



# Heavy Rare Earths for high tech industries

Investor Presentation | February 2013

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All currency amounts are in AUD\$ unless stated otherwise.

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## Exploration Targets

The terms "Target" or "Exploration Target" where used in this presentation should not be misunderstood or misconstrued as an estimate of a Mineral Resource as defined in this context. Exploration Targets are conceptual in nature, there has been insufficient exploration to define a Mineral Resource and it is uncertain further exploration will result in the determination of a Mineral Resource.

## Competent Person's Statement

The information in this presentation that relates to Mineral Resources is based on information compiled by Simon Coxhell. Mr Coxhell is employed as a consultant to the Company and is a member of the Australasian Institute of Mining and Metallurgy. Mr Coxhell has sufficient experience relevant to the styles of mineralisation and types of deposits which are covered in this presentation and to the activity which they are undertaking to qualify as a Competent Person as defined in the 2004 edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves' ("JORC Code"). Mr Coxhell consents to the inclusion in this presentation of the matters based on his information in the form and context in which it appears.

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# Key reasons to invest in Hastings

## Rare earths are indispensable

- › Used extensively in modern manufacturing
- › Minimal practical substitution or recycling

## Heavy rare earths have strategic value

- › Higher value, limited supply
- › Strategic value to major industries/countries

## Hastings project is ideally positioned

- › Largest heavy rare earths project in Australia, fourth largest globally
- › Advanced project with path to production determined

## *Our Vision*

*To become an essential supplier of heavy rare earths for high tech industries*



# Uses of rare earths

*"The list of things that contain Rare Earths is endless"\**



## Reduces

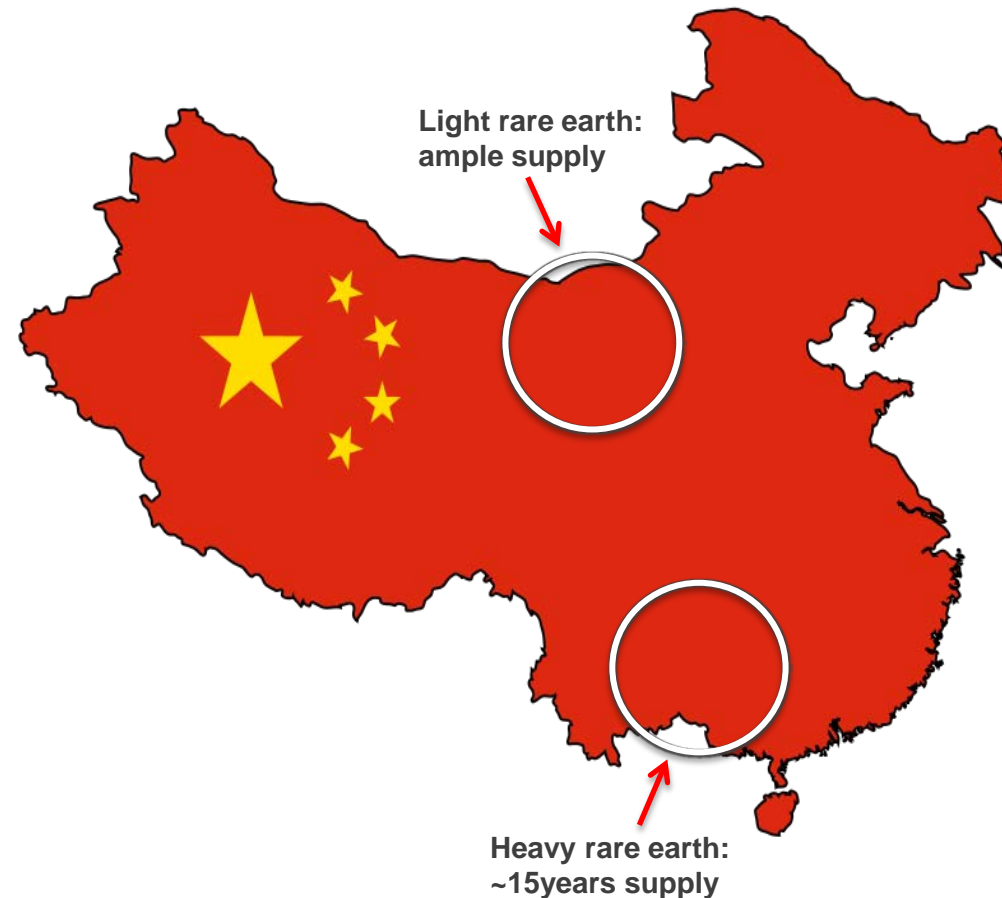
- › Weight
- › Emissions
- › Energy consumption

## Allows

- › Greater efficiency
- › Performance
- › Speed
- › Miniaturisation
- › Durability
- › Thermal stability

\* National Geographic Magazine - June 2012

# China supplies +95% of rare earths



## Recent initiatives by China

- › Imposed export quotas, then reduced to ~30,000tpa (2010)
- › Prohibited new operations/expansions (2012)
- › Eliminating 20% of processing capacity (2012)
- › Concentrating supply to a few (2012 & 2013)

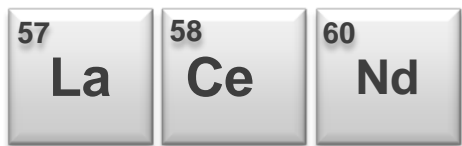


“Forget Chinese supply” CSIRO\*

\* Owned by the Australian Government

# Heavy rare earths are more valuable

## Light Rare Earths



Glass polishing



Petrol refining



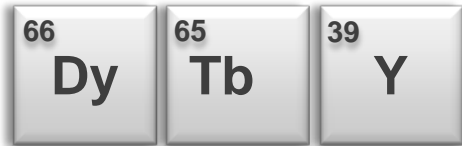
Rechargeable batteries



Lanthanum/Cerium ~US\$11/kg  
Semi-liquid market

Limited substitution  
Ample supply  
Western suppliers coming on stream

## Heavy Rare Earths



Wind turbines



Electric/Hybrid vehicles



Efficient lighting



Dysprosium US\$630/kg  
Contractual market

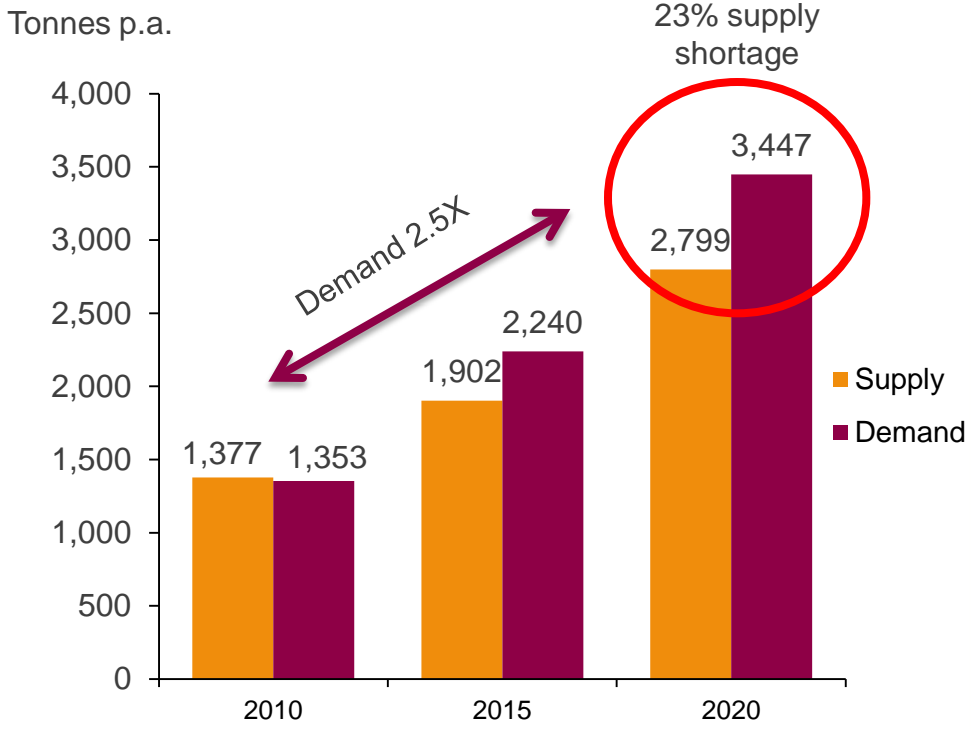
No substitution  
Supply shortfall expected  
No major Western suppliers



\*Prices as January 2013

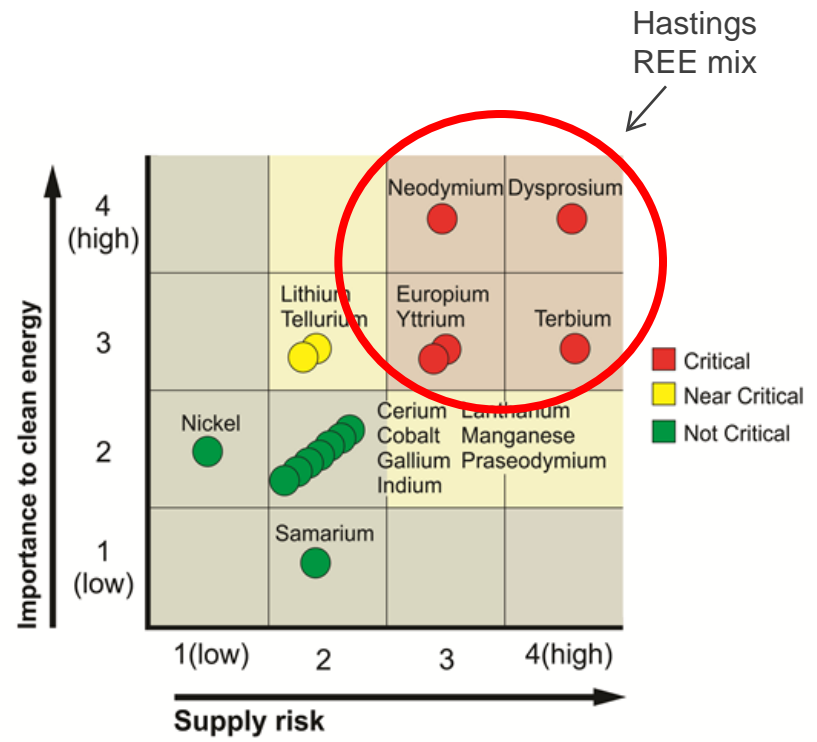
# Predicted major shortfall

## Dysprosium oxide supply/demand



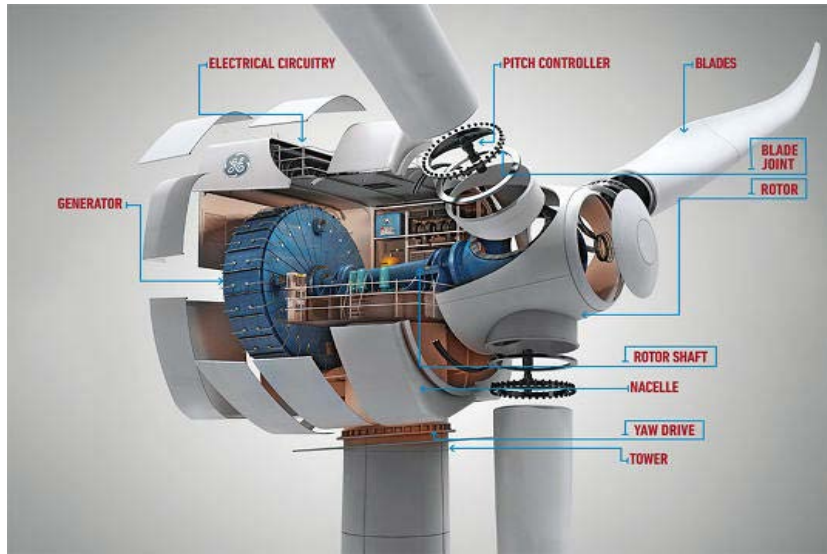
Based on IMCOA and Oko-Institute data

## Critical Supply Matrix (5-15yr)



US Department of Energy (Dec 2011)

# Dysprosium in magnets



GE wind turbine generator



Toyota Prius hybrid vehicle

- › Dysprosium added to magnets in the generator:
  - Eliminates the gearbox (direct drive)
  - Reduces weight
  - Less maintenance
  - Improves performance
  
- › Dysprosium added to magnets in drive systems:
  - Increases performance & efficiency
  - Extends range
  - Reduces weight
  
- › Dysprosium is also used in disk drives, loud speakers, sensors and other applications

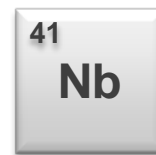
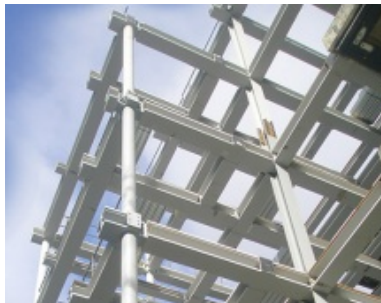
# Yttrium and Niobium also of strategic value



Yttrium is used predominantly in phosphors

- › Monitors, TVs, LEDs
- › iPad, phones
- › Lasers, filters, superconductors

A “Critical Metal”



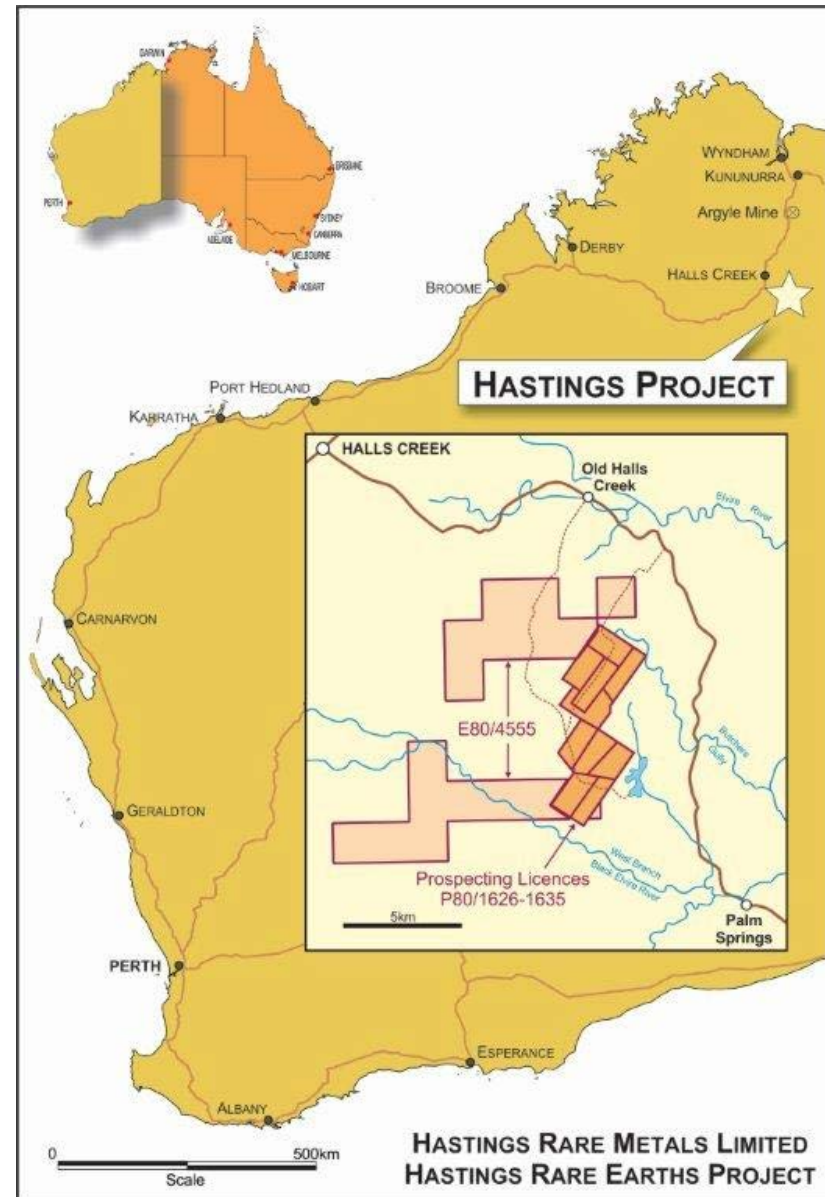
Niobium agent is used predominantly as an alloy

- › Structural steel
- › Auto industry
- › Electronics

A “Critical Metal”

Hastings intends to also produce Zirconium oxide (used in ceramics and refractories) and a mixed rare earth oxide containing Ce, La, Nd/Pr, SEG and other rare earths

# The Hastings project (100%)



- › Largest heavy rare earth project in Australia, fourth largest globally\*
- › Resources for +25 years at 1mtpa
- › To produce over 10,000tpa, including:
  - 140tpa Dysprosium oxide
  - 830tpa Yttrium oxide
  - 590tpa Mixed rare earth oxide
  - 2,630tpa Niobium oxide
  - 6,170tpa Zirconium oxide
- › Well progressed on path to production
- › Close to infrastructure

Heavy rare earths  
Rare Metals

\* Projects that are predominantly HREO defined as >35% HREO:TREO

# Project location

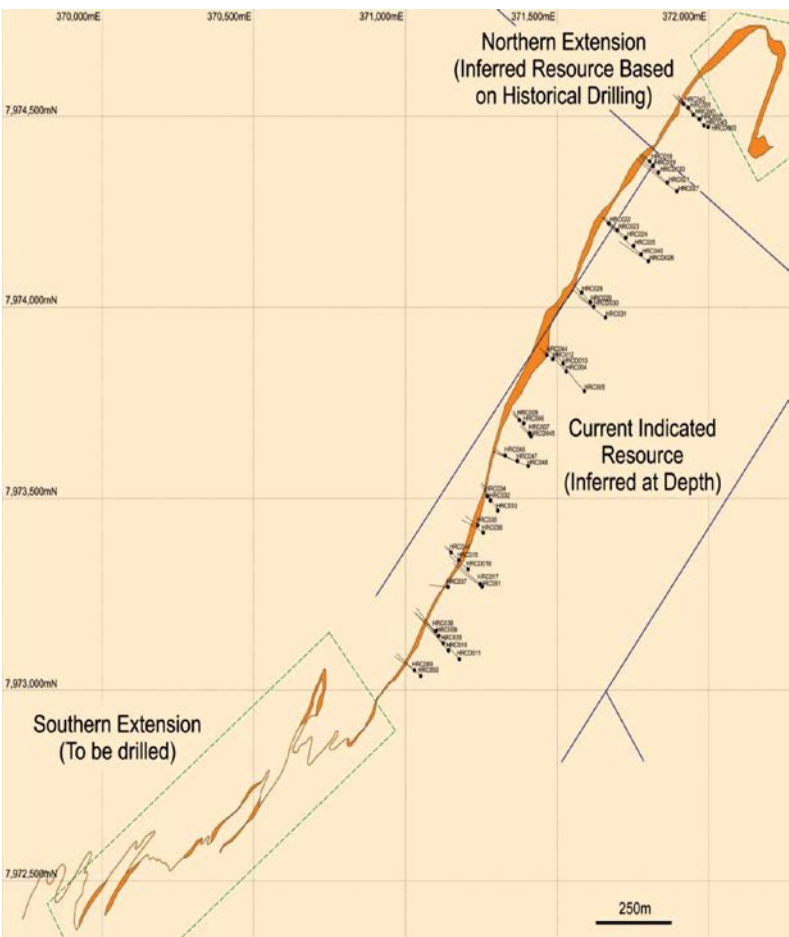


**Panorama over  
Hastings resource  
from the east**

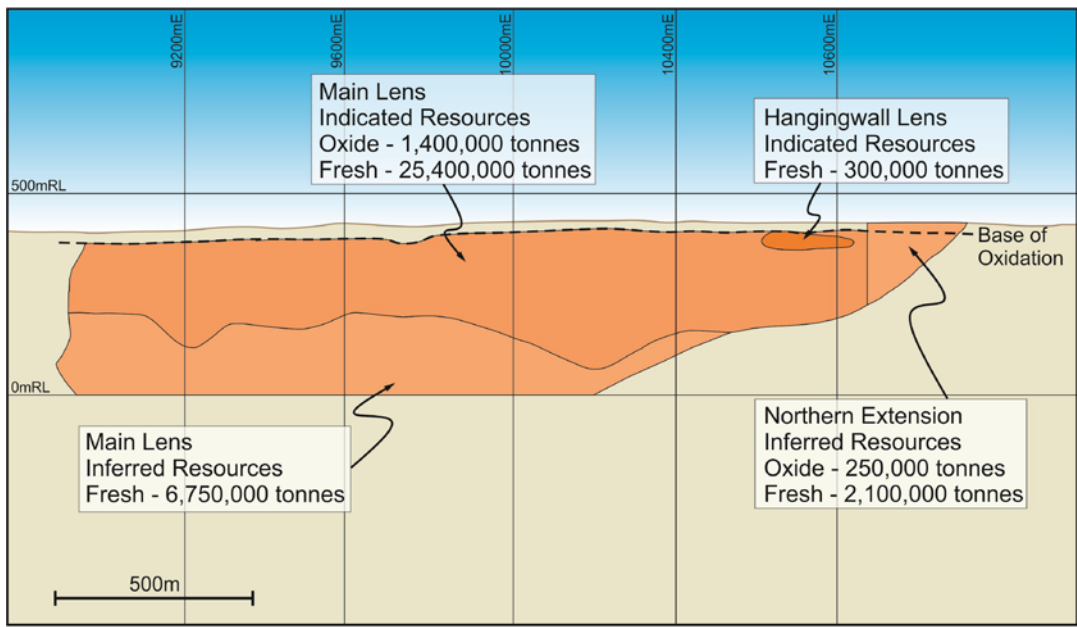


**Hastings  
Mineralisation  
exposed at Surface**

# Existing JORC Resources



- › Existing Resources sufficient for +25 year mine life
- › Open at depth and along strike

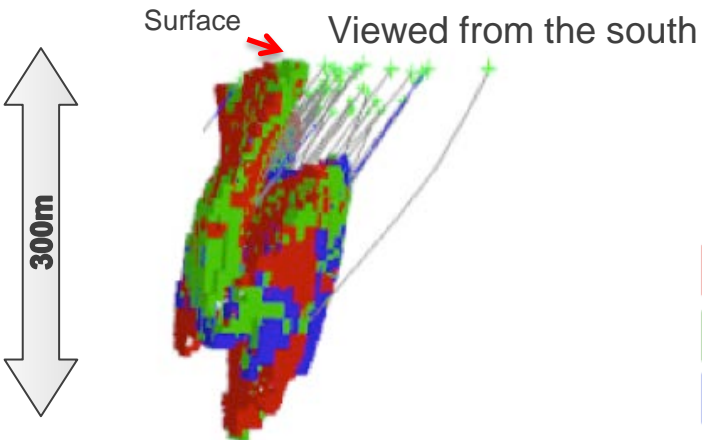
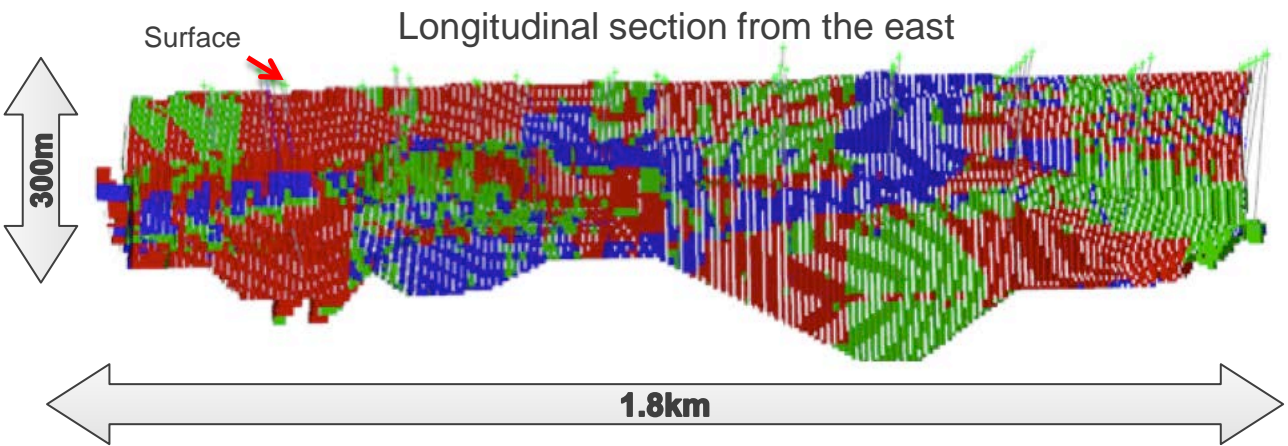


Hastings Project - Longitudinal Section Showing Resources

› 36.2 million tonnes Indicated and Inferred JORC Resources\* at 0.21% TREO (0.18% HREO), plus 0.35% Nb<sub>2</sub>O<sub>5</sub> and 0.89% ZrO<sub>2</sub>

\* Comprises 27.1mt Indicated Resource and 9.1mt Inferred Resource

# Hastings deposit dimensions



HREO GRADE

Red	> 1800ppm
Green	1500-1800ppm
Blue	< 1500ppm

- ✓ Open cut mine
- ✓ Mineralisation from surface
- ✓ Consistent grade
- ✓ Potential to the north and south

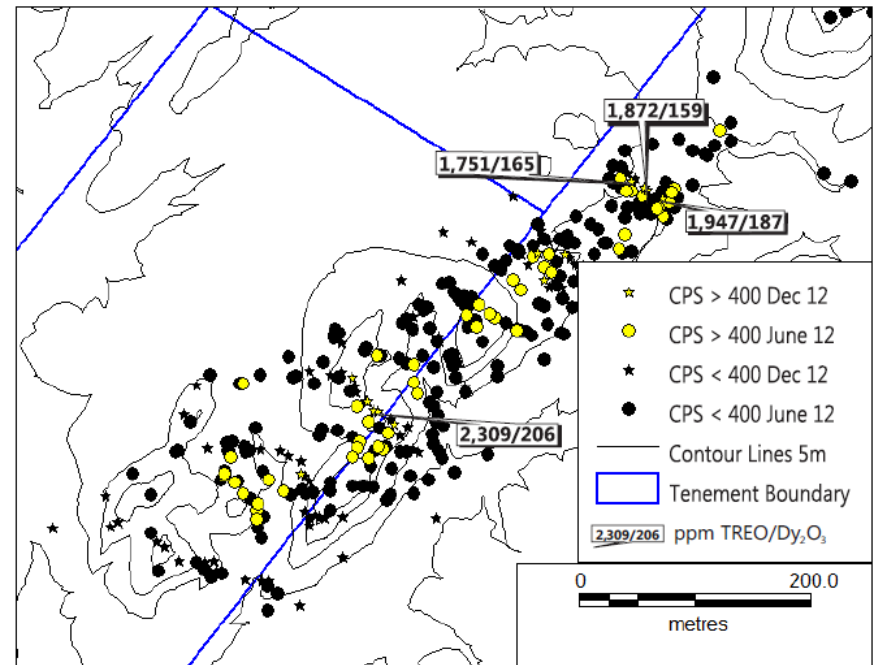
Shows Indicated Resources excluding Inferred Resources

# Southern Extension

- › Recent mapping and sampling has confirmed the potential of the Southern Extension to add to the existing Resources
- › Grades are comparable to near surface oxide material at the main deposit
- › Further sampling is required to delineate targets for drilling



Mineralised outcrop at southern extension



Encouraging Scintillometer readings

# World Class heavy rare earths project

Advanced Rare Earth projects, sorted by contained tonnes of HREO*									
Deposit	Company	JORC Resource	Resource mt	GRADE %		HREO:TREO	Contained HREO t	Contained Dy <sub>2</sub> O <sub>3</sub>	Co-products
				TREO	HREO				
1. Strange Lake	Quest	Y	492.5	0.9	0.33	37%	1,651,000	148,980	Zr
2. Norra Karr	Tasman	Y	60.5	0.54	0.29	53%	173,000	15,730	
3. Lemhi Pass	US Rare Earth	N	61.9	0.53	0.22	42%	137,300	12,370	
<b>4. HASTINGS</b>	<b>Hastings</b>	<b>Y</b>	<b>36.2</b>	<b>0.21</b>	<b>0.18</b>	<b>86%</b>	<b>65,250</b>	<b>6,733</b>	<b>Zr, Nb</b>
5. Zeus (Kipawa)	Matamec	Y	24.5	0.42	0.15	36%	36,700	3,716	Zr
6. Kutessay II	Stans Energy	Y	18	0.26	0.12	47%	21,800	2,944	

One of a few advanced heavy rare earths projects

+20 global firms require a long term secure supply of Hastings Dysprosium output for their electric/hybrid vehicles, wind turbines and rail production

Major shortfall predicted shortfall by manufacturer and governments

\* Projects where heavy rare earth oxides <35% total rare earth oxides are considered to be predominantly light rare earth projects and affected by different market dynamics

\* Excludes projects yet to define an Indicated Resource and complete basic test work

# Metallurgical success



Bulk solution handling at ANSTO



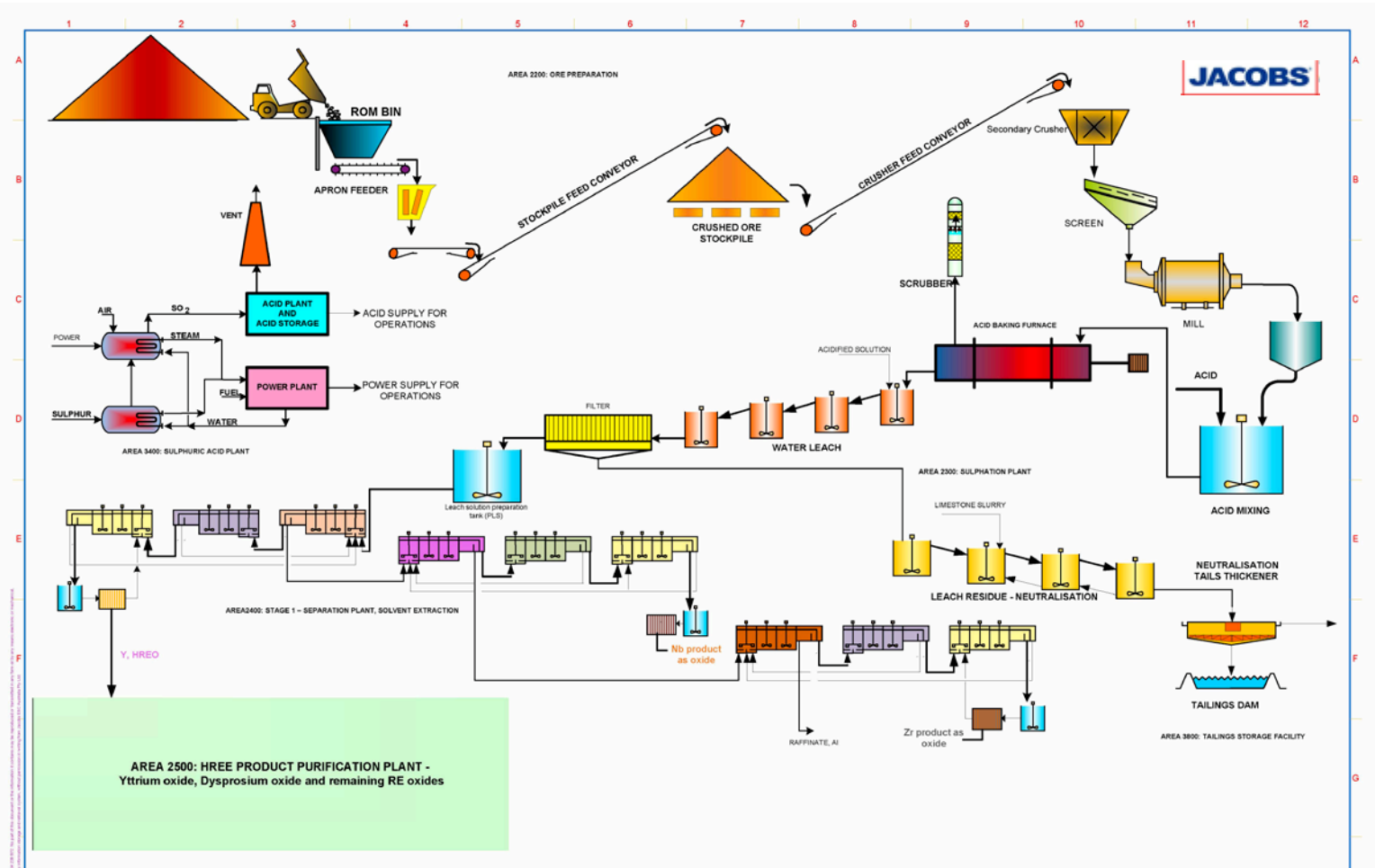
Multi-stage solvent extraction at ANSTO



Sludge planetary mixing at ANSTO

- › ANSTO (Australian Government) scientists completed extensive test work and experiments
- › Time and cost advantage from historical work
- › Metallurgical recoveries of 75% for Dysprosium, Yttrium and Niobium and 70% for Zirconium
- › Primary solvent extraction of valuable minerals successful
- › Confirmed process design and flow sheet

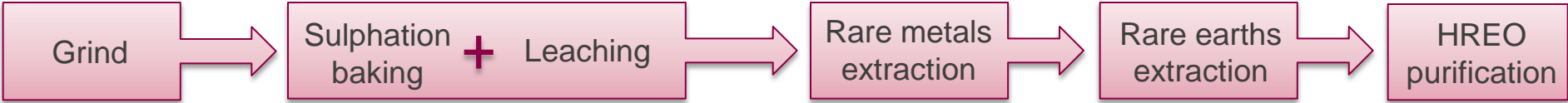
# Process design and flow sheet determined



✓ Process designed

✓ Flow sheet determined

✓ Optimisation work continues



# Attractive economics\*

> 25 years mine life from existing Resources

> Producing oxides of:

	Tonnes p.a.	% world supply
<b>Dysprosium</b>	140	10%
<b>Yttrium</b>	830	6%
<b>Mixed heavy rare earths</b>	590	n/a
<b>Niobium</b>	2,630	±3%
<b>Zirconium</b>	6,170	<1%



Port of Wyndham

\$720m Capital costs (excluding contingencies)

\$482m Annual revenue

\$259m Operating costs

\$223m Earnings before interest and tax

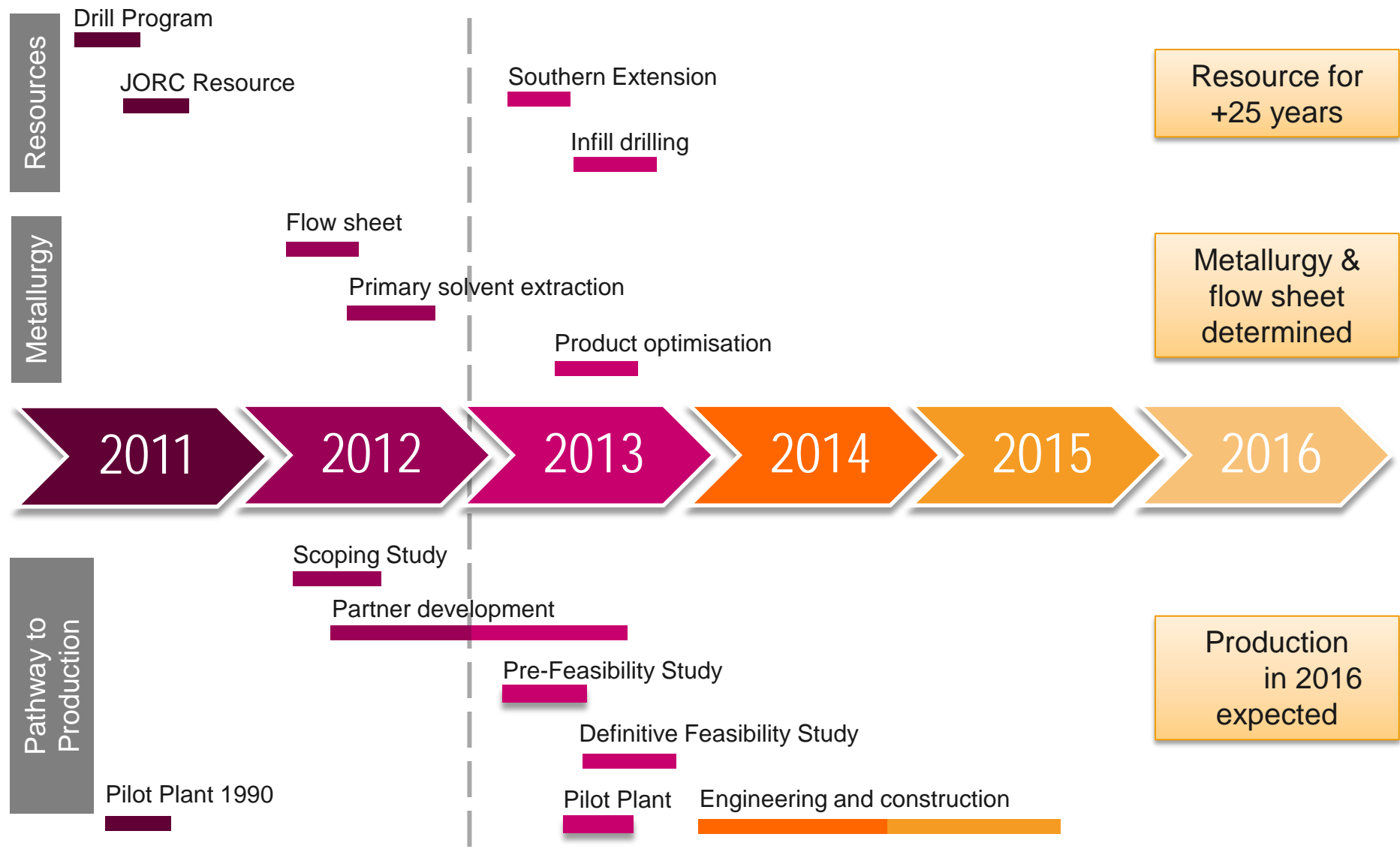
Net present value (pre-tax) \$1.9 billion

Internal rate of return 26%

Capital payback 3.6 years

\* Economics based on August 2012 Scoping Study and economic assessment. Refer detailed ASX announcement

# Production timetable

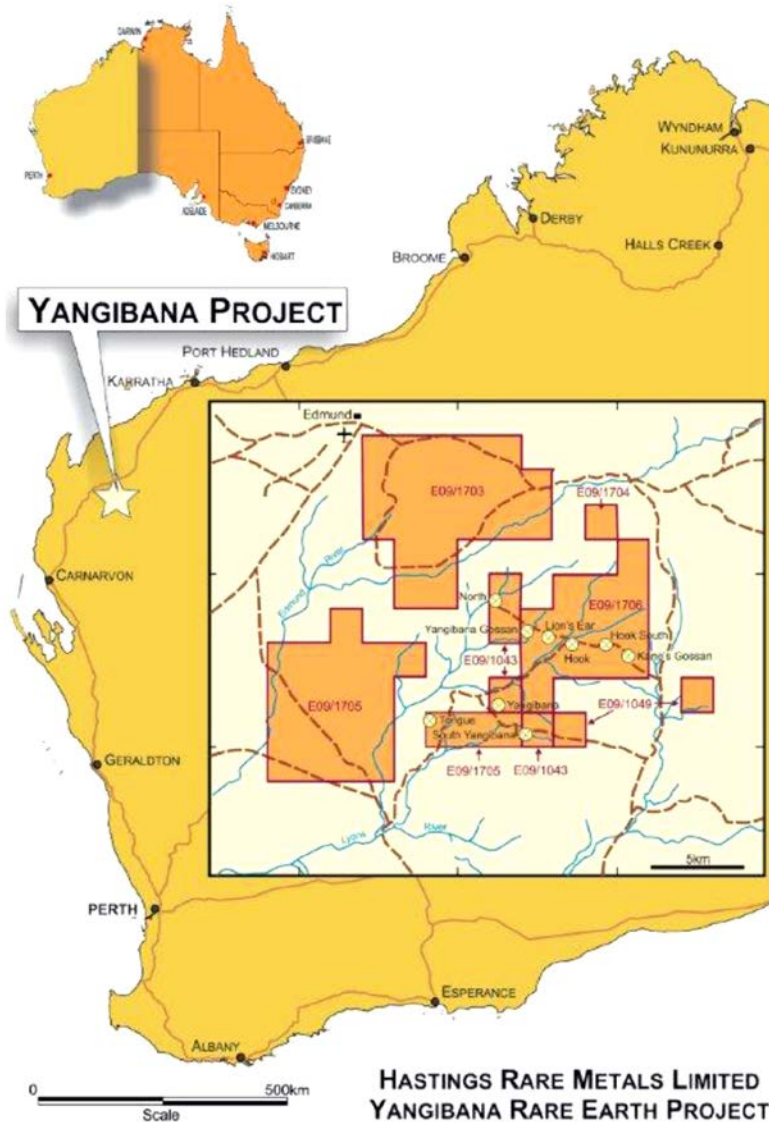


Resource for +25 years

Metallurgy & flow sheet determined

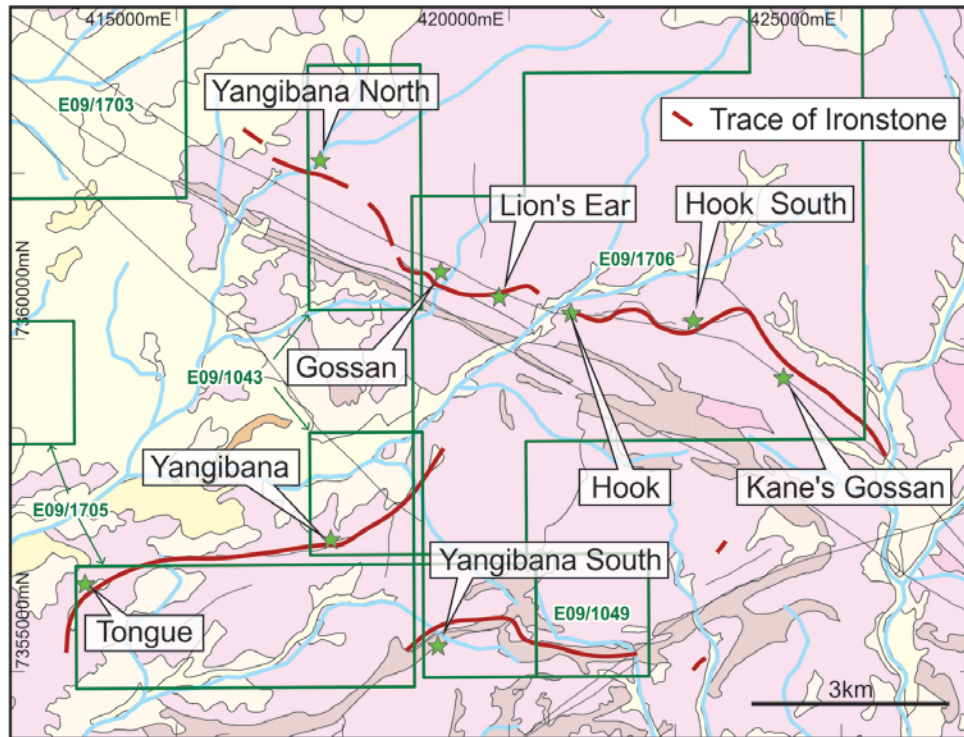
Production in 2016 expected

# The Yangibana project (60%)



- › Exploration Licences covering 320sq km
- › Surface rock chip samples to 19.4% TREO
- › Limited drilling indicates average grade of 1.6% TREO
- › Very high neodymium oxide grade averaging 4000ppm  $\text{Nd}_2\text{O}_3$  or 25% of TREO
- › Elevated europium oxide grade (115ppm  $\text{Eu}_2\text{O}_3$ ) enhances potential
- › Both neodymium and europium classified as Critical Elements
- › Open at depth and along strike

# The Yangibana project



Yangibana – REO Mineralisation zones

- › Only 2.2km of 7km tested to date
- › Potential for +10mt at +1.6% TREO
- › Hyperspectral survey indicates continuity of lenses and possible pegmatite targets

## RC DRILLING RESULTS INCLUDED

Prospect	m	%TREO
Yangibana North	7	2.21
	8	2.78
	4	1.83
	6	2.40
Gossan	3	2.12
The Lion's Ear	4	1.80
	4	2.05
	4	2.73
	3	1.78
	4	1.77
Hook South	2	1.65
Kane's Gossan	8	1.43
	5	1.18
Yangibana	2	1.25

## ROCK CHIP SAMPLES INCLUDED

Prospect	No of Samples	Av. %TREO grade
Yangibana North	22	3.88
Hook	5	1.00
Kane's Gossan	9	3.22
Yangibana	10	1.50
Yangibana South	15	1.97

# Strong board & management



**Tony Ho**  
**Chairman**

- Director of Brazin, Bioxyme, Dolomatrix, Greenland Minerals,
- Chairman of Apollo Minerals
- Over 35 years in senior corporate finance management



**Alastair Metcalf**  
**CEO**

- +25 years resources and finance experience
- Former executive with Rothschild, GE Capital and Bankers Trust



**Steve Mackowski**  
**Technical Director**

- +30 years technical and operational experience in rare earths and associated processing
- Ex Arafura Resources, Iluka, Tiwest, WMC, Comalco



**Guy Robertson**  
**Finance Director**

- +25 years CFO experience
- Former senior finance executive with Jardine Lloyd Thompson, Colliers, Franklins



**Andy Border**  
**Exploration Manager**

- +30 years experience as geologist
- Rare earths, copper, gold and industrial minerals

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## Tony Grey (Advisory Panel)

- Chairman International Ferro Metals
- Director International Potash Corporation
- Former MD of Pancontinental Mining
- Former Chairman of World Nuclear Association



# Significant milestones

## Next 6 -12 Months

- ✓ JORC compliant Resource Nov-11
- ✓ ANSTO validates sulphation and Water Leach flowsheet Jul-12
- ✓ Scoping Study defines operating parameters and confirms strong business case Sept-12
- ✓ Primary solvent extraction of valuable minerals successful Nov -12
- ✓ Commence feasibility study preparations Q1 2013
- Pilot plant design Q2 2013
- Commence Pre-feasibility study Q2 2013
- Strategic partner to be secured (funding, technical, offtake?) Q2 2013
- Southern Extension Infill drilling and resource upgrade Q3 2013
- Target to commence engineering and construction Q1 2014

# Additional information

## ASX Code – HAS, HASO

Shares on issue	167 million
Listed options (15c March 2014)	81 million
Unlisted options	5 million

Market capitalisation (at 10c)	\$16 million
Cash (December 2012)	\$4 million

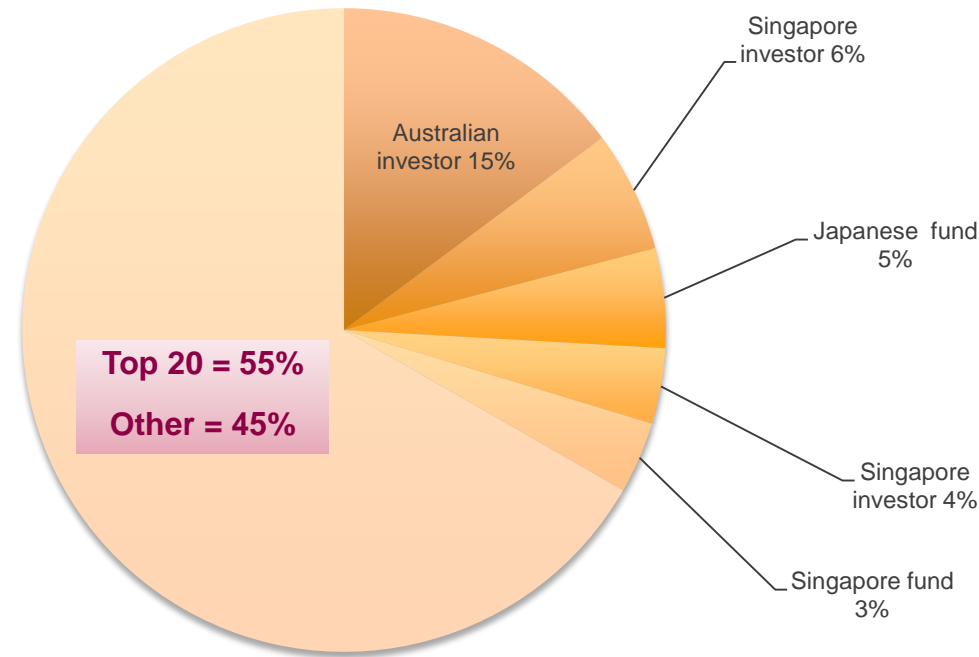
### Contact information

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**Phone:** +61 2 9078 7674

**Email:** [info@hastingsraremetals.com](mailto:info@hastingsraremetals.com)

## Major shareholders



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