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## THE IMPORTANCE OF RARE EARTHS TO MODERN MANUFACTURING

### HIGHLIGHTS

- Rare earths are 17 elements that are essential ingredients in modern manufacturing
- Shortage of supply and escalating demand favours heavy rare earths
- The Hastings Project is Australia's largest and the world's 4<sup>th</sup> largest heavy rare earths project
- End users need secure, reliable, long-term non-Chinese supply of rare earths

Hastings Rare Metals (HAS: ASX) will be releasing the results of its Scoping Study at the end of August. This is the culmination of 6 months of metallurgical verification, engineering, costing and related assessment. As a prelude to the Scoping Study, this release provides background information to assist investors understand aspects of rare earths most relevant to the Company.

**Rare earths** – Rare earths are mineral elements that can be mined by open cut or underground methods. The ore extracted from mining requires processing in order to extract the full value.

There are 17 different rare earths, comprising the Lanthanide group plus Yttrium and Scandium. Each rare earth has different properties and uses. Taken as a group:

- global production of all rare earth elements totals between 110,000 and 130,000 tonnes a year
- China produces over 90% of all rare earths, in part due to lower labour costs and historically less stringent environmental requirements
- rare earths are indispensable for modern manufacturing, often with no or limited substitutes. Significant recycling is neither practical nor economic in most cases
- there is a 50 year history of consistently finding new applications for rare earths.

**Benefits of rare earths** – Rare earths can be equated to the vitamins of modern manufacturing. They create disproportionately large benefits in the end product. The major benefits include reduced weight, greater efficiency and lower energy consumption. They allow enhanced efficiency, performance, speed, miniaturisation, durability and thermal stability. They are essential to the manufacture of high technology applications where there is a constant search for greater efficiency and performance.



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For example, approximately US\$30,000 of dysprosium in the magnets of a wind turbine assist to eliminate the gearbox and double the generation capacity of the unit. Rare earths are required to operate screens in phones and flat screen TVs, to make phones vibrate and to make LEDs illuminate.

**Different types of rare earths** – The 17 rare earths can be divided into ‘light rare earths’ and ‘heavy rare earths’ based predominantly on their atomic weight.

**Light rare earths** such as Lanthanum and Cerium are more commonly found, more easily extracted and more readily available. As a result, the prices of light rare earths tend to be lower. They are used in glass polishing, rechargeable batteries, catalytic converters and fluorescent bulbs and are currently priced at under US \$20/kg. China is the major supplier of light rare earths, with Molycorp of the US and Lynas Corporation of Australia soon to be marketing their products.

**Heavy rare earths** are less common, more difficult to extract and less readily available. The benefits of heavy rare earths can be very significant, particularly in high-performance magnets which allow small-scale yet powerful electric motors to be manufactured. As a result, the prices tend to be high at up to US \$2,000/kg. China is the only supplier of heavy rare earths currently, with few potential non-Chinese sources of supply at an advanced stage of development.

The Hastings project is Australia’s largest and the world’s 4<sup>th</sup> largest heavy rare earths project. Hastings considers projects with greater than 35% heavy rare earths to total rare earths to be heavy rare earth projects.

**Supply shortage** - Supply and demand projections, including from the United States Department of Energy, Australia’s CSIRO, The Economist, BCC Research and REE World, indicate that there will be a shortage of heavy rare earths both in the medium term and long term.

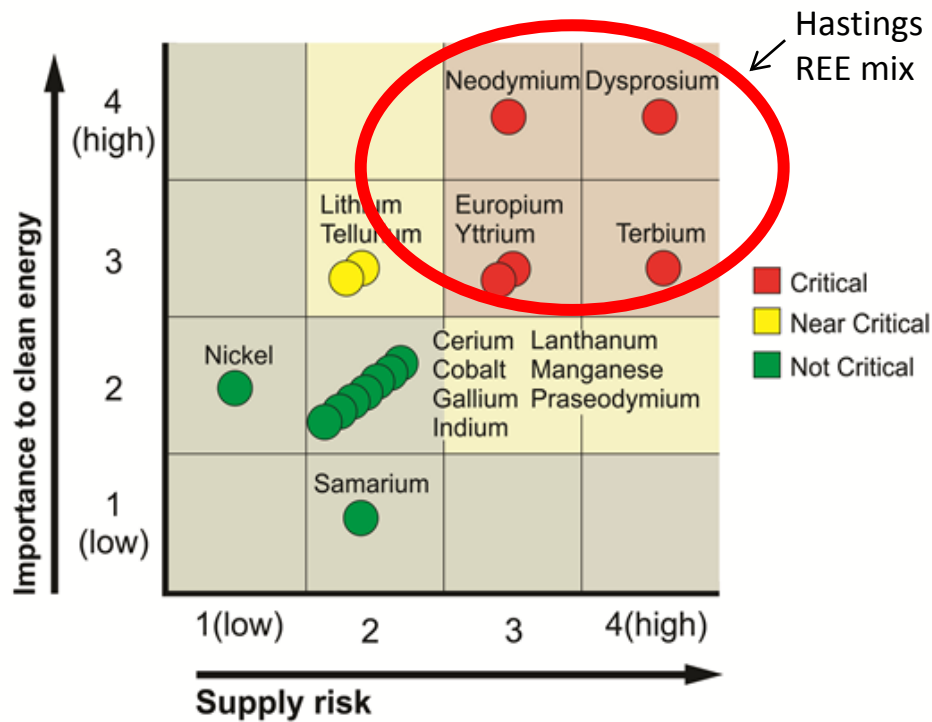
The reasons for the shortage include:

- strong and growing demand for high technology consumer and industrial products
- the marked efficiencies gained through the use of heavy rare earths at relatively low cost compared with the price of the end product
- continuing development of new applications for heavy rare earths
- limited heavy rare earths resources affecting supply
- the lack of heavy rare earth projects identified, with new deposits taking many years from discovery to commercialisation

By way of example, the United States Department of Energy has defined “critical” rare earths based on those at most supply risk. The Hastings project contains two of these critical rare earths, namely Yttrium and, the most critical, Dysprosium.

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**Pricing of rare earths** - Rare earths are not traded on an international financial exchange like gold or silver. The market is more akin to diamonds which tend to be traded directly between buyer and seller.

Saleable products can vary in composition and quality. International prices may be expressed on the basis of 99.99% purity free-on-board ("FOB") China and are typically higher than domestic China prices, in part due to Chinese export taxes.

International prices increased dramatically from 2009 until late 2011, driven in part by speculation and a supply shortage. While prices have generally retreated, heavy rare earth prices remain substantially higher than historically. For example, Dysprosium is still 9 times more expensive and Yttrium 14 times more expensive than in 2009.

**Chinese rare earths industry** - China supplies over 95% of the world's rare earths. Rare earths are indispensable in modern manufacturing globally, but particularly in countries such as Japan, Korea, Germany, the United States and China itself.

**Constraints imposed on the Chinese industry** - The Chinese authorities have taken action recently to address environmental damage, depletion of their rare earths resource, and illegal mining and smuggling. These actions include:

- quotas imposed on export tonnages, including a 40% reduction during 2010
- taxes of 15% to 25% imposed on the export of rare earths
- sub-quotas introduced for individual rare earths
- environmental requirements, closing illegal operations and a moratorium on new operations and mine expansion



- minimum standards expected to close more than one third of rare earths mines and up to half the country's smelters and extracting enterprises
- stockpiling certain heavy rare earths.

**Secure long-term non-Chinese supply** – It is essential that businesses in the major manufacturing countries obtain secure, reliable, long-term supply of rare earths. An indication of the high level of concern is an action taken in the World Trade Organisation by the US and other industrialised nations claiming that China is in breach of its free trade obligations, which China denies. The action cannot address the primary challenge of a predicted shortage of supply of particular rare earths.

The Hastings Project can supply Dysprosium, which is used in magnets to reduce weight and size and improve efficiency. The industries most reliant on Dysprosium are the auto, wind turbine and rail industries. The Hastings Project can also supply significant quantities of Yttrium, which is used in phosphors in the manufacture of flat-screen TVs and smart hand-held devices.

CEO of Hastings Rare Metals, Alastair Metcalf said, "Major manufacturers are right to be concerned about the supply of heavy rare earths. China has limited resources and is taking action to address its challenges. It cannot keep supplying the world with rare earths at the rate it has been. Our project is one of a few that can provide a secure reliable supply of heavy rare earths for over 25 years, and it is one of the most advanced in terms of bringing it to production."

**Next steps** - This background information is intended to assist investors understand aspects of rare earths most relevant to Hastings Rare Metals. The Company will release the results of its Scoping Study on the Hastings Project shortly.

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**About Hastings Rare Metals**

- Hastings Rare Metals is a leading Australian rare earths company, with two rare earths projects in Western Australia.
- Rare earths are critical to a wide variety of current and new technologies, from smart phones to hybrid cars and from wind turbines to energy efficient light bulbs.
- The Hastings deposit contains predominantly heavy rare earths (85%), such as Dysprosium and Yttrium, which are substantially more valuable than the more common 'light' rare earths.
- The company aims to capitalise on the strong demand for heavy rare earths created by expanding new technologies. It is currently validating the extensive historical work and undertaking further scoping studies to confirm economics.
- More Information is available at [www.hastingsraremetals.com](http://www.hastingsraremetals.com)

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