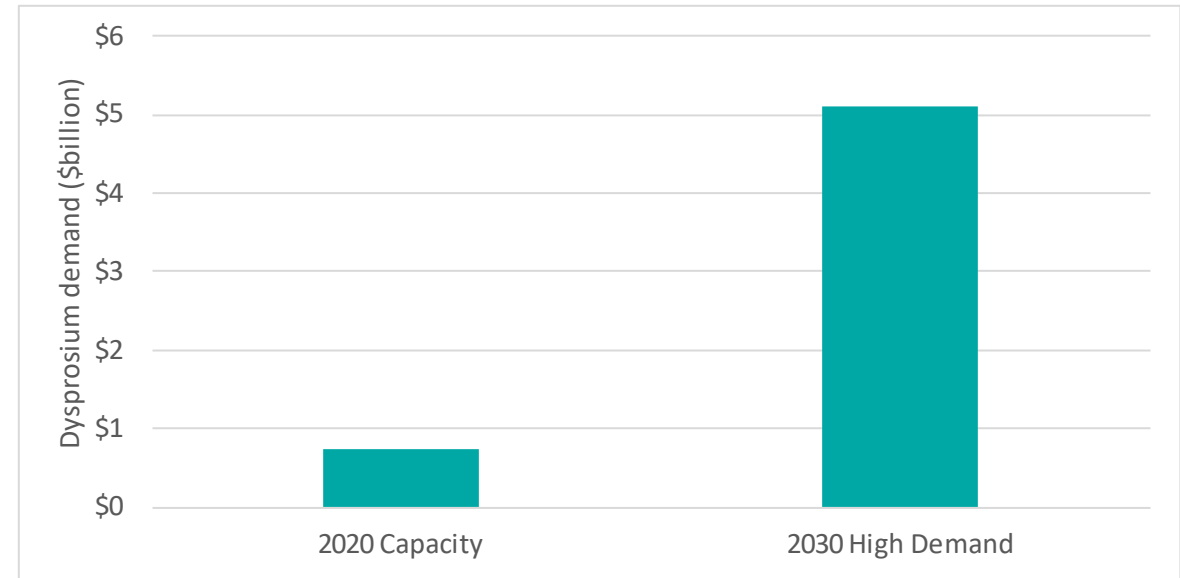


# Massive demand growth for rare earths

Electric motors require permanent magnets containing rare earths



Source: Adamas Intelligence



Sources: US DoE, Critical Minerals Assessment, 2023; Ginger International Trade & Investment

- Demand for NdFeB magnets forecast to increase at a CAGR of 8.7% for 2024 to 2040

- Of the rare earths, dysprosium has the most acute supply risk

# ABx Deep Leads Rare Earth Project

- Upgrade to 89 Mt announced May 2024<sup>1</sup>
- Over 10-fold increase in 12 months

| Size               | Cut-off<br>(ppm<br>TREO-CeO <sub>2</sub> ) | Mean<br>TREO<br>(ppm) | Mean<br>TREO-CeO <sub>2</sub><br>(ppm) | DyTb <sup>3</sup><br>(%TREO) |
|--------------------|--------------------------------------------|-----------------------|----------------------------------------|------------------------------|
| 89 Mt <sup>2</sup> | 350                                        | 844                   | 652                                    | 4.3%                         |

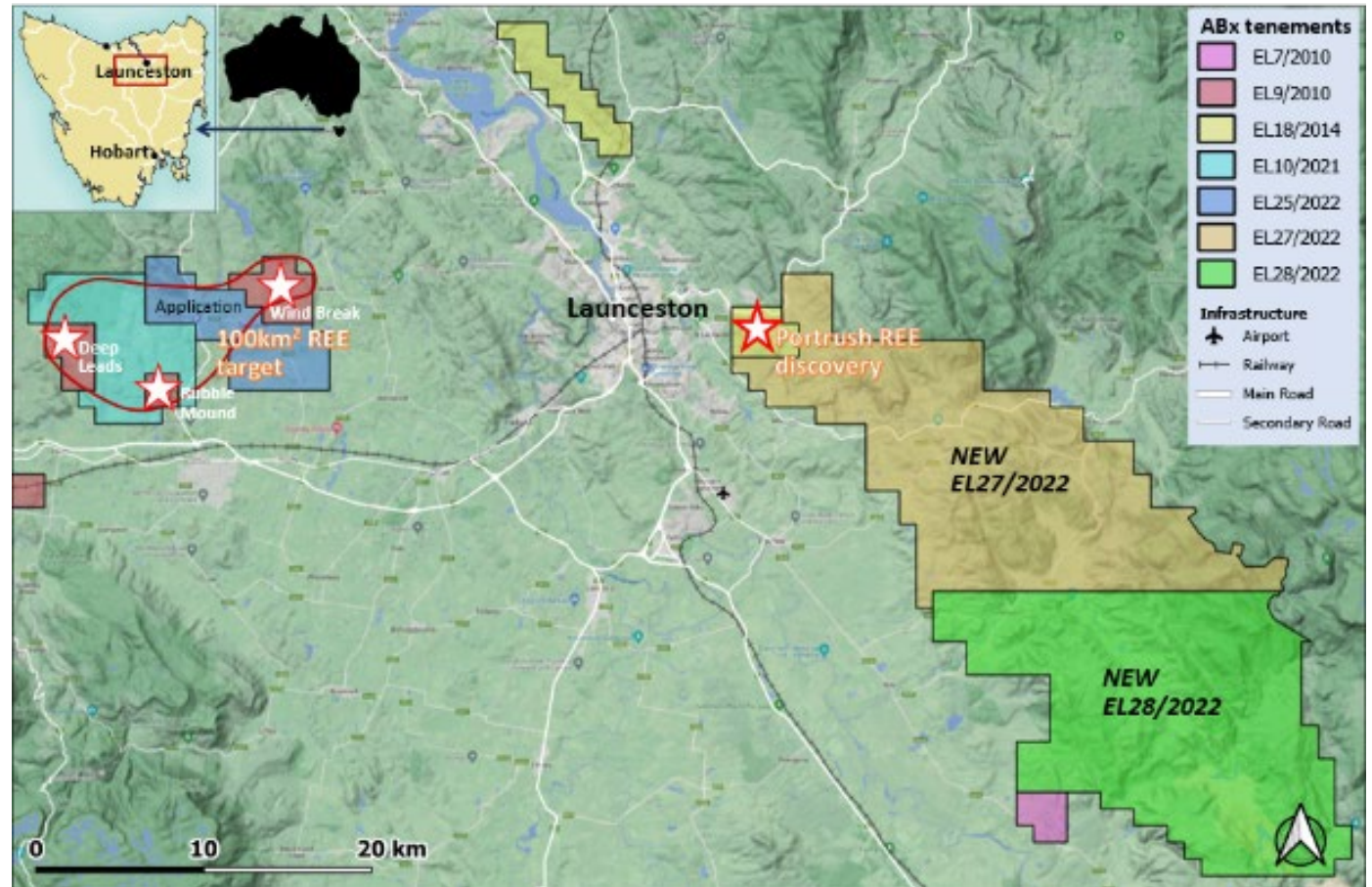
| Holes drilled | Metres drilled<br>(m) | Metres assayed<br>(m) | From<br>(m) | To<br>(m) |
|---------------|-----------------------|-----------------------|-------------|-----------|
| 1,077         | 9,742                 | 3,843                 | 4.2         | 12.0      |

Resource based on only 29% of identified mineralised outline<sup>1</sup>

<sup>1</sup>ABX ASX Announcement, 2 May 2024

<sup>2</sup>41 Mt inferred, 42 Mt indicated and 6 Mt measured

<sup>3</sup>DyTb = Dy<sub>2</sub>O<sub>3</sub> + Tb<sub>4</sub>O<sub>7</sub>



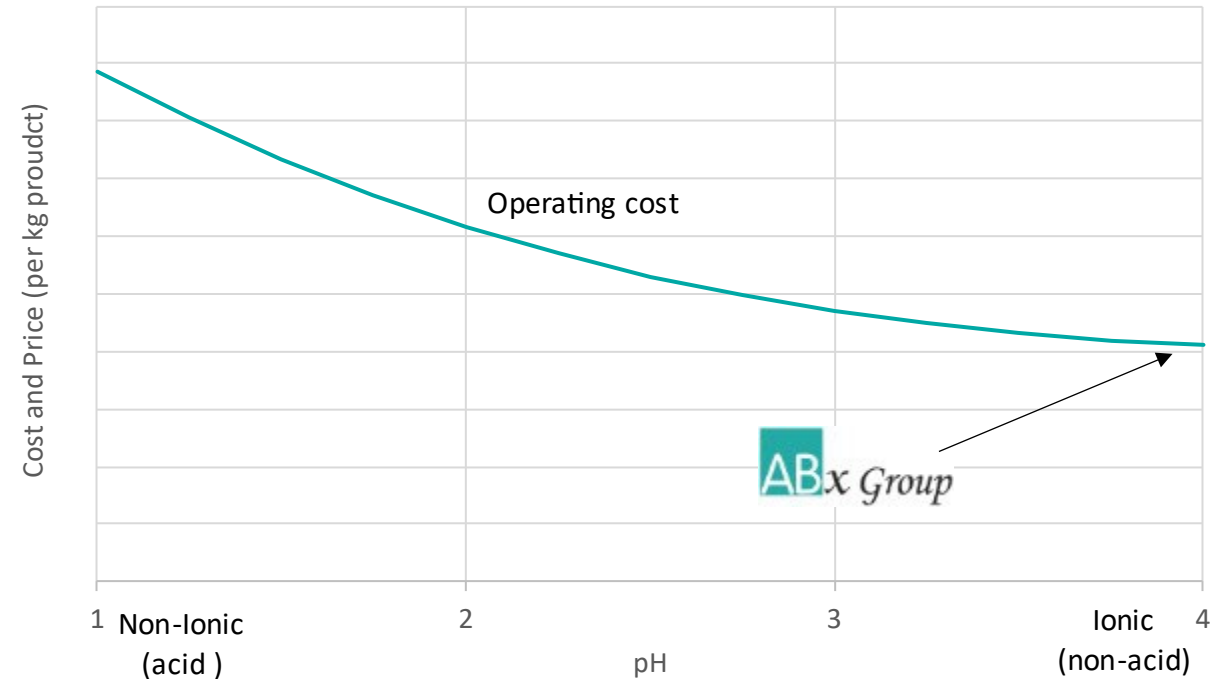
# Deep Leads mineralogy is amenable to low cost processing

Deep Leads is one of the few ionic adsorption clay resources

- Rare earths can be extracted from an ionic adsorption clay ore in less than 30 minutes at pH 4 or above. They do not require acid
- Avoidance of acid significantly reduces impurities and hence operating cost
- Most clay-hosted deposits are not ionic

| Company                | Project       | Country   | Proposed Leaching |
|------------------------|---------------|-----------|-------------------|
| ABx                    | Deep Leads    | Australia | AMSUL, pH 4       |
| Australian Rare Earths | Koppamuura    | Australia | MGSUL, pH 1-2.2   |
| OD6                    | Splinter Rock | Australia | HCl, 25 g/L       |
| Meteoric Resources     | Caldeira      | Brazil    | 4                 |
| Ionic Rare Earths      | Makuutu       | Uganda    | 2                 |

Sources: See Appendix 1



Illustrative cost curve for clay-hosted rare earth resources

# Deep Leads has ideal balance of light and heavy rare earths

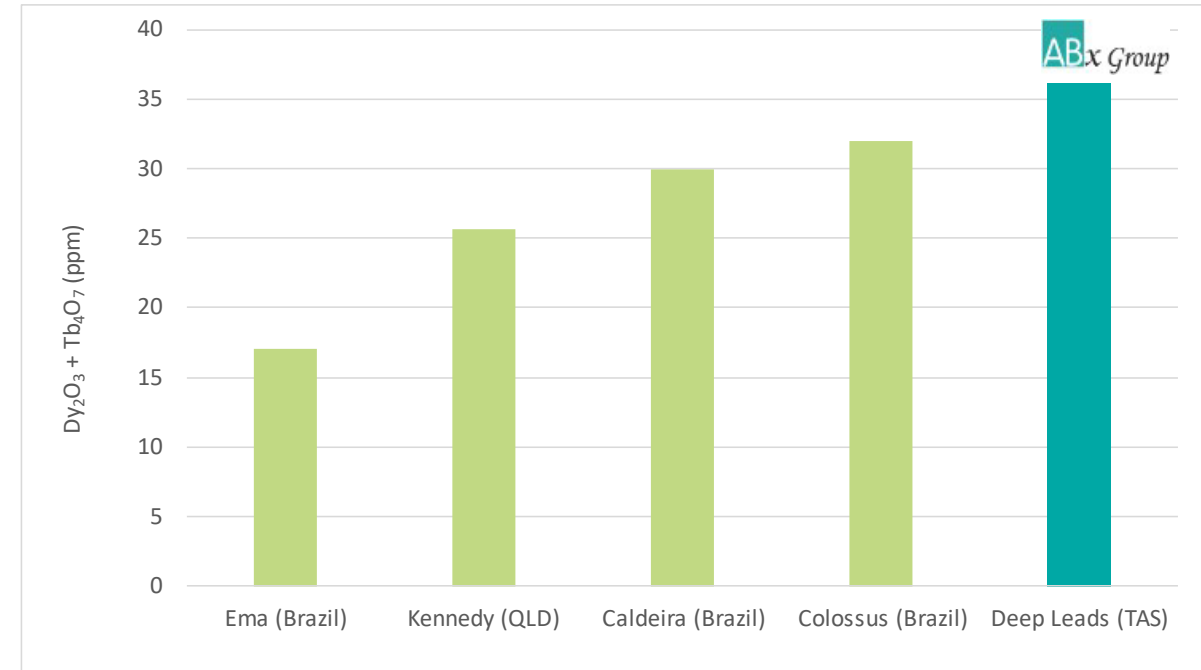
- ABx rare earth product will be attractive to separation plants
- ABx will be more resilient to variation in demand for light and heavy rare earths

| Company            | Project       | Country   | %NdPr | %DyTb |
|--------------------|---------------|-----------|-------|-------|
| ABx                | Deep Leads    | Australia | 21.8% | 4.3%  |
| Lynas              | Mt Weld       | Australia | 23.3% | 0.4%  |
| MP Materials       | Mountain Pass | USA       | 16.4% | -     |
| Meteoric Resources | Caldeira      | Brazil    | 23%   | 1.1%  |

Sources: See Appendix 2

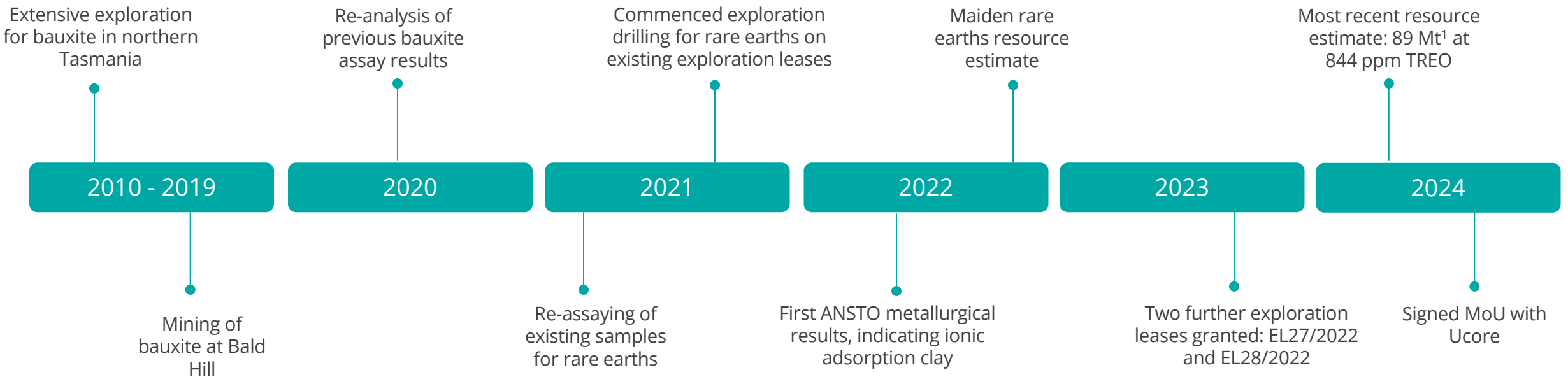
| Rare earth | Type             | Feature                                         |
|------------|------------------|-------------------------------------------------|
| Nd and Pr  | Light rare earth | Provide magnetic strength                       |
| Dy and Tb  | Heavy rare earth | Retain magnetic properties at high temperatures |

- ABx has among the highest Dy and Tb grades of any ionic adsorption clay deposit



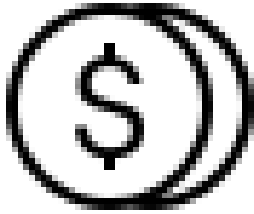
Sources: See Appendix 3

# Pathway to Production: Rapid project advancement



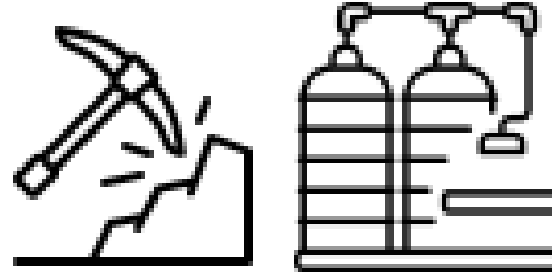
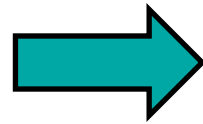
<sup>1</sup>41 Mt inferred, 42 Mt indicated and 6 Mt measured

# Pathway to Production: Vision for rare earths business



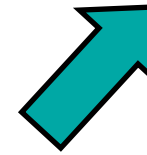
## Project Development

Demonstrate project feasibility



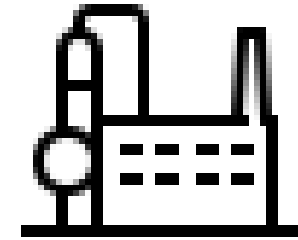
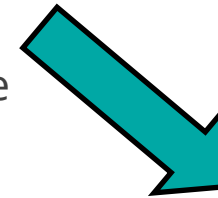
## Production

Construct mine and plant to produce mixed rare earth carbonate



## Expansion

Identify additional ionic adsorption clay rare earth resources



## Value-adding

Construct plant to produce separated rare earth oxides

## Deep Leads Project Enabler: Bauxite Mining

Pre-strip bauxite mining to supply cement and fertiliser plants  
Project will expose rare earths and provide funding for rare earths development

# Pathway to Production: Bauxite operations

- ABx mined bauxite northern Tasmania from 2014 to 2020, and sold the product to cement and fertiliser plants. Customer demand is ongoing<sup>1</sup>
- Similar bauxite resource overlays Deep Leads rare earth resource
- Bauxite mining operations will expose rare earth mineralisation and enable rare earths project to be fast tracked
- Bauxite sales will provide cashflow for funding rare earths development
- Bauxite mining licence application submitted. Operations expected to commence in Q1 2025



ABx bauxite mining at Bald Hill Project near Campbell Town, Tasmania in 2020

<sup>1</sup>ABx ASX Announcement, 11 September 2023

# Pathway to Production: Strategic and offtake partnerships

## Offtake Interest

- Executed MOU for offtake and potential investment with Ucore, who is undertaking technology transfer from demonstration scale to commercial scale rare earth oxide separation in North America

## Strategic Investor Interest

- Engaging with deep-pocketed long-term investors with strategic interest in rare earths supply chain

## Government Support

- Engaged with the Australian and Tasmanian governments' critical minerals strategies – potential for the company to receive financial support



Australian Government  
Department of Industry,  
Science and Resources



ASX: ABX



Joint Announcement 4 September 2024

### ABx Group and Ucore Rare Metals Sign MoU for Australia-USA Rare Earths Supply Chain

**Key Objectives:**

- Work to establish a binding offtake agreement for the supply of mixed rare earth carbonates from Australia to the USA through enhanced collaboration
- Establish an investment pathway for Ucore into ABx
- Bolster relationships between the United States and Australia as both countries strive to enhance critical minerals and clean energy projects

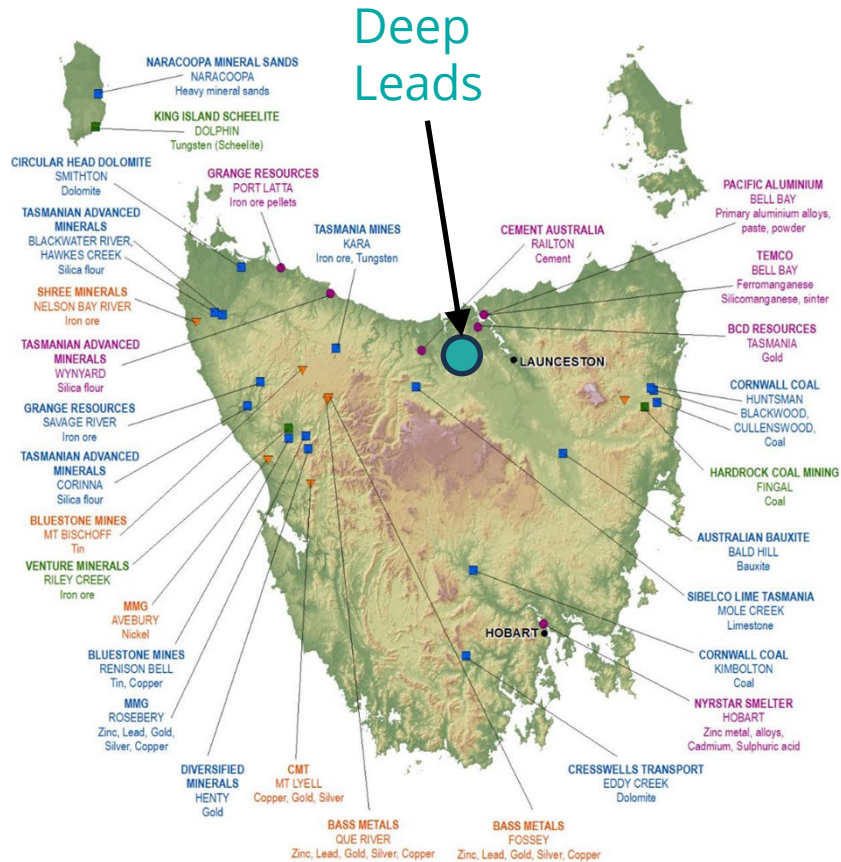
South Melbourne, Victoria and Halifax, Nova Scotia – (September 4, 2024) – [ABx Group](#) (ASX: [ABX](#)) (“ABx”) and [Ucore Rare Metals Inc.](#) (TSXV: [UCU](#)) (OTCQX: [UURAF](#)) (“Ucore”) are pleased to announce the September 3, 2024, execution of a Memorandum of Understanding (“MOU”) that describes the collaborative pathway ABx and Ucore will embark on to advance to:



Ucore Rapid<sup>SX</sup> demonstration plant in Kingston, Canada

# Deep Leads is in outstanding jurisdiction and location

## Commercial plantation forest area in Tasmania, Australia



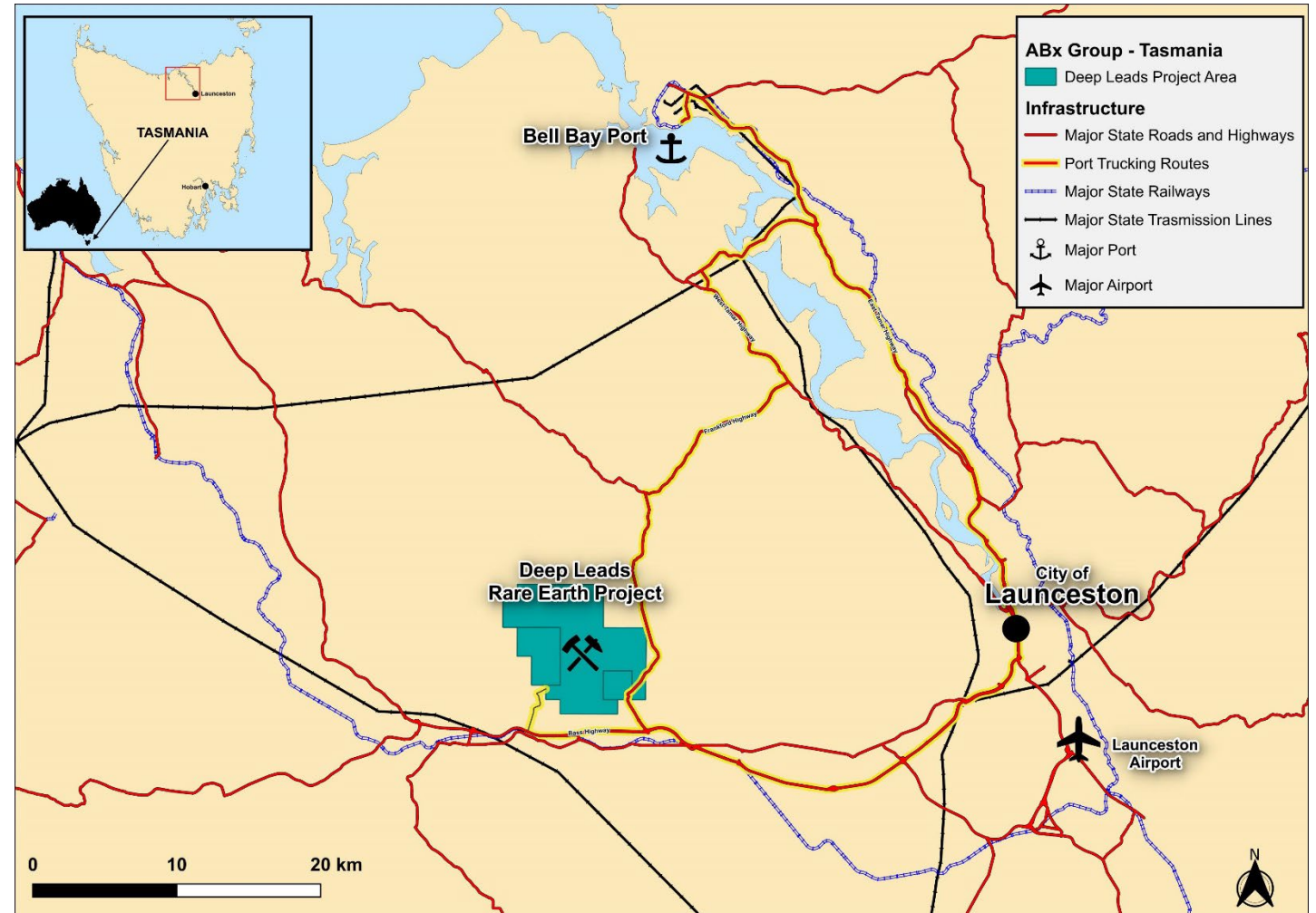
- Deep Leads located in recently harvested commercial hardwood plantation, close to town of Launceston and Bell Bay port
- Australian supply highly attractive to global customers
- ABx has operated in region for over 10 years

# Significant infrastructure locally available

## Infrastructure

|           |                                                                                                                      |
|-----------|----------------------------------------------------------------------------------------------------------------------|
| Transport | Less than 20 km to major highway<br>Less than 100 km to deepwater Bell Bay port                                      |
| Labour    | Less than 50 km to Launceston (pop 65,000)                                                                           |
| Water     | High availability in Tasmania                                                                                        |
| Energy    | Close to major transmission lines<br>Greater than 90% of Tasmania energy demand generated by renewables <sup>1</sup> |

<sup>1</sup>2018-23, [Open Electricity](#)



# Investment Proposition

Highest proportion of Dy+Tb of any clay-hosted resource in Australia

Simple processing without drill and blast mining, or use of acids

## Team

Experienced and capable



## Supply shortage

Massive demand growth for rare earths



## Mineralogy and REE Distribution

No acid required for processing  
Balance of light and heavy REE



## Pathway to Production

Bauxite mining is enabler



## Jurisdiction

Commercial forest plantation in Australia



## Infrastructure

Less than 50 km to industrial centre and enabling infrastructure





**ABx Group Limited**

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# Appendix 1

| Company                | Project       | Country   | Stage       | Study Level | Resource |                  |                    |                                              |                                      |         |             | Proposed leaching conditions |                                                                              |                            |
|------------------------|---------------|-----------|-------------|-------------|----------|------------------|--------------------|----------------------------------------------|--------------------------------------|---------|-------------|------------------------------|------------------------------------------------------------------------------|----------------------------|
|                        |               |           |             |             | Mt       | Type             | Grade (TREO) (ppm) | Cut-off grade (TREO-CeO <sub>2</sub> ) (ppm) | Reference                            |         |             | Conditions                   | Reference                                                                    |                            |
| ABx                    | Deep Leads    | Australia | Exploration | -           | 89       | Meas + Ind + Inf | 844                | 350                                          | <a href="#">ABX ASX Announcement</a> | Table 1 | 2 May 2024  | AMSUL pH 4                   | <a href="#">ABX ASX Announcement</a>                                         | 31 May 2022                |
| Australian Rare Earths | Koppamurra    | Australia | Exploration | -           | 236      | Meas + Ind + Inf | 748                | 325                                          | <a href="#">AR3 ASX Announcement</a> | Table 1 | 30 Sep 2024 | MGSUL pH 1-2.2               | <a href="#">AR3 ASX Announcement</a><br><a href="#">AR3 ASX Announcement</a> | 16 May 2023<br>8 July 2024 |
| OD6                    | Splinter Rock | Australia | Exploration | -           | 682      | Ind + Inf        | 1,338              | 1,000 <sup>2</sup>                           | <a href="#">OD6 ASX Announcement</a> | Table 1 | 29 May 2024 | HCl, 25g/L                   | <a href="#">OD6 ASX Announcement</a>                                         | 16 Oct 2024                |
| Meteoric Resources     | Caldeira      | Brazil    | Exploration | Scoping     | 409      | Inferred         | 2,626              | 1,000 <sup>2</sup>                           | <a href="#">MEI ASX Announcement</a> | Table 2 | 1 May 2023  | AMSUL pH 4                   | <a href="#">MEI ASX Announcement</a>                                         | 8 July 2024                |
| Ionic Rare Earths      | Makuutu       | Uganda    | Exploration | DFS         | 532      | Ind + Inf        | 640                | 200                                          | <a href="#">IXR ASX Announcement</a> | Table 3 | 20 Mar 2023 | AMSUL pH 2                   | <a href="#">IXR ASX Announcement</a>                                         | 20 Mar 2023                |

<sup>1</sup>Meas = Measured, Ind = Indicated, Inf = Inferred

<sup>2</sup>Cut-off grade is TREO (ppm)

The resource figures provided are the most recent reported by each company, and at the desired reported cut-off grade provided by each company's headline numbers. Each resource model contains its own economic and geological assumptions not represented in this table. Resource sizes and grades vary depending on the cut-off used by the specific company.

The leaching conditions provided are the most representative provided by each company. In the case of a DFS, PFS or scoping study, they are the conditions used as the base case in that study. In other cases, they are those reported as 'optimum' by the company

# Appendix 2

| Company            | Project       | Country   | Stage       | Study Level | Resource (Mt)     |                   | Grade (TREO) (ppm) | Cut-off grade (TREO) (ppm) | %Pr <sup>2</sup>  | %Nd <sup>2</sup>   | %Tb <sup>2</sup>   | %Dy <sup>2</sup>  | Reference                                              |                    |             |
|--------------------|---------------|-----------|-------------|-------------|-------------------|-------------------|--------------------|----------------------------|-------------------|--------------------|--------------------|-------------------|--------------------------------------------------------|--------------------|-------------|
|                    |               |           |             |             | Mt                | Type <sup>1</sup> |                    |                            |                   |                    |                    |                   |                                                        |                    |             |
| ABx                | Deep Leads    | Australia | Exploration | -           | 89                | Meas + Ind + Inf  | 844                | 350 <sup>3</sup>           | 4.4%              | 17.4%              | 0.62%              | 3.7%              | <a href="#">ABX ASX Announcement</a>                   | Table 1            | 2 May 2024  |
| Lynas              | Mt Weld       | Australia | Production  | -           | 106.6             | Meas + Ind + Inf  | 41,000             | 25,000                     | 5.1% <sup>4</sup> | 18.3% <sup>4</sup> | 0.16% <sup>4</sup> | 0.6% <sup>4</sup> | <a href="#">LYC ASX Announcement</a>                   | Table 1<br>Table 7 | 5 Aug 2024  |
| MP Materials       | Mountain Pass | USA       | Production  | -           | 9.09 <sup>5</sup> | Ind + Inf         | 50,500             | 21,800                     | 4.2%              | 12.1%              | 0.0%               | 0.0%              | <a href="#">MP Materials Form 10-K for 31 Dec 2023</a> | Page 22            | 22 Feb 2024 |
| Meteoric Resources | Caldeira      | Brazil    | Exploration | Scoping     | 409               | Inferred          | 2,626              | 1,000 <sup>2</sup>         | 5.9%              | 17.0%              | 0.19%              | 1.0%              | <a href="#">MEI ASX announcement</a>                   | Table 2            | 1 May 2023  |

<sup>1</sup>Meas = Measured, Ind = Indicated, Inf = Inferred

<sup>2</sup>%Pr = Pr<sub>6</sub>O<sub>11</sub> / TREO, %Nd = Nd<sub>2</sub>O<sub>3</sub> / TREO, %Tb = Tb<sub>4</sub>O<sub>7</sub> / TREO, %Dy = Dy<sub>2</sub>O<sub>3</sub> / TREO,

<sup>3</sup>Cut-off grade is TREO-CeO<sub>2</sub> (ppm)

<sup>4</sup>For 32.0 Mt reserve, not 106.6 Mt resource

<sup>5</sup>Short tons

The figures provided are the most recent reported by each company, and at the desired reported cut-off grade provided by each company's headline numbers. Each resource model contains its own economic and geological assumptions not represented in this table. Resource sizes and grades vary depending on the cut-off used by the specific company.

# Appendix 3

| Company                     | Project    | Country   | Stage       | Study Level | Resource (Mt) |                      | Grade (TREO) (ppm) | Cut-off grade (TREO-CeO <sub>2</sub> ) (ppm) | Tb <sub>4</sub> O <sub>7</sub> (ppm) | Dy <sub>2</sub> O <sub>3</sub> (ppm) | Reference                            |         |             |
|-----------------------------|------------|-----------|-------------|-------------|---------------|----------------------|--------------------|----------------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|---------|-------------|
|                             |            |           |             |             | Mt            | Type <sup>1</sup>    |                    |                                              |                                      |                                      |                                      |         |             |
| Brazilian Critical Minerals | Ema        | Brazil    | Exploration | -           | 1,017         | Inferred             | 793                | 500                                          | 4                                    | 13                                   | <a href="#">BCM ASX Announcement</a> | Table 1 | 22 Apr 2024 |
| Devex Resources             | Kennedy    | Australia | Exploration | -           | 150           | Inferred             | 1,000              | 325                                          | 3.7                                  | 22                                   | <a href="#">DEV ASX Announcement</a> | Table 2 | 4 Jul 2024  |
| Meteoric Resources          | Caldeira   | Brazil    | Exploration | Scoping     | 409           | Inferred             | 2,626              | 1,000 <sup>2</sup>                           | 5                                    | 25                                   | <a href="#">MEI ASX Announcement</a> | Table 2 | 1 May 2023  |
| Viridis Mining and Minerals | Colossus   | Brazil    | Exploration | Scoping     | 201           | Indicated + Inferred | 2,590              | 1,000 <sup>2</sup>                           | 5                                    | 27                                   | <a href="#">VMM ASX Announcement</a> | Page 4  | 4 June 2024 |
| ABx                         | Deep Leads | Australia | Exploration | -           | 89            | Meas + Ind + Inf     | 844                | 350                                          | 5.2                                  | 31                                   | <a href="#">ABX ASX Announcement</a> | Table 1 | 2 May 2024  |

<sup>1</sup>Meas = Measured, Ind = Indicated, Inf = Inferred

<sup>2</sup>Cut-off grade is TREO (ppm)

The figures provided are the most recent reported by each company, and at the desired reported cut-off grade provided by each company's headline numbers. Each resource model contains its own economic and geological assumptions not represented in this table. Resource sizes and grades vary depending on the cut-off used by the specific company.