LIL **METALS IASMAN** 

Moving from

discovery to development of one of the

world's major REE resources





ASTER Final Conference, April 2015

Dr. Henning Holmström Managing Director Tasman Metals AB (Sweden)



Uniquely placed, exploring for high value critical metals in **Europe** 



#### Disclaimer



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Cautionary Note to U.S. Investors Concerning Mineral Resources and Reserves: In this presentation, the definitions of "mineral resources" are those used by the Canadian securities administrators and conform to the definitions utilized by CIM in the "CIM Standards on Mineral Resources and Reserves – Definitions and Guidelines" adopted on August 20, 2000 and amended December 11, 2005.

The standards employed in estimating the mineral resources referenced in this presentation differ significantly from the requirements of the United States Securities and Exchange Commission (the "SEC") and the resource information reported may not be comparable to similar information reported by United States companies. The term "resources" does not equate to "reserves" and normally may not be included in documents filed with the SEC. "Resources" are sometimes referred to as "mineralization" or "mineral deposits." While the terms "mineral resource", "measured mineral resource", "indicated mineral resource" and "inferred mineral resource" are recognized and required by Canadian regulations, they are not defined terms under standards in the United States and normally are not permitted to be used in reports and registration statements filed with the SEC. The terms "mineral reserve," "proven mineral reserve" and "probable mineral reserve" are Canadian mining terms as defined in accordance with NI 43-101 and the CIM - CIM Definition Standards on Mineral Resources and Mineral Reserves, adopted by the CIM Council, as may be amended from time to time by the CIM. These definitions differ from the definitions in the SEC's Industry Guide 7 ("SEC Industry Guide 7") under the Securities Act of 1933. As such, information contained in this presentation concerning descriptions of mineralization and resources under Canadian standards may not be comparable to similar information made public by United States companies in SEC filings.

The estimation of measured, indicated and inferred mineral resources involves greater uncertainty as to their existence and economic feasibility than the estimation of proven and probable reserves. U.S. investors are cautioned (i) not to assume that measured or indicated resources will be converted into reserves and (ii) not to assume that estimates of inferred mineral resources exist, are economically minable, or will be upgraded into measured or indicated mineral resources. It cannot be assumed that the Company will identify any viable mineral resources on its properties or that any mineral reserves, if any, can be recovered profitably, if at all.

The qualified person for the Company's exploration projects, Mark Saxon, President and Chief Executive Officer of Tasman and a Fellow of the Australasian Institute of Mining and Metallurgy and Member of the Australian Institute of Geoscientists, has reviewed and verified the contents of this presentation.

### Tasman's Corporate Vision



# "To provide the foundation to a long lived and sustainable European Rare Earth Element supply chain"

REE's provide the ideal material properties for modern society .......

Efficiency enhancement
Weight reduction
Access to E - mobility
Emission reduction
Miniaturisation
Durability
Performance



...... a European supply chain will be sustainable, secure and have a low environmental impact, so critical metals can be engineered with confidence for generations to come.

#### The Key Elements Are All in Place



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HIGH GROWTH SECTOR

Demand for magnets for wind turbines, vehicles, communication, medicine has never been stronger. Supply side has never been weaker.

WORLD CLASS PROJECT

Norra Kärr is truly unique in its ability to be a long term supplier of the most critical REE's. Will also be a major player in Zr, Hf, Nb, ceramic use minerals.

STABLE MINING REGION

Sweden is a major mining country, with transparent mining laws. The operation shall be both "best practice", and sustainable.

VERY WELL LOCATED

Norra Kärr is surrounded by infrastructure and close to customers. Offsite construction is minimal, transport is simple, short and low risk.

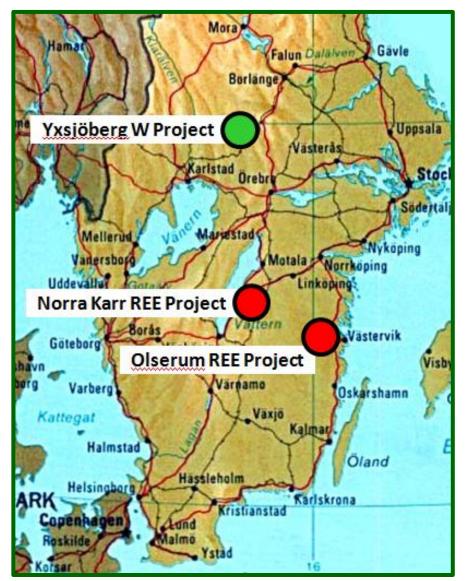
EUROPEAN SUPPLY CHAIN

Europe has skilled people in all parts of the REE supply chain. Full advantage can be taken of the Norra Kärr opportunity.

#### Tasman Snapshot



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- Tasman owns two of the world's most significant heavy rare earth element projects Norra Kärr and Olserum.
- These are the only heavy REE projects within the EU

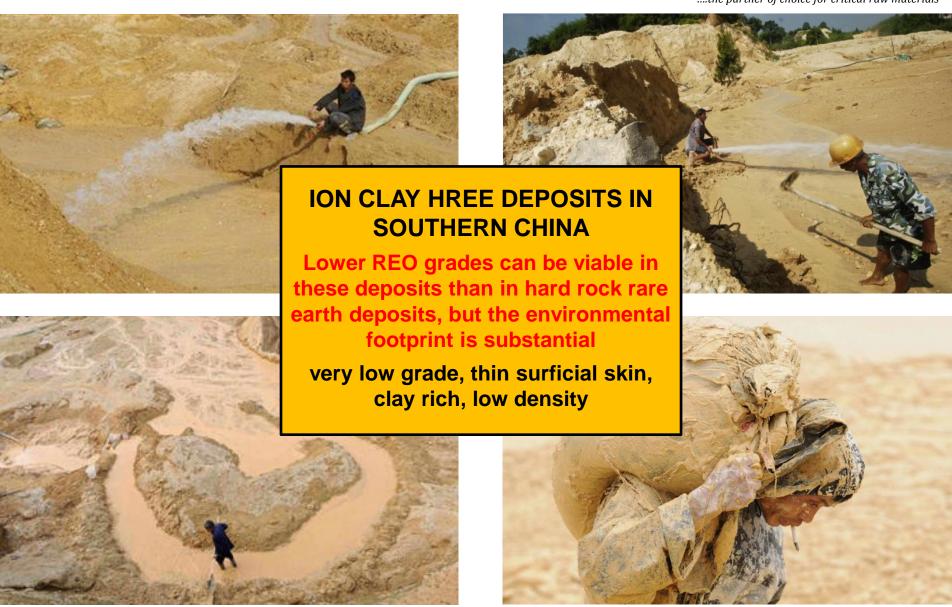
#### Norra Kärr:

- has a recently completed PFS with a positive financial model and significant scope for improvement
- can supply all of Europe's REE + Hf needs for the next 50 years
- has background levels of radiation, lowest of all projects
- will have a very low carbon footprint
- will draw most staff from the local area
- has a >25 year mining lease
- Tasman also owns tungsten and chromite assets in Scandinavia



# Only Global Source of Dy, Y, Tb





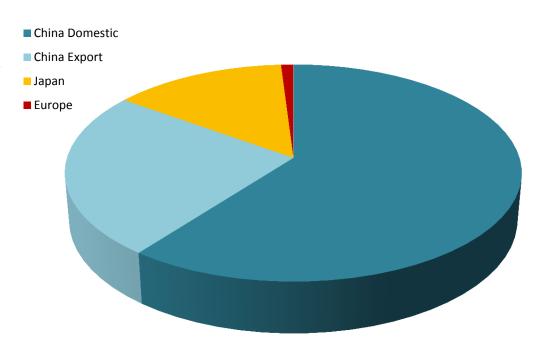


## The Magnet Industry



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- REE permanent magnets have the formula Nd<sub>x</sub>Fe<sub>x</sub>B with 1 10% Dy replacing Nd
- In 2013, China produced 81,000 tonnes of NdFeB magnets consuming around 22,000 tonnes of Nd metal
- Global magnet production currently 93,000 tonnes consuming 28,000 tonnes Nd (Pr) and approx. 2,100 tonnes Dy

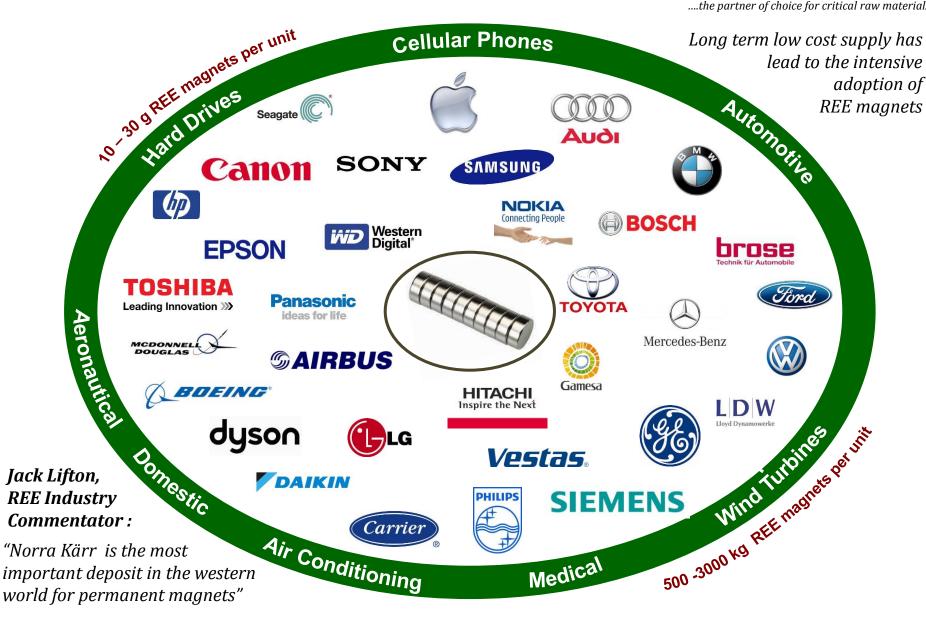


Association of China Rare Earth Industry, September 2014

Electric motors account for 45% of energy consumed today. REE-bearing permanent magnet motors are up to 20% more efficient

## The Major REE Growth is in Magnets

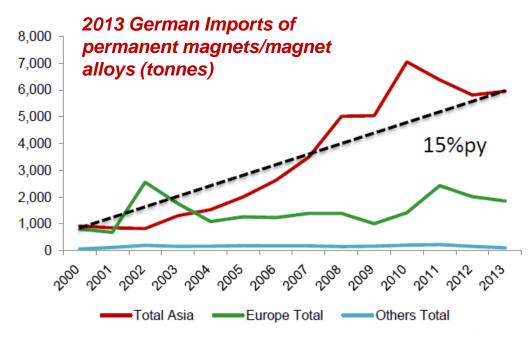




#### European Magnet Demand



- Imports of REE raw material are modest
- Europe is importing finished magnets/ finished goods, not raw material
- Magnets arrive for every vehicle built and within every phone, computer, many household electrical appliances, some wind turbines



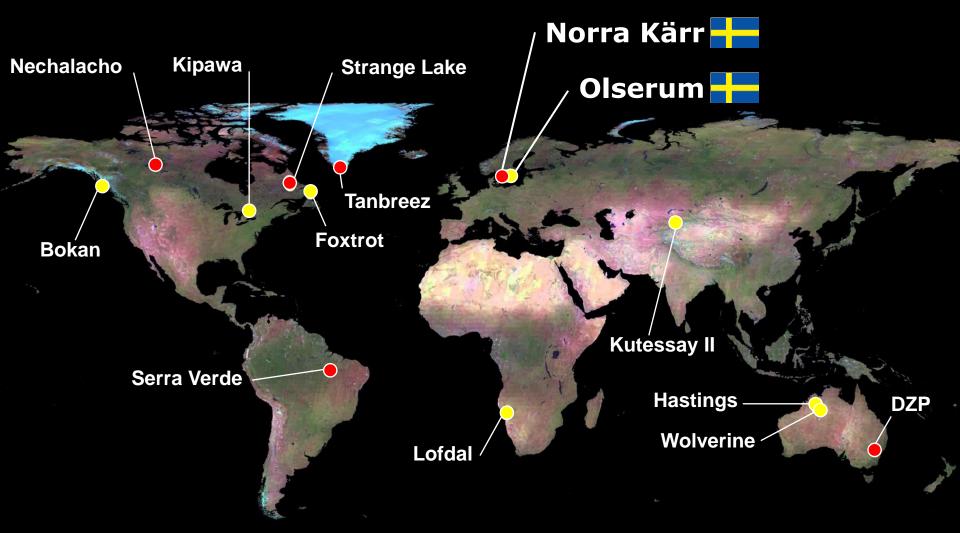
Source:Roskill, Kingsnorth, Hatch, Lifton, Various Chinese references

- Numbers vary, but estimate 15,000 20,000 tpa (some re-exported). Growth in consumption 5 15%, which is the long term trend.
- European demand requires 5,000 tpa Nd and 400 tpa Dy some 10 x what is imported as raw materials



# Significant HREE Projects





**Grade > 0.1% TREO ; > 15% HREO/TREO** 

- Dy > 10,000 tonnes
- Dy < 10,000 tonnes</p>

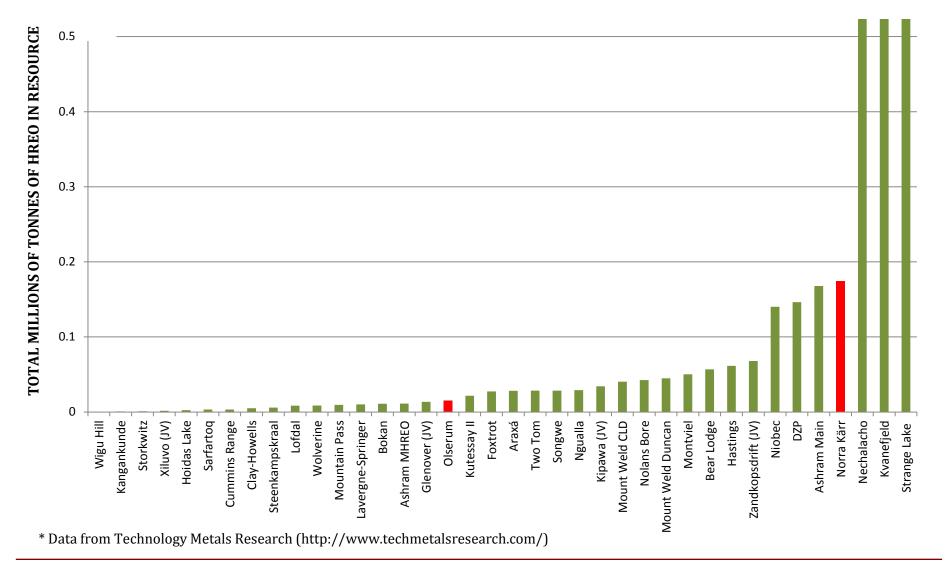
<sup>\*</sup> Data from Technology Metals Research (http://www.techmetalsresearch.com/)

#### Potential Heavy REE Sources



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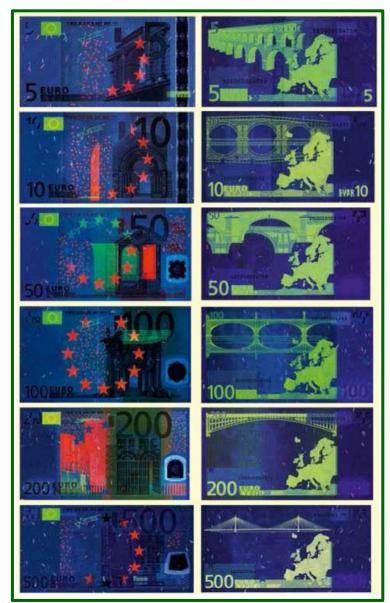
#### **REE Resource Projects with Grade > 0.1%: Projects Sorted by Contained HREO**



#### **Europe** is in the Best Position

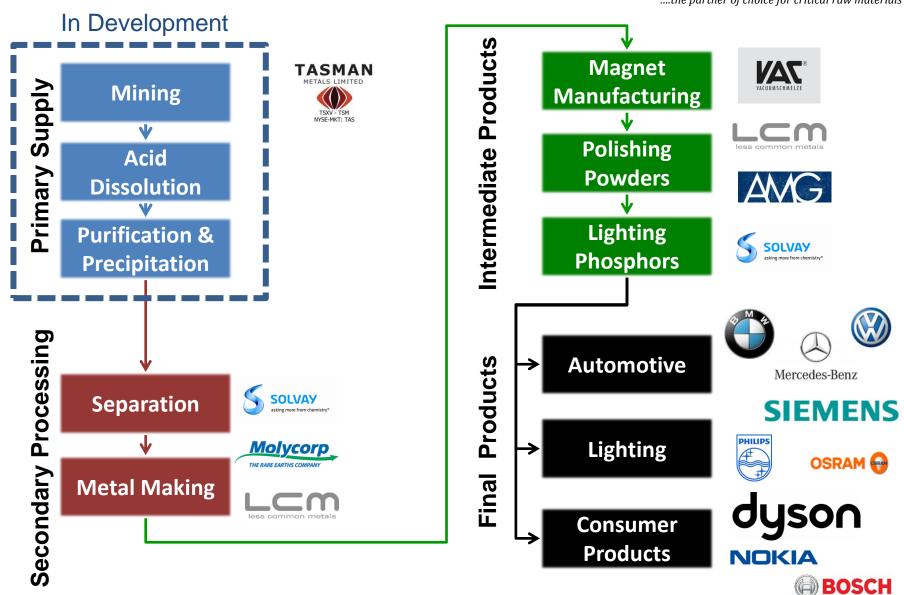


- **Europe has REE mineral resources** of a high quality and long mine life
  - Present in Sweden and Greenland
  - High grades of the most critical metals, >50 years life each
- Europe has A Downstream Supply Chain Intact and Operating
  - Separation, metal making, alloying, magnet making, OEM's all large businesses
  - Simple access to skilled people and process chemicals
  - Significant research into new low cost/environmentally efficient technology
- REE's are found in every European pocket - europium is used as a security measure in the Euro banknotes



### Supply Security in Europe is Possible







#### Mining in Sweden



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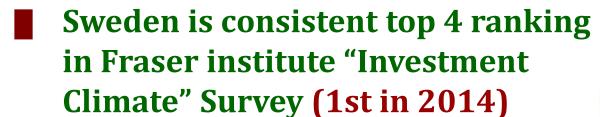
■ Sweden and Finland are the mining powerhouses of Europe. Strong mining industries with renowned mining + mineral processing equipment manufacturers















Highly efficient industry, therefore low operating costs. Very supportive of green technologies and innovation



Outotec



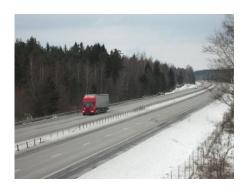




## Norra Kärr – Right Project, Right Time



- Norra Kärr is a world leading heavy REE project large, long mine life, high HREE grade
- Norra Kärr is the only REE project at PFS/advanced engineering stage in the EU
- Project is able to produce more than 200 tonnes of dysprosium oxide per year for at least 20 years.
- Attractive location with extensive transport/power/water infrastructure. Close to major European REE consumers
- **■** Greater than 60 year mine life
- **25-year Mining Lease is already granted**
- **100% owned by Tasman Metals Ltd**







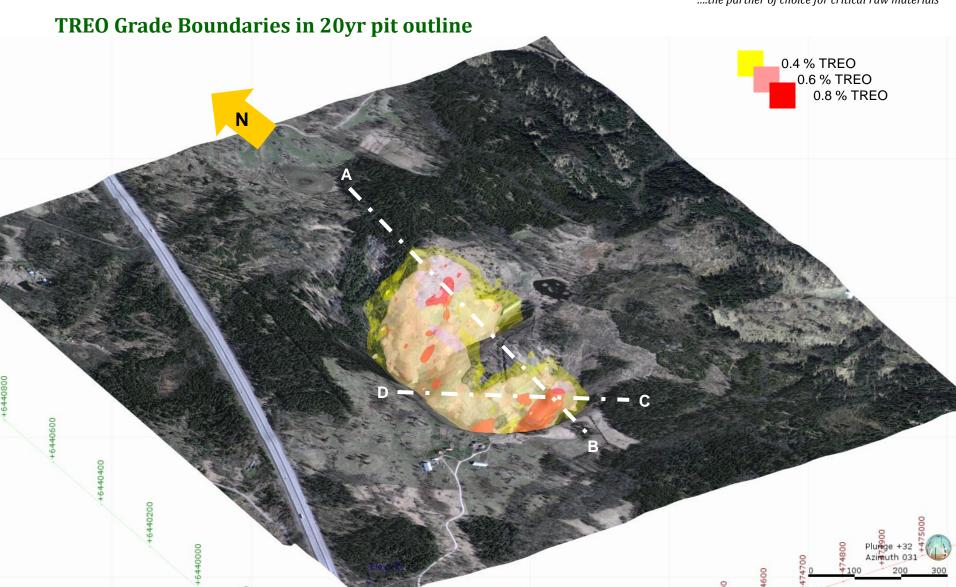
#### Close to everything





# Norra Kärr – Deposit



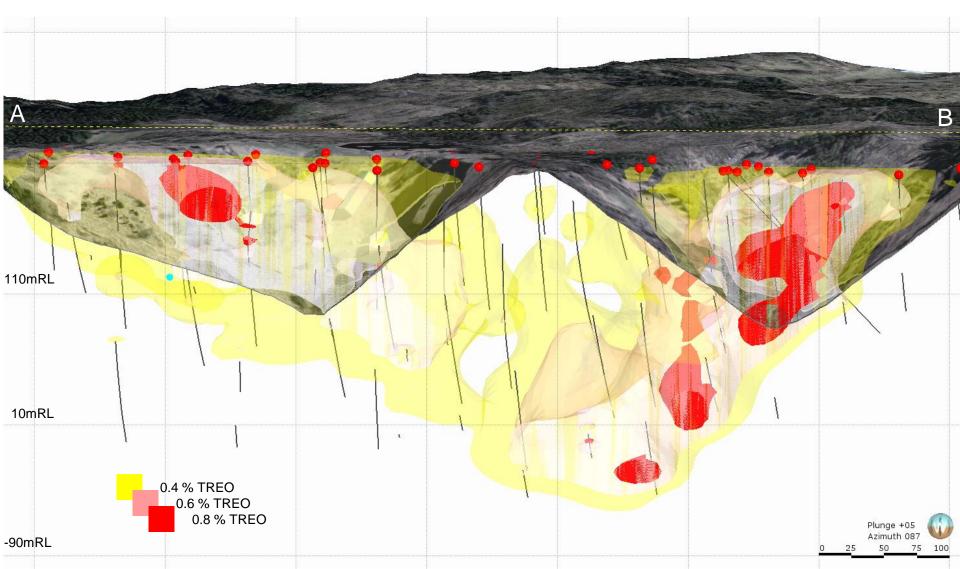


## Norra Kärr – Deposit



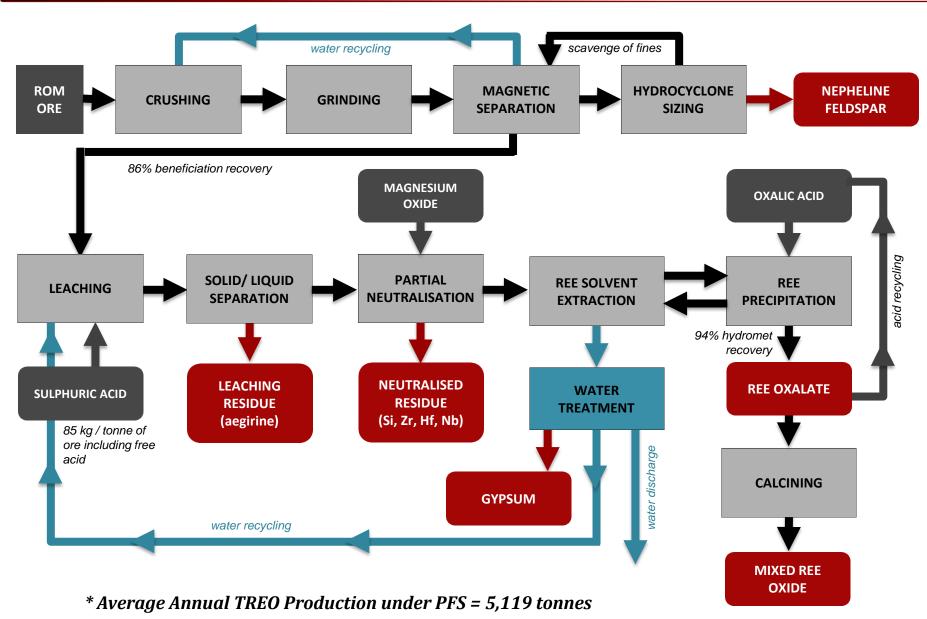
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#### **TREO Grade Boundaries in 20yr pit outline - East View**



#### Norra Kärr – Fully Tested Flowsheet





## PFS - Financial Highlights



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#### PFS Published 21st January - Norra Kärr is now "in play"

FINANCIAL RESULT	VALUE
Initial capital cost (million)	US\$378
Pre-tax / After-tax IRR	24% / 20%
Pre-tax / After-tax NPV at 10% discount rate (million)	US\$456 / US\$313
After-tax payback period	4.9 years
Mine life (constrained to 20 years)	20 years
TREO basket price/kg	US\$64.57
Average annual operating cash flow (after-tax) (million)	US\$96

OPERATIONAL METRICS	VALUE
Average annual ore mining rate (million tonnes)	1.18
Average Annual Total Rare Earth Oxide (TREO) production (tonnes)	5,119
Average Mining Grade, % TREO	0.59%
Life of Mine (20 year) Strip ratio (waste to ore)	0.73:1
Beneficiation Plant recovery rate	89%
Hydrometallurgical Recovery Rate	86%
Overall Recovery	77%
Separation Charge per kg TREO (Converting Mixed to Individual REO's)	US\$19
Operating cost per tonne processed, including REO separation	US\$179.60
Operating cost per kg TREO, including REO separation	\$US39.69

Assumptions that formed the basis of this PFS can be found on SEDAR and EDGAR in a National Instrument 43-101 Standards of Disclosure for Mineral Projects ("NI43-101") report titled "Prefeasibility Study - NI 43-101 - Technical report for the Norra Kärr Rare Earth Element Deposit" dated 13th January 2015. as prepared by GBM Minerals Engineering Consultants Limited.

#### PFS – Capital Costs

**TOTAL CAPITAL INVESTMENT** 



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COST AREA	INITIAL CAPITAL (US\$ M)
Mining	21.8 m
Process & Tailings	169.5 m
Waste Management	14.3 m
Product Handling	<u>-</u>
Infrastructure and Utilities	18.1 m
General	7.6 m
DIRECT TOTAL	231.3 m
EPCM	36.2 m
Field Indirect	45.3 m
Contingency	40.2 m
INDIRECT TOTAL	121.6 m
FIXED CAPITAL TOTAL	352.9 m
Working Capital	25.3 m

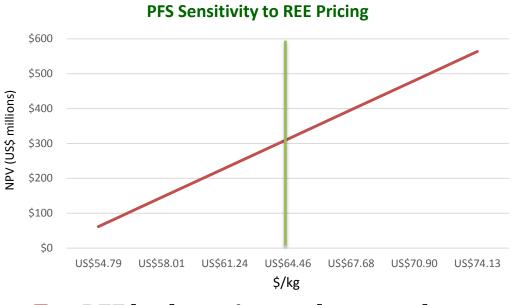
- \$378M initial capital estimate
- \$40M contingency included in CAPEX estimate
- Lowest capex requirements versus competing HREE projects
- \$44.3M sustaining capital
- Infrastructure already existing in and around Norra Kärr includes rail, road and power

378.3 m

## PFS - REE Pricing Sensitivity



	PFS	Current (Dec 2014)	Trailing 3 year Avg
	(US\$/kg)	(US\$/kg)	(US\$/kg)
$Ce_2O_3$	5.00	4.65	11.88
$Dy_2O_3$	575.00	340.00	670.69
Er <sub>2</sub> O <sub>3</sub>	n/a	0.00	0.00
Eu <sub>2</sub> O <sub>3</sub>	700.00	705.00	1455.48
$Gd_2O_3$	40.00	46.50	65.34
Ho <sub>2</sub> O <sub>3</sub>	n/a	n/a	n/a
La <sub>2</sub> O <sub>3</sub>	7.00	4.85	11.99
Lu <sub>2</sub> O <sub>3</sub>	900.00	n/a	n/a
Nd <sub>2</sub> O <sub>3</sub>	80.00	58.00	84.32
Pr <sub>2</sub> O <sub>3</sub>	115.00	117.00	110.94
Sm <sub>2</sub> O <sub>3</sub>	8.00	16.50	27.59
Tb <sub>2</sub> O <sub>3</sub>	950.00	615.00	1199.23
Tm <sub>2</sub> O <sub>3</sub>	n/a	n/a	n/a
$Y_2O_3$	25.00	14.00	44.40
Yb <sub>2</sub> O <sub>3</sub>	n/a	n/a	n/a
NK Basket	64.46	41.42	80.65



- REE basket price used was market tested and lies between current price and 3-year trailing average price
- NPV is most sensitive to REE pricing
- Current pricing environment challenging for Chinese domestic producers and in particular those weighted towards LREEs

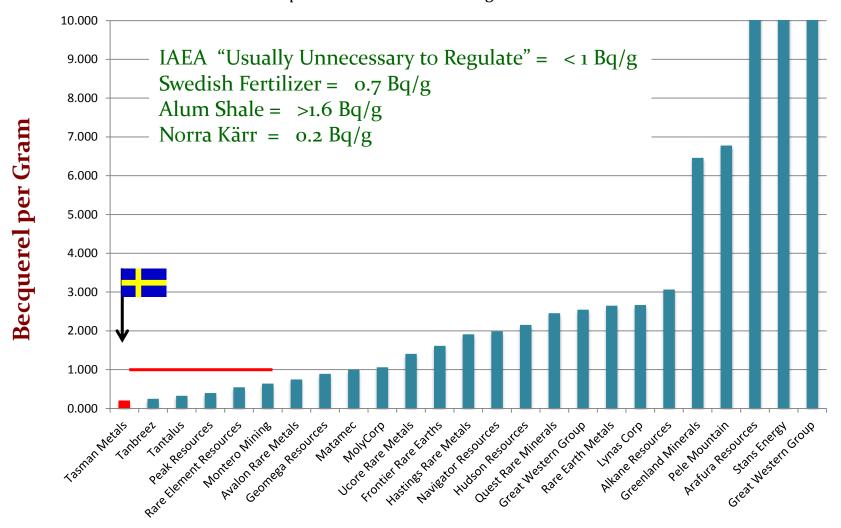


#### Norra Kärr – Very Low Radioactivity



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"Tasman's Norra Kärr project is unusually low in radioactivity, well below even the level of agricultural fertilizer sold in Sweden. The rock is clean enough to be considered for domestic building materials. By-product markets are being considered."



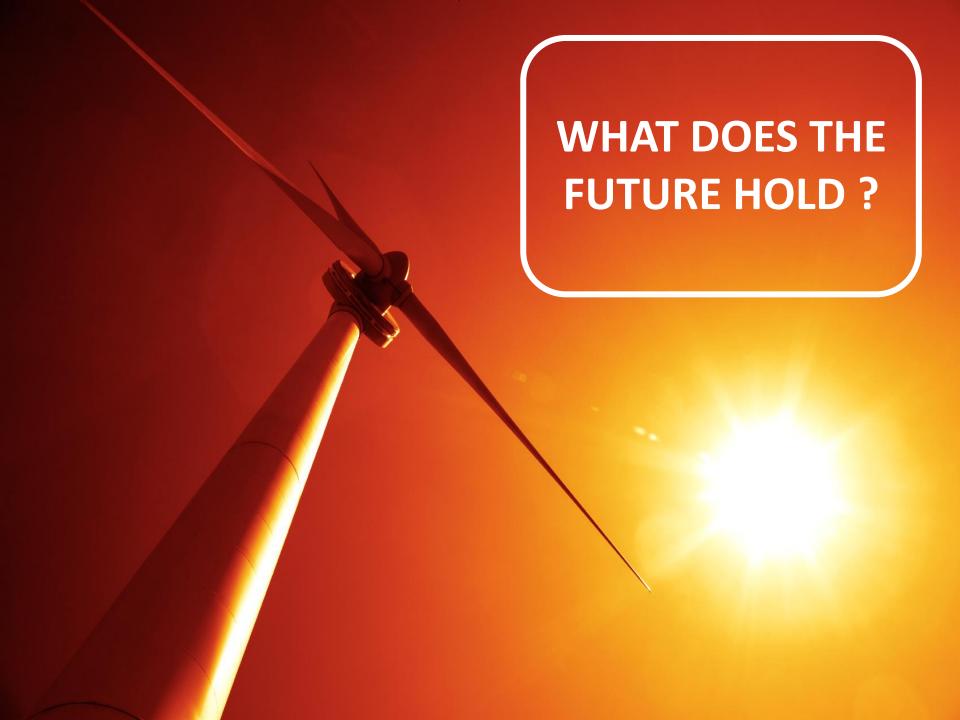
## No Such Thing as Waste



#### An Example of Sustainability at Norra Kärr

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- The minerals at Norra Kärr that don't contain REE's include approximately 50% nepheline and feldspar
- These minerals are widely consumed in Europe in ceramic industries (Imerys, Sibelco...) using product from Turkey, Russia and Brazil
- Tasman has opportunity to develop new products with this "waste"





## With Norra Kärr Supplying Europe



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**PHOSPHORS** (Y, Eu, Tb)



























SAINT-GOBAIN GLASS



(intel





CERAMICS (feldspar, Zr)









**AEROGEL** INSULATION (silica)









Guerbet |









# Norra Kärr – Projected Timing



2010 20	11 201	2 2013	2014	2015	2016	2017	2018
Discovery							
Resource  INFER	RED	INDICATED				· ·	MEASURED
Metallurgy	<b>)</b>				● PP	● PP P	PP = Pilot Plant
Scoping							
Pre-Feasibility							
Feasibility							
Engineering							
Construction							
Production							
Permitting	ML	APP •			EXTRAC	T APP	-
Partner Developme	ent 🗀					ine Lease and ermit Application	



