



**HASTINGS**  
Technology Metals Limited

**HASTINGS TECHNOLOGY METALS LTD**  
(ASX Listed Stock Code: HAS)  
**A Future Producer of Magnets' Rare Earth**

**Investment Highlights**  
**October 2016**



★ Yangibana

**All currency amounts are in A\$ 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 Persons' Statement**

- The information in this presentation that relates to Resources is based on information compiled by Simon Coxhell. Simon Coxhell is a consultant to the Company and a member of the Australasian Institute of Mining and Metallurgy. The information in this presentation that relates to Exploration Results is based on information compiled by Andy Border, an employee of the Company and a member of the Australasian Institute of Mining and Metallurgy.
- Each has sufficient experience relevant to the styles of mineralisation and types of deposits which are covered in this report and to the activity which they are 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' ("JORC Code"). Each 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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## Charles Lew

### Executive Chairman

- Private investor and entrepreneur
- Independent Director of RHB Banking Group 2004 - 2016
- 30+ years experience in investment banking



## Charles Tan

### Chief Operating Officer

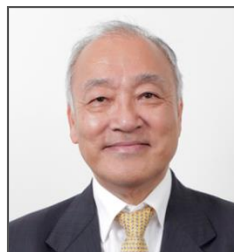
- 20+ years in Commercial, Procurement, Outsourcing & Supply Chain Management
- Mineral sands & aluminium mining



## Jean Claude Steinmetz

### Non Executive Director

- Previously Chief Operating Officer for Lynas Corporation
- 25+ years Involved in the chemical industry with a strong focus on the automotive industry
- Chairman of the Auto Plastic and Innovative Materials Committee of Sino-EU Chemical Manufacturers Association



## Tony Ho

### Non Executive Director & Chair of Audit Committee

- Chairman of Bioxyne Ltd and non-executive director Greenland Minerals Ltd
- 35+ years in senior corporate management with Brazin, Yates and Dolomatrix



## Malcolm Mason

### Non Executive Director

- 45+ years experience in Australian and international exploration and mining
- Experience covers rare earths, uranium, gold and base metals



## Guy Robertson

### Chief Financial Officer & Company Secretary

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



## Andy Border

### General Manager Exploration

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

**ASX Listed Stock Code: HAS**



## Dr Kwan Wong

### KYSPYmet Mineral Processing Consultants Flotation Specialist

- 50+ years practicing metallurgist
- Possesses extensive flotation treatment experience in rare earth oxide ores
- Consulting activities in evaluating flotation test work, plant performance & commissioning; pilot plant test programme design and execution
- Specialist speaker in flotation workshops.
- Worked on 9 REO oxide development projects covering Australia and overseas deposits.



## Narelle Marriott

### Principal Engineer – Beneficiation

- 14+ years experience in the minerals processing and mining industry
- Experienced in process and flowsheet development for beneficiation plants
- Worked on 5 pilot plant operations in comminution and flotation of nickel and RE ores
- Nickel, copper, uranium, iron ore and RE industries



## Robin Zhang

### Process Engineering Manager

- 20+ years experience in R&D, project engineering, plant commissioning and running of operations in the rare earth industry
- 8 years at Lynas Corporation, serving as Senior Technical Services Manager and Senior Project Development Manager
- 11 years with Gansu Rare Earth Group - one of the largest rare earth companies in China & served as the Deputy Director of its Technical Centre.

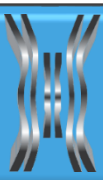


## Domenic Furfaro

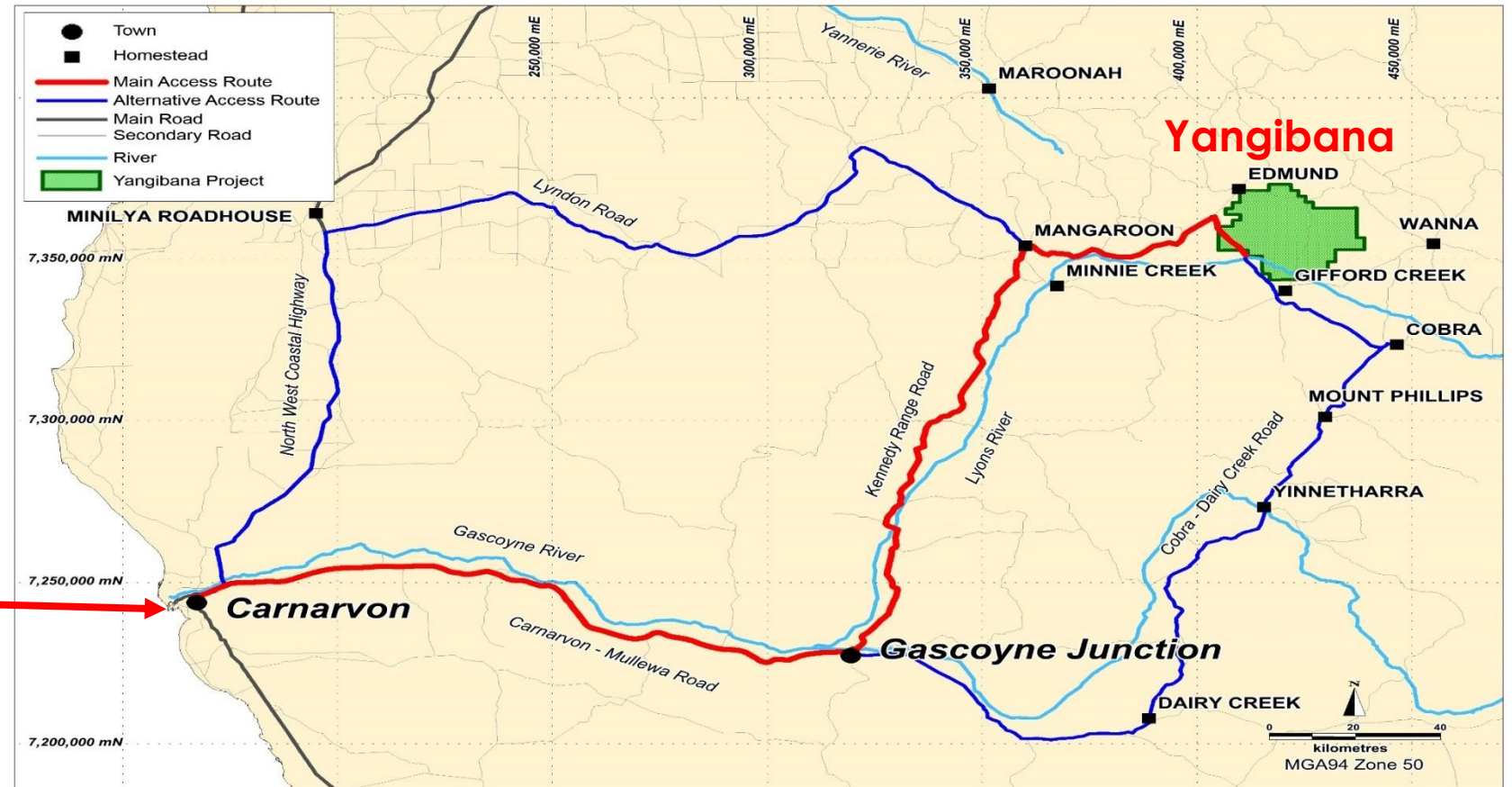
### Metallurgy Manager

- 20+ years experience in the mining industry
- Hydrometallurgical experience in a range of metals including REs, uranium, nickel and cobalt
- Experienced in hydrometallurgical process and flowsheet development
- Managed hydrometallurgical programs in the development of Kvanefield RE project from proof of concept through to feasibility study

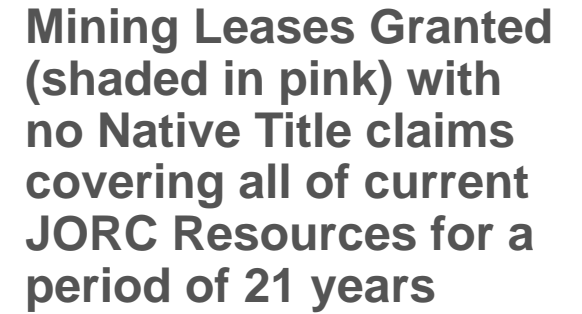




# Yangibana : Located in Central Western Australia





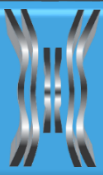


## Miscellaneous and General Purpose Leases granted

## Application to authorities for permit to commence mine construction and production plant

## Pioneering work permit approved





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# Yangibana : Open Pit Mining on Flat Terrain





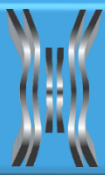


# Lanthanides – Rare Earth Elements

Period	Group 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1 H 1.008																	2 He 4.003
2	3 Li 6.941	4 Be 9.012											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16	9 F 19	10 Ne 20.18
3	11 Na 22.99	12 Mg 24.31											13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.95
4	19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.88	23 V 50.94	24 Cr 52	25 Mn 54.94	26 Fe 55.85	27 Co 58.47	28 Ni 58.69	29 Cu 63.55	30 Zn 65.39	31 Ga 69.72	32 Ge 72.59	33 As 74.92	34 Se 78.96	35 Br 79.9	36 Kr 83.8
5	37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc (98)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3
6	55 Cs 132.9	56 Ba 137.3	57 La 138.9	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197	80 Hg 200.5	81 Tl 204.4	82 Pb 207.2	83 Bi 209	84 Po (210)	85 At (210)	86 Rn (222)
7	87 Fr (223)	88 Ra (226)	89 Ac (227)	104 Rf (257)	105 Db (260)	106 Sg (263)	107 Bh (262)	108 Hs (265)	109 Mt (266)	110 Ds (271)	111 Rg (272)	112 Uub (285)	113 Uut (284)	114 Uuq (289)	115 Uup (288)	116 Uuh (292)	117 Uus 0	118 Uuo 0
			6	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (147)	62 Sm 150.4	63 Eu 152	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173	71 Lu 175	
			7	90 Th 232	91 Pa (231)	92 U (238)	93 Np (237)	94 Pu (242)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (249)	99 Es (254)	100 Fm (253)	101 Md (256)	102 No (254)	103 Lr (257)	

The term Rare Earths covers a group of 15 elements with similar characteristics (the Lanthanides) and often with the addition of yttrium (Y) and scandium (Sc)



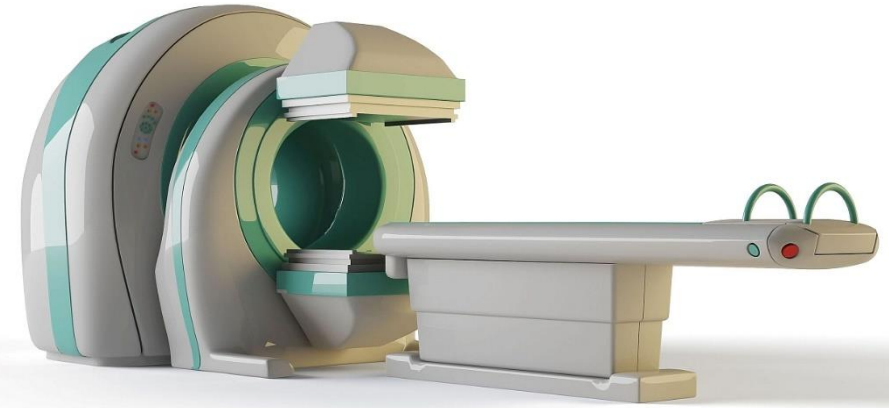


## Yangibana : Project Highlights

- 4 key rare earths: (1) Neodymium (Nd), (2) Praseodymium (Pr) (3) Dysprosium (Dy) and (4) Terbium (Tb)
- Nd & Pr account for approx. 83% of in-ground value
- Focus on production of magnets' rare earth; ie. Nd, Pr and Dy due to strong future demand for Electric Vehicles, wind turbines, domestic appliances, industrial robotics, digital devices, etc.



# Some End Uses for Magnets' Rare Earth







## Rare earth elements (REEs) in electronic products

**COLOURED SCREEN**

- Yttrium (Y)
- Lanthanum (La)
- Praseodymium (Pr)
- Europium (Eu)
- Gadolinium (Gd)
- Terbium (Tb)
- Dysprosium (Dy)

**PHONE CIRCUITRY**

- Lanthanum (La)
- Praseodymium (Pr)
- Neodymium (Nd)
- Europium (Eu)
- Gadolinium (Gd)



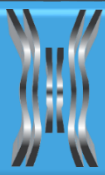
- Did you know? A typical smartphone like the Apple iPhone contains 30 MG of gold (Au) and 300 MG of silver (Ag)
- Over US\$2.5bn worth of gold and silver found in smartphones shipped annually
- 8-9 rare earth elements (REEs) go into every iPhone (for coloured screen, phone circuitry, speakers, and vibration unit)

**SPEAKERS**

- Praseodymium (Pr)
- Neodymium (Nd)
- Gadolinium (Gd)
- Dysprosium (Dy)

**VIBRATION UNIT**

- Neodymium (Nd)
- Terbium (Tb)
- Dysprosium (Dy)



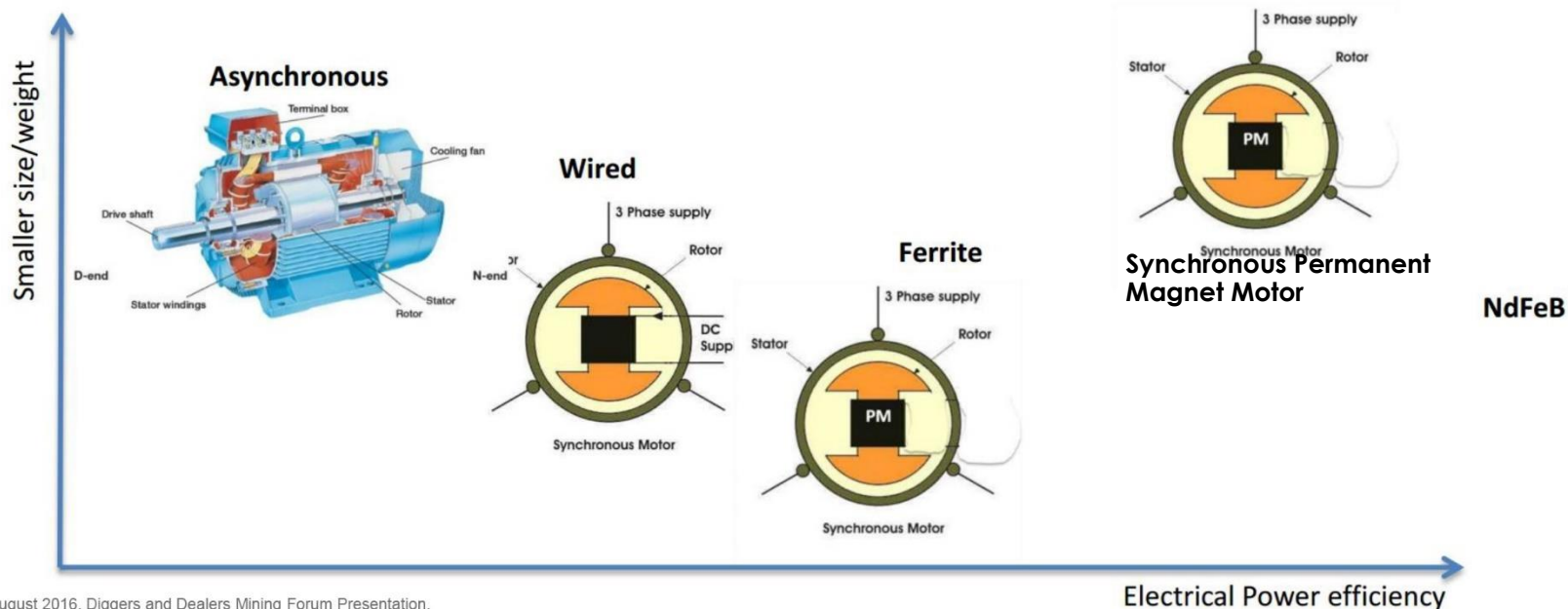
- In 2014 : World wide sales of mobile phones ~7.3B sales
- Approx. 0.1g of Nd/Pr per phone => 730 tonnes per annum

- Renewable Energy - wind turbine adds to demand for NdFeB magnets (permanent magnets)
- Each 2MW wind turbine contains 340-420kg REE

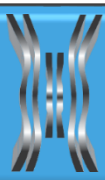


- Each HEV contains about 2.7kg REE
- EU – 118% increase in HEV sales in 1Q2015 vs 1Q2014 (2013: 37% increase)

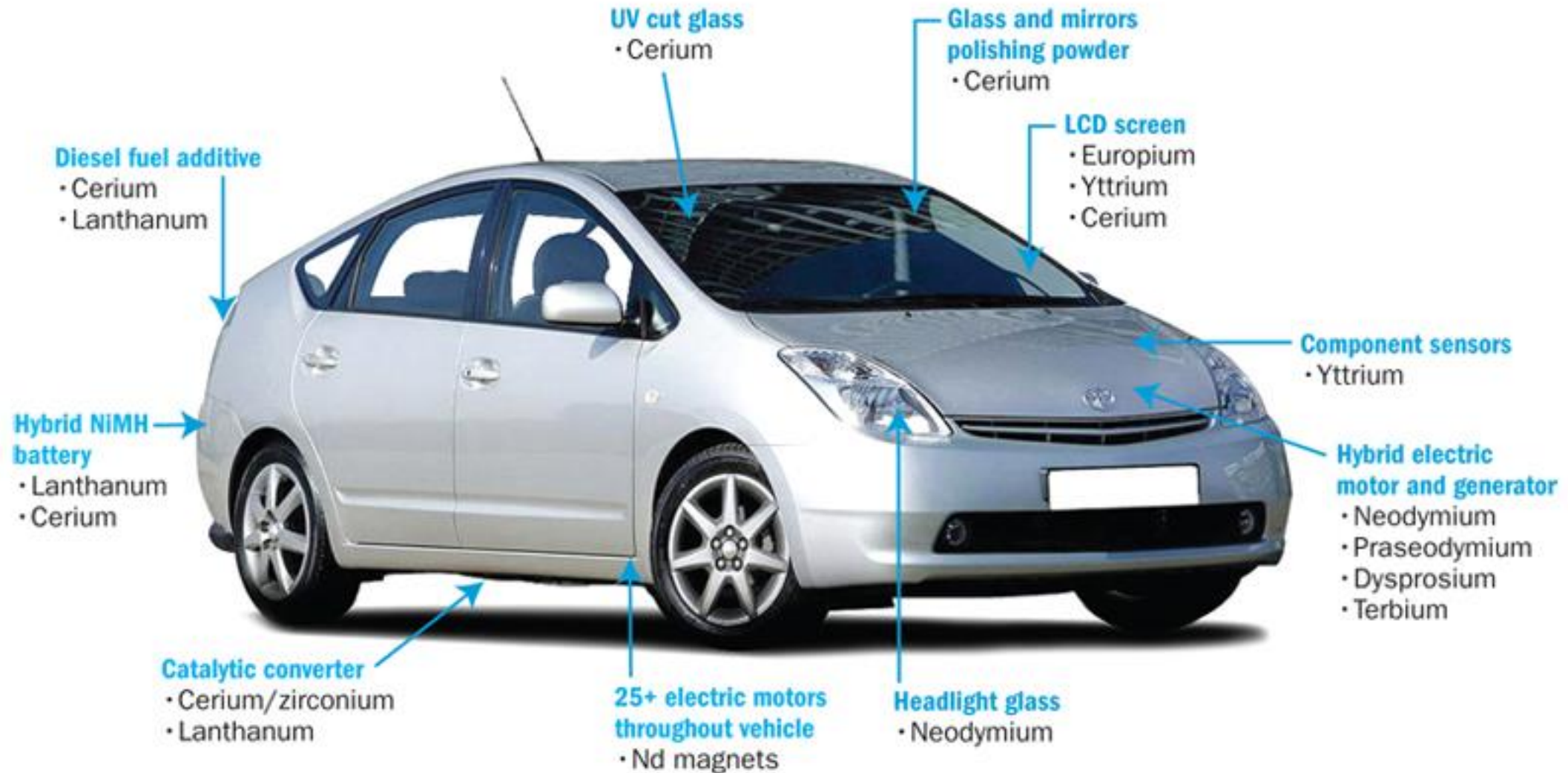




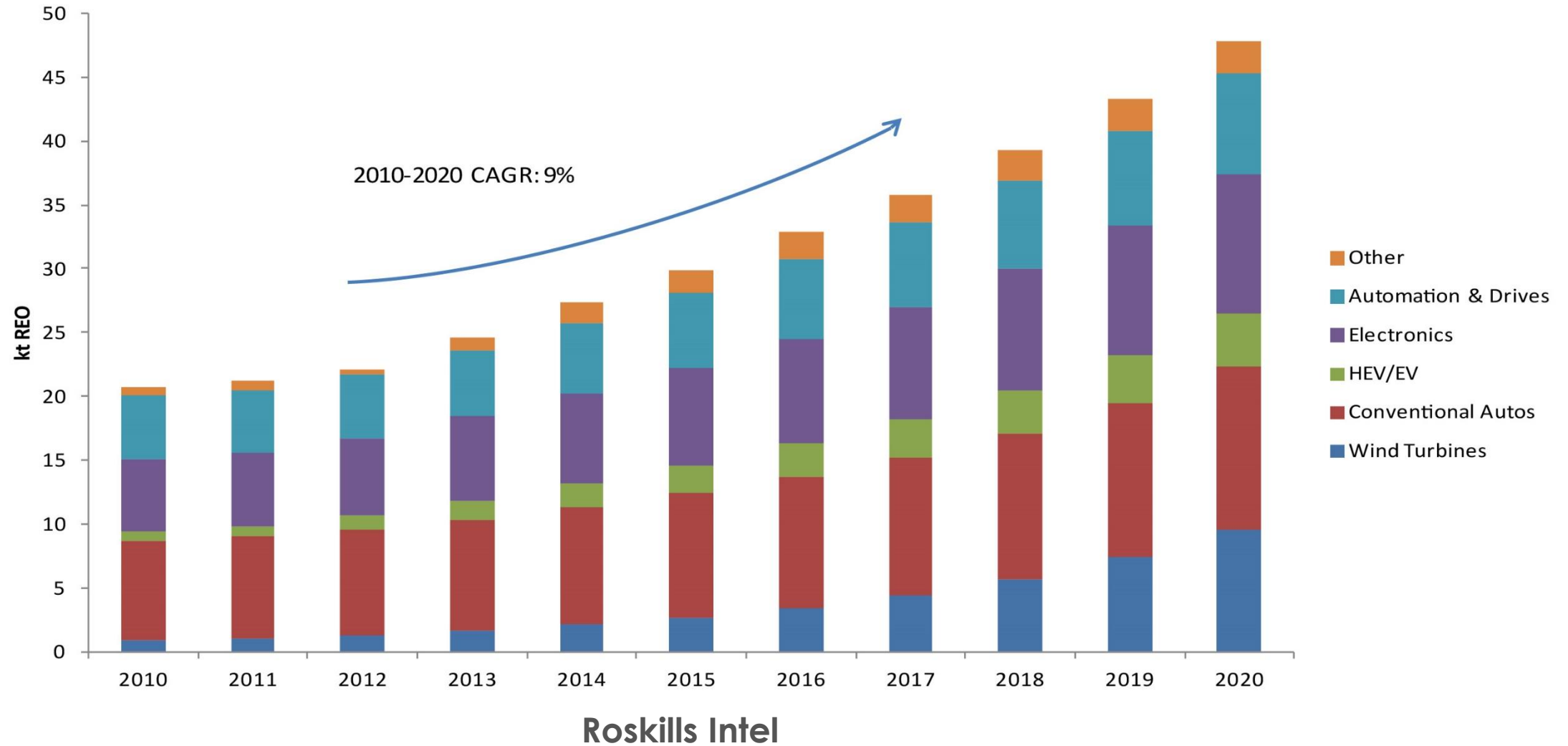
- **NdFeB** (Neodymium, Iron, Boron Magnet) - **strongest permanent magnet** commercially available
- **~10 times more powerful**, and **3 times lighter** than traditional ferrite magnet → **Superior performance, miniaturisation, compact, lightweight and more efficient**
- Synchronous PM Drive Motors used in HEV and EV. Advantages → **Extremely high torque, compact, lightweight and very efficient.**

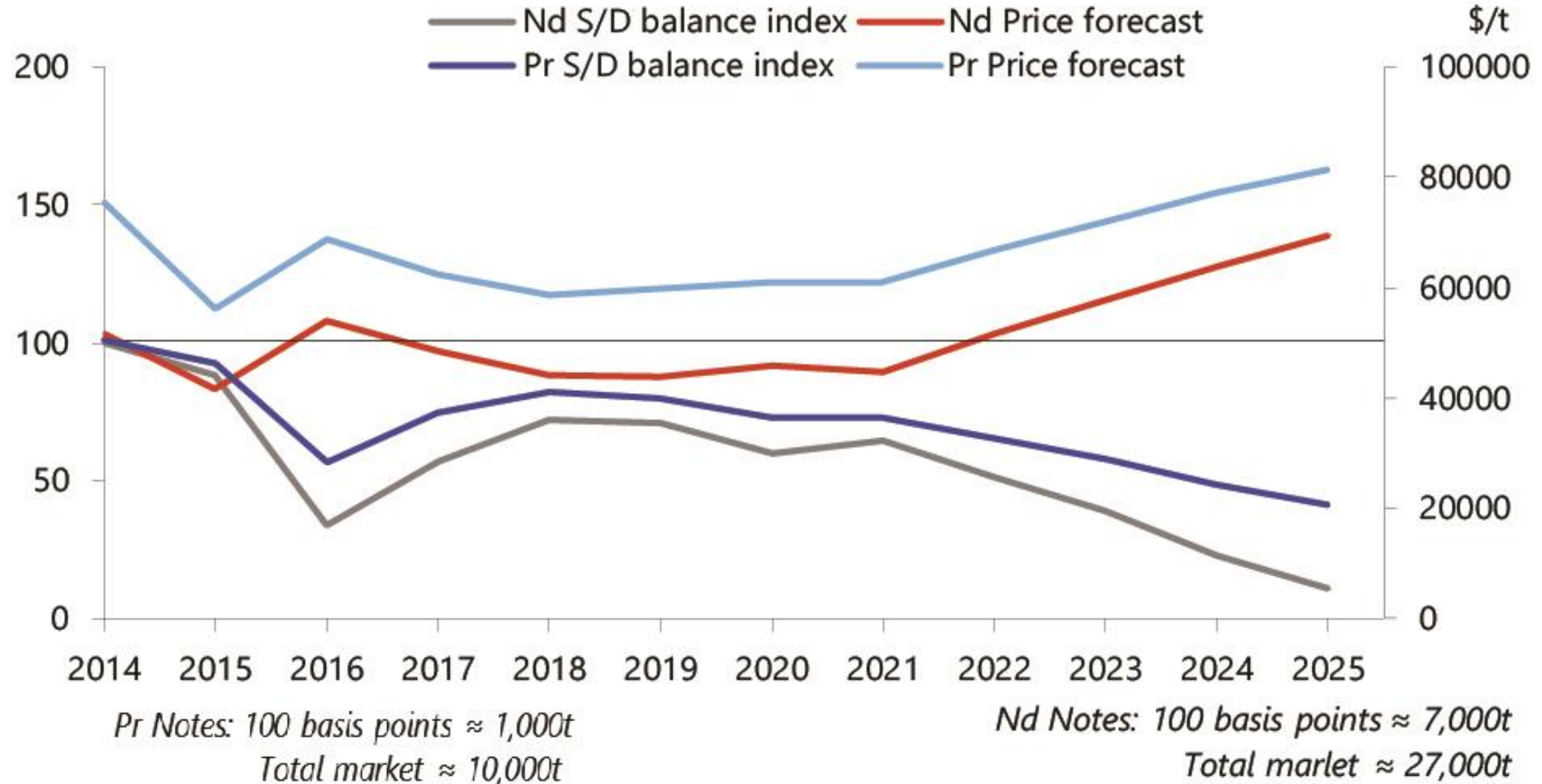


# Rare Earth Metals in an Electric Vehicle













## Comparison of REO Distribution Between Hastings and Major Light RE Producers

RE Oxide/TREO	Unit	Hastings	China		Outside of China	
			Producer 1	Producer 2	Producer 1	Producer 2
Lanthanum	%	9.99	25.94	36.50	25.16	33.22
Cerium	%	39.59	50.69	47.90	46.36	49.10
Praseodymium	%	8.01	5.15	4.10	5.38	4.30
Neodymium	%	33.80	15.90	10.00	18.79	12.00
Samarium	%	3.88	1.21	0.70	2.27	0.80
Europium	%	0.84	0.22	0.08	0.47	0.12
Gadolinium	%	1.80	0.39	0.23	0.85	0.17
Terbium	%	0.15	0.05	0.04	0.06	0.04
Dysprosium	%	0.50	0.11	0.06	0.16	0.07
Yttrium	%	1.14	0.25	0.31	0.45	0.10
Other	%	0.29	0.10	0.08	0.05	0.09
<b>Economic Value Factor</b>		<b>1.94</b>	<b>1.00</b>	<b>0.72</b>	<b>1.16</b>	<b>0.81</b>

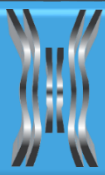
Note: The above REO distribution (Total RE Oxide/TREO) is based on RE Oxides content in beneficiated RE concentrate. The Value factor is calculated based on the value of normalized TREO with current prices for each single RE Oxide.

- Yangibana's Rare Earth minerals is the best light rare earth deposit rich in:
  - Neodymium
  - Praseodymium
  - Middle & Heavy RE
- Value for each unit of Yangibana' RE concentrate is 67% to 270% > than some major light RE producers in the world.

REO	Low	High
La	1.50	1.70
Ce	1.70	2.00
Nd	38.00	40.00
Pr	48.00	52.00
Sm	1.80	1.95
Eu	62.00	72.00
Gd	22.50	23.50
Dy	198.00	202.00
Tb	410.00	420.00
Y	3.55	3.80



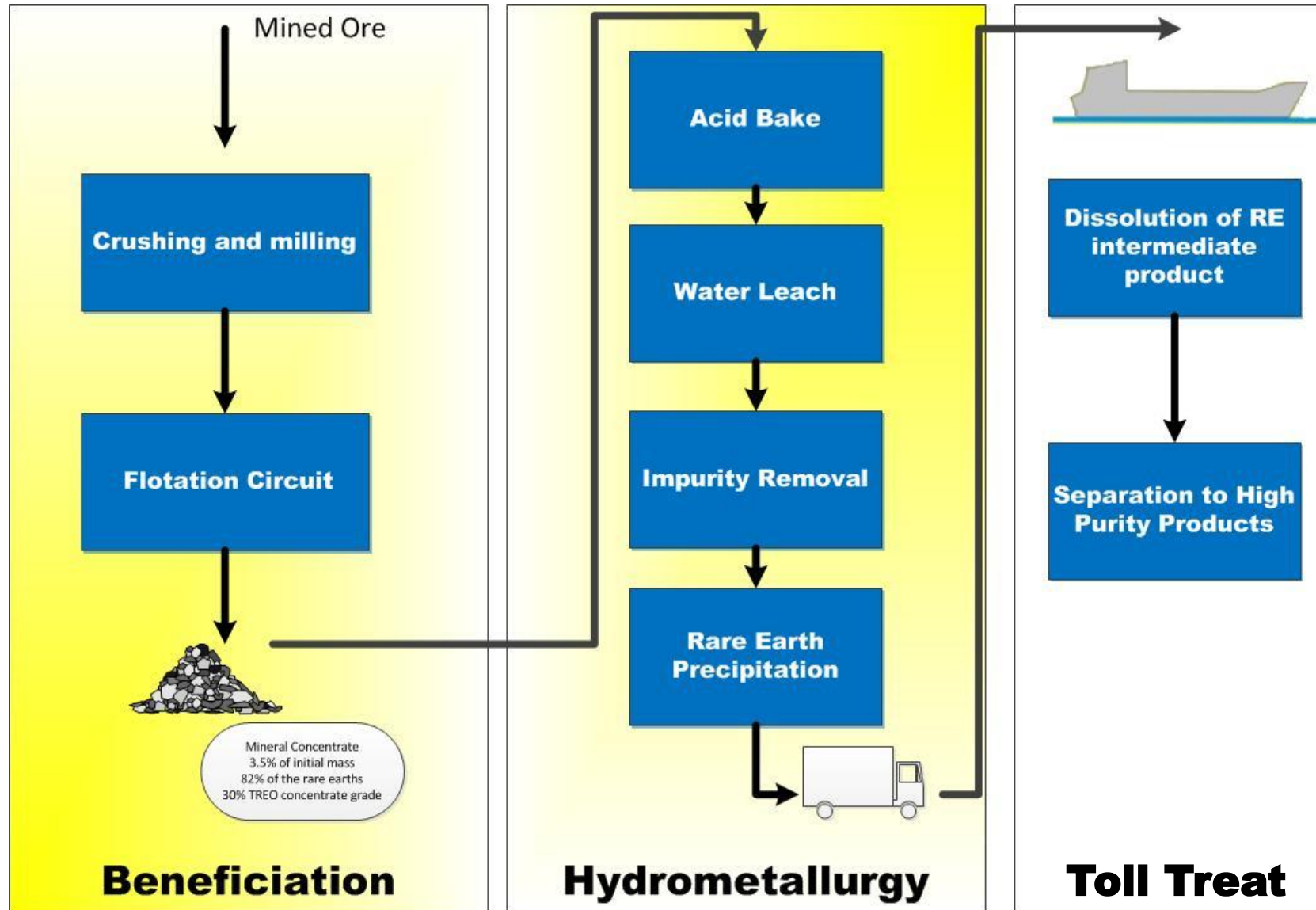
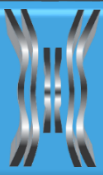
# Hydrometallurgy



Flotation  
technique









		FY15				FY16				FY17				FY18				FY19			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Stages	Pre- Feasibility Study	Completed																			
	Definitive Feasibility Study						In Progress														
	Production Plan Evaluation						In Progress														
	Pilot Plant Work						In Progress														
	Mining Application/Approval						In Progress														
	Financing							In Progress													
	Design								Prelim Design		Detailed Design										
	Procurement																				
	Construction										Infrastructure Work		Plant Construction								
	Commissioning																Track 1		Track 2		

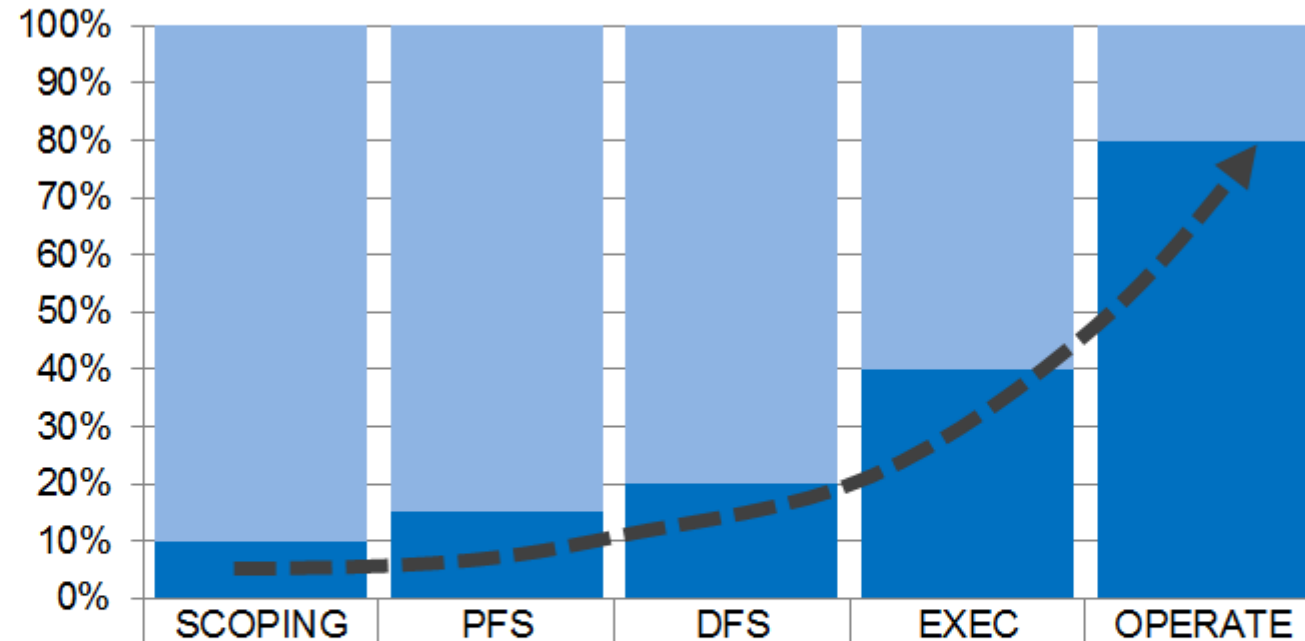
**Track 1 = Beneficiation Process Plant**

**Track 2 = Hydromet Process Plant**





## INDICATIVE EFFORT CONTRIBUTION - BY PHASE



CONTRACTED SPECIALISTS	90%	85%	80%	60%	20%
HAS (PROJECT OWNER)	10%	15%	20%	40%	80%

■ HAS (PROJECT OWNER) ■ CONTRACTED SPECIALISTS

EXCLUDING CONSTRUCTION WORKFORCE



# Pioneering Work - South of the Mining Facility



Airstrip



Village Bulk  
Earthworks



Floodway

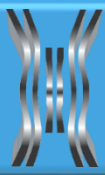
Shire Road

Access  
Road



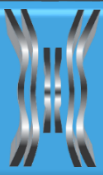


- Complete Beneficiation Pilot Plant Test Work Nov 2016
- Mining Proposal/Mine Rehab Plan Submission Nov
- Complete HydroMet Pilot Plant Test Work Feb 2017
- Production Process Optimisation March
- Commence Infrastructure “Pioneering” Work April
- Prelim Plant Engineering Specification Complete May
- DFS Document Release to Public July
- Commence Mining and Plant Construction Jan 2018

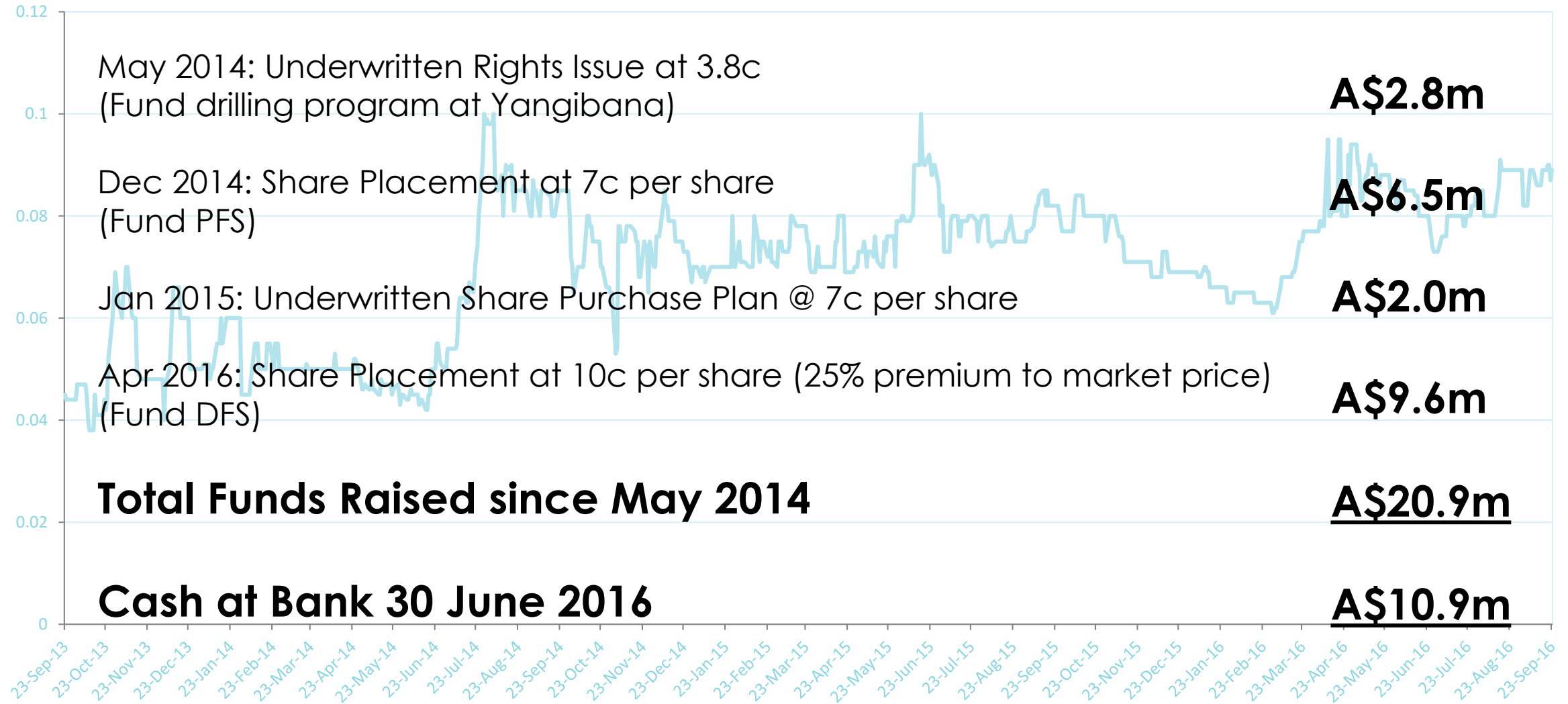


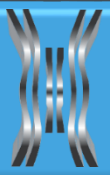
	AUDm
• Roads (15km of access road)	4.0
• River crossing	1.5
• Bulk earth works for camp site	1.5
• Airstrip (1.8km to handle 65 seater plane)	2.0
• <b>Total - Pioneering work cost</b>	<b>9.0</b>
• <b>Production Process Optimisation</b> (post piloting)	<b>3.0</b>





## HAS:AU - Share Price Performance





- **Strong growth in demand for Nd/Pr for Permanent Magnets**
- **Exceptional Nd/Pr mineralogy supports strong economics**
- **Good cost & process control through to production**
- **Granted Mining Leases free of Native title claims**
- **Australia: AAA sovereign risk rating**

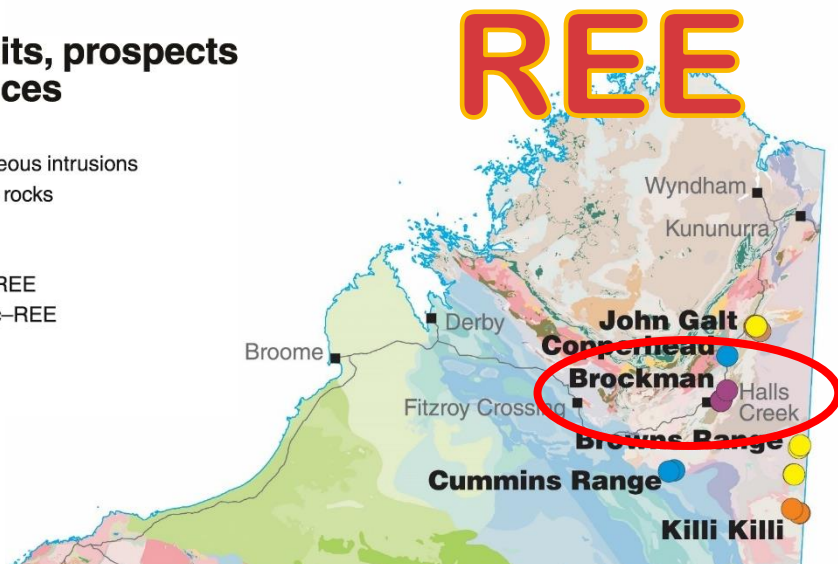




## Mines, deposits, prospects and occurrences

### Mineralization type

- Carbonatite and igneous intrusions
- Felsic volcanoclastic rocks
- Hydrothermal
- Pegmatite
- Sandstone-type U-REE
- Lignite-hosted U-Sc-REE
- Regolith
- Highway
- Town



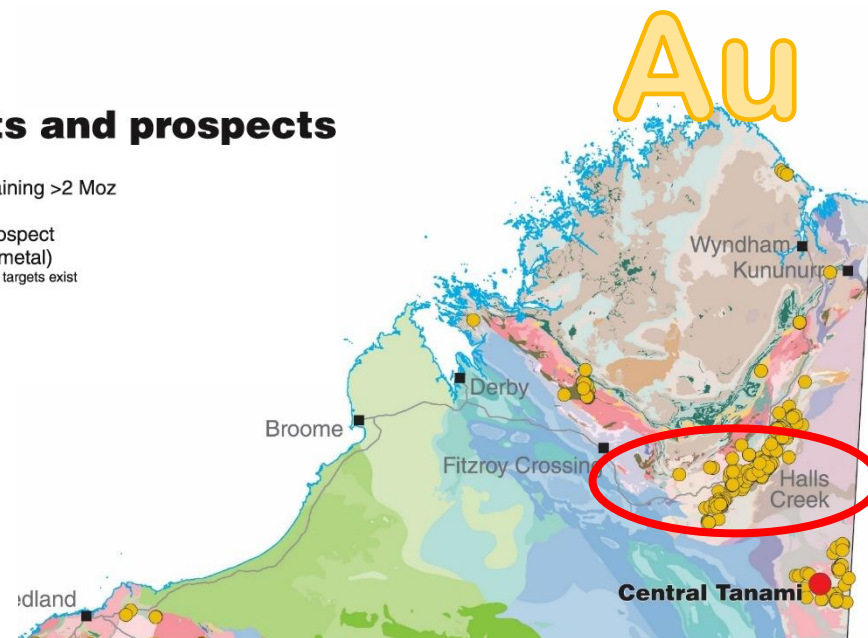
<http://dmpbookshop.eruditetechnologies.com.au/product/rare-earth-may-2014.do>

- JORC resources estimate: 41.4 million tonnes at 0.21% TREO including 0.18% HREO
- Australia's largest HREO deposits
- Mainly Dy and Y

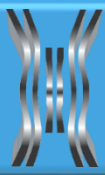
## Northern WA

## Mines, deposits and prospects

- Gold projects containing >2 Moz
- Mine, deposit or prospect (with gold as main metal)  
Note: additional exploration targets exist
- Highway
- Town



<http://dmpbookshop.eruditetechnologies.com.au/product/gold-flyer-march-2016.do>



**THANK YOU**

**Q&A**