Uniquely placed, exploring for high value critical metals in Europe

Norra Kärr
Future Benefits of Heavy REE Production in Europe

ASTER Final Conference, April 2015

Dr. Henning Holmström
Managing Director Tasman Metals AB (Sweden)
Some of the statements contained in the following material may be "forward-looking statements." All statements, other than statements of historical fact, that address activities, events or developments that Tasman Metals Ltd. ("Tasman") believes, expects or anticipates will or may occur in the future are forward-looking statements. Forward-looking statements are often, but not always, identified by the use of words such as "seek," "anticipate," "believe," "plan," "estimate," "expect," and "intend" and statements that an event or result "may," "will," "can," "should," "could," or "might" occur or be achieved and other similar expressions. These forward-looking statements reflect the current expectations or beliefs of Tasman based on information currently available to Tasman.

Forward-looking statements are subject to a number of risks and uncertainties that may cause the actual results of Tasman to differ materially from those discussed in the forward-looking statements, and even if such actual results are realized or substantially realized, there can be no assurance that they will have the expected consequences to, or effects on Tasman. Factors that could cause actual results or events to differ materially from current expectations include, among other things, failure to successfully complete intended financings, capital and other costs varying significantly from estimates, production rates varying from estimates, changes in world metal markets, changes in equity markets, changes in laws or regulations, uncertainties relating to the availability and costs of financing needed in the future, equipment failure, unexpected geological conditions, imprecision in resource estimates, success of future development initiatives, competition, operating performance of facilities, environmental and safety risks, delays in obtaining or failure to obtain necessary permits and approvals from government authorities, and other development and operating risks. Any forward-looking statement speaks only as of the date on which it is made and, except as may be required by applicable securities laws, Tasman disclaims any intent or obligation to update any forward-looking statement, whether as a result of new information, future events or results or otherwise.

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.
“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

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. Off-site 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 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

ION CLAY HREE DEPOSITS IN SOUTHERN CHINA

Lower REO grades can be viable in these deposits than in hard rock rare earth deposits, but the environmental footprint is substantial

very low grade, thin surficial skin, clay rich, low density
HIGH STRENGTH REE PERMANENT MAGNETS ARE THE KEY
The Magnet Industry

- REE permanent magnets have the formula \( \text{Nd}_x\text{Fe}_x\text{B} \) 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

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

10 - 30 g REE magnets per unit

Cellular Phones

Long term low cost supply has lead to the intensive adoption of REE magnets

Hard Drives

Automotive

Aeronautical

Domestic

Air Conditioning

Medical

Wind Turbines

10 - 30 g REE magnets per unit

Jack Lifton, REE Industry Commentator:

“Norra Kärr is the most important deposit in the western world for permanent magnets”

www.tasmanmetals.com
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
- 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 10x what is imported as raw materials

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

2013 German Imports of permanent magnets/magnet alloys (tonnes)

15%py

Source: Roskill, Kingsnorth, Hatch, Lifton, Various Chinese references
FUTURE REE OPPORTUNITIES
Significant HREE Projects

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

* Data from Technology Metals Research (http://www.techmetalsresearch.com/)
Potential Heavy REE Sources

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

* Data from Technology Metals Research (http://www.techmetalsresearch.com/)
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

TASMAN METALS LIMITED
....the partner of choice for critical raw materials

In Development

Primary Supply

- Mining
- Acid Dissolution
- Purification & Precipitation

Secondary Processing

- Separation
- Metal Making

Intermediate Products

- Magnet Manufacturing
- Polishing Powders
- Lighting Phosphors

Final Products

- Automotive
- Lighting
- Consumer Products

In Development

- Magnet Manufacturing
- Polishing Powders
- Lighting Phosphors

Secondary Processing

- Metal Making

Final Products

- Automotive
- Lighting
- Consumer Products
THE OPPORTUNITY PRESENTED BY NORRA KÄRR
Sweden and Finland are the mining powerhouses of Europe. Strong mining industries with renowned mining + mineral processing equipment manufacturers.

Sweden is consistent top 4 ranking in Fraser institute “Investment Climate” Survey (1st in 2014).

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

Infrastructure EVERYWHERE.
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

- **CHEMICAL PLANT**
- **MAJOR PORT**
- **MAJOR MINE**

NORRA KARR

Intrusion outline

0.25 km
Norra Kärr – Deposit

TREO Grade Boundaries in 20yr pit outline
TREO Grade Boundaries in 20yr pit outline – East View
Norra Kärr – Fully Tested Flowsheet

- **ROM ORE**
  - CRUSHING
  - GRINDING
  - MAGNETIC SEPARATION
  - HYDROCYCLONE SIZING

- **LEACHING**
  - SOLID/LIQUID SEPARATION
  - PARTIAL NEUTRALISATION
  - REE SOLVENT EXTRACTION

- **SULPHURIC ACID**
  - LEACHING RESIDUE (aegirine)

- **MAGNESIUM OXIDE**
  - NEUTRALISED RESIDUE (Si, Zr, Hf, Nb)

- **REE OXALATE**
  - REE PRECIPITATION
  - REE OXALATE

- **OXALIC ACID**

- **HYDROCYCLONE SIZING**

- **NEPHELINE FELDSPAR**

- **GYSUMP**

- **CALCINING**

- **MIXED REE OXIDE**

- **WATER TREATMENT**

- **scavenge of fines**

- **water recycling**

- **86% beneficiation recovery**

- **acid recycling**

- **94% hydromet recovery**

- **85 kg / tonne of ore including free acid**

*Average Annual TREO Production under PFS = 5,119 tonnes*
### PFS - Financial Highlights

**PFS Published 21\textsuperscript{st} January - Norra Kärr is now “in play”**

<table>
<thead>
<tr>
<th><strong>FINANCIAL RESULT</strong></th>
<th><strong>VALUE</strong></th>
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<tbody>
<tr>
<td>Initial capital cost (million)</td>
<td>US$378</td>
</tr>
<tr>
<td>Pre-tax / After-tax IRR</td>
<td>24% / 20%</td>
</tr>
<tr>
<td>Pre-tax / After-tax NPV at 10% discount rate (million)</td>
<td>US$456 / US$313</td>
</tr>
<tr>
<td>After-tax payback period</td>
<td>4.9 years</td>
</tr>
<tr>
<td>Mine life (constrained to 20 years)</td>
<td>20 years</td>
</tr>
<tr>
<td>TREO basket price/kg</td>
<td>US$64.57</td>
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<tr>
<td>Average annual operating cash flow (after-tax) (million)</td>
<td>US$96</td>
</tr>
</tbody>
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<thead>
<tr>
<th><strong>OPERATIONAL METRICS</strong></th>
<th><strong>VALUE</strong></th>
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<tbody>
<tr>
<td>Average annual ore mining rate (million tonnes)</td>
<td>1.18</td>
</tr>
<tr>
<td>Average Annual Total Rare Earth Oxide (TREO) production (tonnes)</td>
<td>5,119</td>
</tr>
<tr>
<td>Average Mining Grade, % TREO</td>
<td>0.59%</td>
</tr>
<tr>
<td>Life of Mine (20 year) Strip ratio (waste to ore)</td>
<td>0.73 : 1</td>
</tr>
<tr>
<td>Beneficiation Plant recovery rate</td>
<td>89%</td>
</tr>
<tr>
<td>Hydrometallurgical Recovery Rate</td>
<td>86%</td>
</tr>
<tr>
<td>Overall Recovery</td>
<td>77%</td>
</tr>
<tr>
<td>Separation Charge per kg TREO (Converting Mixed to Individual REO’s)</td>
<td>US$19</td>
</tr>
<tr>
<td>Operating cost per tonne processed, including REO separation</td>
<td>US$179.60</td>
</tr>
<tr>
<td>Operating cost per kg TREO, including REO separation</td>
<td>$US39.69</td>
</tr>
</tbody>
</table>

## PFS – Capital Costs

<table>
<thead>
<tr>
<th>COST AREA</th>
<th>INITIAL CAPITAL (US$ M)</th>
</tr>
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<tbody>
<tr>
<td><strong>Mining</strong></td>
<td>21.8 m</td>
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<tr>
<td><strong>Process &amp; Tailings</strong></td>
<td>169.5 m</td>
</tr>
<tr>
<td><strong>Waste Management</strong></td>
<td>14.3 m</td>
</tr>
<tr>
<td><strong>Product Handling</strong></td>
<td>-</td>
</tr>
<tr>
<td><strong>Infrastructure and Utilities</strong></td>
<td>18.1 m</td>
</tr>
<tr>
<td><strong>General</strong></td>
<td>7.6 m</td>
</tr>
<tr>
<td><strong>DIRECT TOTAL</strong></td>
<td><strong>231.3 m</strong></td>
</tr>
<tr>
<td><strong>EPCM</strong></td>
<td>36.2 m</td>
</tr>
<tr>
<td><strong>Field Indirect</strong></td>
<td>45.3 m</td>
</tr>
<tr>
<td><strong>Contingency</strong></td>
<td>40.2 m</td>
</tr>
<tr>
<td><strong>INDIRECT TOTAL</strong></td>
<td><strong>121.6 m</strong></td>
</tr>
<tr>
<td><strong>FIXED CAPITAL TOTAL</strong></td>
<td><strong>352.9 m</strong></td>
</tr>
<tr>
<td><strong>Working Capital</strong></td>
<td>25.3 m</td>
</tr>
<tr>
<td><strong>TOTAL CAPITAL INVESTMENT</strong></td>
<td><strong>378.3 m</strong></td>
</tr>
</tbody>
</table>

- **$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
### PFS – REE Pricing Sensitivity

Table: REE Pricing Sensitivity

<table>
<thead>
<tr>
<th>REE</th>
<th>PFS (US$/kg)</th>
<th>Current (Dec 2014) (US$/kg)</th>
<th>Trailing 3 year Avg (US$/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ce₂O₃</td>
<td>5.00</td>
<td>4.65</td>
<td>11.88</td>
</tr>
<tr>
<td>Dy₂O₃</td>
<td>575.00</td>
<td>340.00</td>
<td>670.69</td>
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<tr>
<td>Er₂O₃</td>
<td>n/a</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Eu₂O₃</td>
<td>700.00</td>
<td>705.00</td>
<td>1455.48</td>
</tr>
<tr>
<td>Gd₂O₃</td>
<td>40.00</td>
<td>46.50</td>
<td>65.34</td>
</tr>
<tr>
<td>Ho₂O₃</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>La₂O₃</td>
<td>7.00</td>
<td>4.85</td>
<td>11.99</td>
</tr>
<tr>
<td>Lu₂O₃</td>
<td>900.00</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Nd₂O₃</td>
<td>80.00</td>
<td>58.00</td>
<td>84.32</td>
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<tr>
<td>Pr₂O₃</td>
<td>115.00</td>
<td>117.00</td>
<td>110.94</td>
</tr>
<tr>
<td>Sm₂O₃</td>
<td>8.00</td>
<td>16.50</td>
<td>27.59</td>
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<tr>
<td>Tb₂O₃</td>
<td>950.00</td>
<td>615.00</td>
<td>1199.23</td>
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<tr>
<td>Tm₂O₃</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
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<tr>
<td>Y₂O₃</td>
<td>25.00</td>
<td>14.00</td>
<td>44.40</td>
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<tr>
<td>Yb₂O₃</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
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<tr>
<td>NK Basket</td>
<td>64.46</td>
<td>41.42</td>
<td>80.65</td>
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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.
ENVIRONMENT AND SUSTAINABILITY
“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.”

IAEA “Usually Unnecessary to Regulate” = < 1 Bq/g
Swedish Fertilizer = 0.7 Bq/g
Alum Shale = >1.6 Bq/g
Norra Kärr = 0.2 Bq/g
No Such Thing as Waste

An Example of Sustainability at Norra Kärr

- 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”

Nepheline/feldspar buttons from Norra Kärr “waste material”. Has passed tests (chemistry, whiteness, translucency) to be suitable for roof and floor tiles and sanitary ware.

ENVIROMENTAL SUSTAINABILITY
LESS WASTE ROCK

SOCIAL SUSTAINABILITY
MORE LOCAL EMPLOYMENT
WHAT DOES THE FUTURE HOLD?
With Norra Kärr Supplying Europe

...the partner of choice for critical raw materials

STEEL ALLOYS
(Nb, Y, Yb)

MAGNETS
(Dy, Nd, Tb, Pr, Sm)

PHOSPHORS
(Y, Eu, Tb)

NUCLEAR MATERIALS
(Zr, Hf)

CATALYSTS
(Ce, La)

COMPUTER CHIPS
(Hf)

GLASS
(Ce, Zr)

MEDICAL
(Lu, Gd)

CERAMICS
(feldspar, Zr)

AEROGEL INSULATION
(silica)
Norra Kärr – Projected Timing

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<td>PP</td>
<td>PP</td>
<td>PP = Pilot Plant</td>
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<td>EXTRACT APP</td>
<td>Mine Lease and Extraction Permit Application/Granting</td>
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Thanks for listening

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