

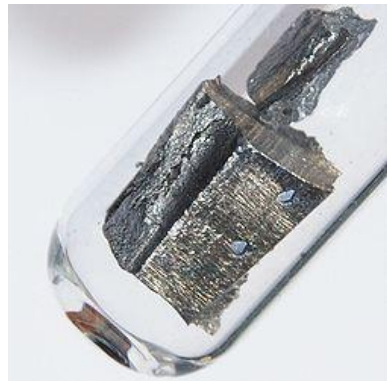
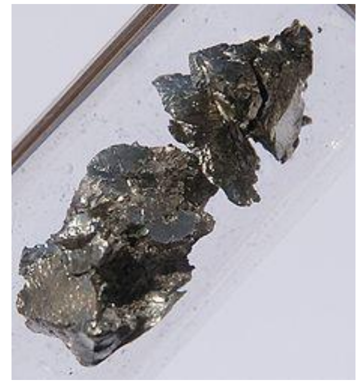

RARE EARTH ELEMENTS 101

February 2012




IAMGOLD®
CORPORATION

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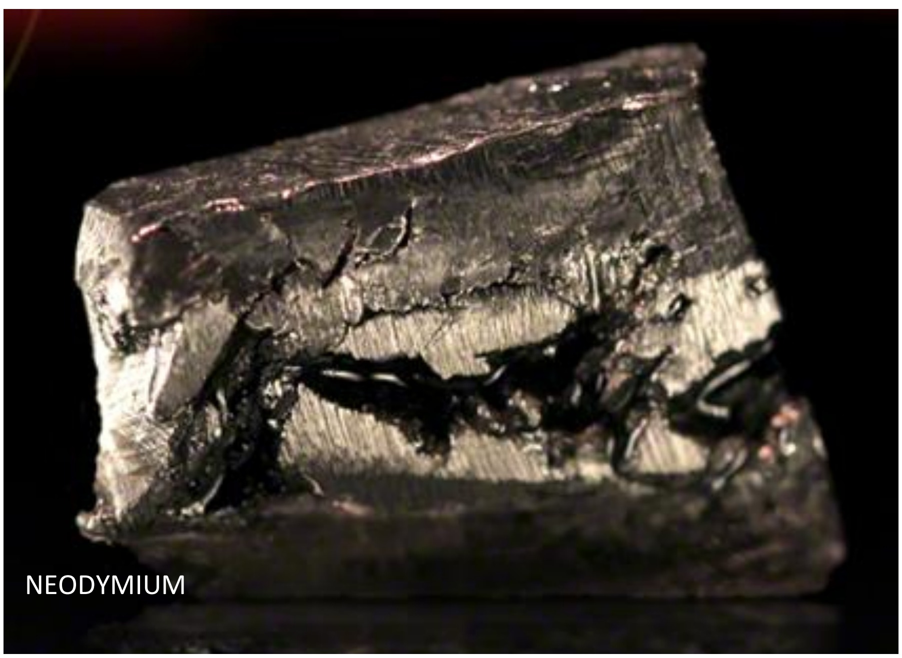
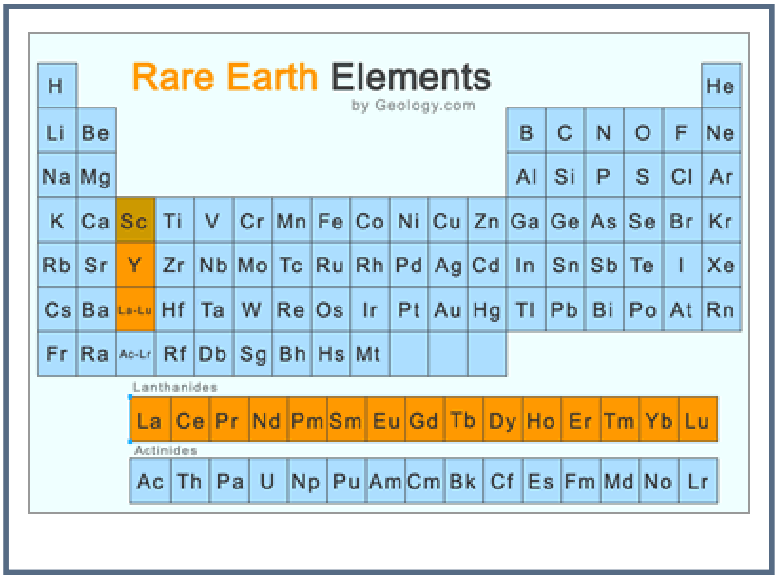


Rare Earth Elements (REE) Explained

The rare earth elements (REE) are a group of 17 chemical (metallic) elements which appear in the periodic table. The group consists of the 15 lanthanide elements along with Yttrium and Scandium. They share many similar properties, which is why they occur together in geological deposits. The 17 REEs are found in all REE deposits but their distribution and concentrations vary. They are referred to as 'rare' because it is not common to find them in commercially viable concentrations. REEs generally fall into one of two categories – light rare earths (LREE) and heavy rare earths (HREE), with varying levels of uses and demand. REE mineral deposits are usually rich in either LREE or HREE, but rarely contain both in significant quantities. In general, they are vital to some of the world's fastest growing markets: clean energy and high technology.



Rare Earths Expected to be in Short Supply in the next 15 years *

Neodymium, Europium, Terbium, Dysprosium, Yttrium

Light Rare Earths

- Lanthanum (La)
- Cerium (Ce)
- Praseodymium (Pr)
- Neodymium (Nd)
- Samarium (Sm)

Accounted for 66.8% of global demand in 2010 (Lanthanum and Cerium)

Heavy Rare Earths

(Less common and more valuable)

- Europium (Eu)
- Gadolinium (Gd)
- Terbium (Tb)
- Dysprosium (Dy)
- Holmium (Ho)
- Erbium (Er)
- Thulium (Tm)
- Ytterbium (Yb)
- Lutetium (Lu)
- Yttrium (Y)

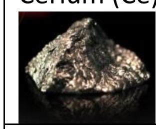
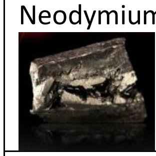
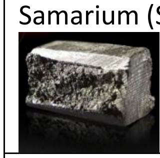
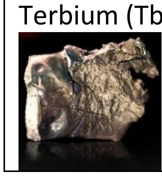
Notes:

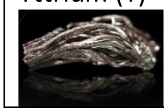
- Yttrium is lighter than the light rare earths, but included in the heavy rare earth group because of its chemical and physical associations with heavy rare earths in natural deposits.

**Ernst & Young - Technology Minerals – The rare earths race is on! - April 2011*

Unique Properties

Silvery-white or gray in colour, these metals have a high lustre and tarnish readily when exposed to air. REEs are found in most everyday applications because of their unique chemical and physical properties. New applications have arisen consistently over the past 50 years CIBC, including important environmental innovations such as catalytic converters and the development of permanent magnets which have enabled greater efficiency, miniaturization, durability and speed in electric and electronic components. Substitutes exist, but rarely work as effectively. The properties of each REE along with the percentage share of estimated global production in 2015 are summarized in the following table.

REE	Catalytic	Magnetic	Electrical	Chemical	Optical	% Share of Estimated World Supply in 2015*
Lanthanum (La) 	X		X	X	X	27%
Cerium (Ce) 	X		X	X	X	40%
Praseodymium (Pr) 		X	X	X	X	5%
Neodymium (Nd) 	X	X	X		X	16%
Samarium (Sm) 		X				2%
Europium (Eu) 					X	.4%
Gadolinium (Gd) 		X			X	2%
Terbium (Tb) 		X			X	.2%

REE	Catalytic	Magnetic	Electrical	Chemical	Optical	% Share of Estimated World Supply in 2015*
Dysprosium (Dy) 		X			X	.9%
Erbium (Er) 					X	.4%
Yttrium (Y) 					X	5%

This list excludes Holmium, Thulium, Ytterbium, Lutetium and Scandium as they represent a very small portion of total supply
**Source: IMCOA - Based on Estimated Supply in 2015 of ~225,000 tons.*

Rare Earth Applications

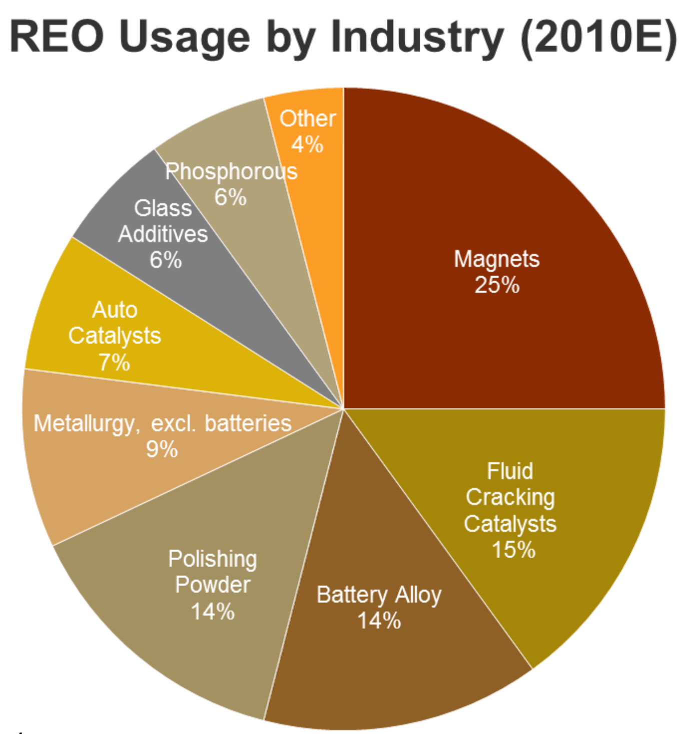
Often referred to as the `seeds of technology` by the Japanese, REEs are a major constituent of many advanced materials, especially in the high tech and green energy sectors where robust performance, durability and low carbon emissions are so important.

Application by Individual REE

Lanthanum	Used to make rechargeable lanthanum nickel metal hydride batteries – the type used in electric and hybrid vehicles, laptop computers, cameras; fibre optics to increase transmission rates, high-end camera lenses, telescopes, binoculars – as lanthanum improves visual clarity; infrared absorbing glass for night vision goggles, used to reduce the level of phosphates in patients with kidney disease.
Cerium	Used to polish glass, metal and gemstones, computer chips, transistors and other electronic components; automotive catalytic converters to reduce pollution, added in glass making process to decolourize it, gives compact fluorescent bulbs the green part of the light spectrum.
Praseodymium	Used in combination with neodymium, its primary use is to make high power magnets. Used to make welder and glass blower goggles as praseodymium oxide protects against yellow flare and UV light; plastic, vibrant yellow ceramics.
Neodymium	An elemental twin of praseodymium, the principal use of Neodymium is in the manufacture of the strongest magnets in the world. These magnets are so strong that one the size of a coin cannot be removed from a refrigerator by hand. Other important applications include laser range finders and guidance systems.
Samarium	Primary use is in the production of permanent magnets but also in X-ray lasers, precision guided weapons and white-noise production in stealth technology.
Europium	Primarily used in phosphors used in pilot display screens, televisions (reddish-orange), and energy efficient fluorescent lights (reddish-orange and blue).

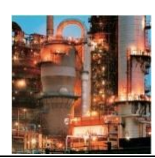
Gadolinium	Used to enhance the clarity of MRI scans by injecting Gadolinium contrast agents into the patient. Used in nuclear reactor control rods to control the fission process.
Terbium	Primarily used in phosphors, particularly in fluorescent bulbs and tubes (yellow-green), high intensity green emitter used in projection televisions and X-ray intensifying screens (yellow-green, violet, and blue).
Dysprosium	Most commonly used in the manufacture of neodymium-iron-boron high strength permanent magnets. Dysprosium-165 is injected into joints to treat rheumatoid arthritis. Dysprosium is used in radiation badges to detect and monitor radiation exposure.
Erbium	Used in glass coloring, as an amplifier in fiber optics, and in lasers for medical and dental use.
Yttrium	Yttrium phosphors are used in energy efficient fluorescent lamps and bulbs. Yttria stabilized zirconium oxide is used in high temperature applications, such as thermal barrier coating to protect aerospace high temperature surfaces. Can increase the strength of metallic alloys.

Applications in High Growth Markets



Source: CIBC World Markets

The fastest growing markets for REEs are permanent magnets, rechargeable batteries, phosphors and polishing agents, with neodymium, praseodymium, dysprosium, yttrium, and terbium having the greatest exposure to these segments.

Application	Estimated Compound Annual Growth Rate 2010-2015*
Permanent Magnets The largest end user of REEs is the permanent magnet industry. This segment represents about 25% of total demand and is expected to grow to 30% by 2015. They are in high demand due to their strength, heat resistance and ability to maintain their magnetism over very long periods of time. Magnets made from rare earth elements, such as neodymium, praseodymium, and dysprosium are the strongest known permanent magnets. Their higher performance and smaller size enables many miniature applications, such as personal electronic devices (smart phones, ear buds, iPod music players). A miniature magnet made with neodymium causes the cell phone to vibrate when a call is received. Capacity utilization is one of the biggest challenges in the wind energy sector. Replacing gear driven turbines with powerful direct-drive permanent magnet generators can increase efficiency by 25%. Some of the largest turbines require two tons of rare earth magnets, which contain about 30% REE.	**16%** 
Rechargeable Batteries Rechargeable batteries (NiMH) made from lanthanum, cerium, neodymium and praseodymium (combined with nickel, cobalt, manganese and/or aluminum) are used in car batteries in hybrid electric vehicles, electronic devices and power tools.	**18%** 
Auto Catalysts Lanthanum and Cerium are used in the manufacture of catalytic converters which convert the pollutants in engine exhaust to non-toxic compounds.	**8%** 
Fluid Cracking Catalysts Fluid cracking catalysts, which contain lanthanum and cerium, are used in the refining of crude oil. They are essential to the process of transforming heavy molecules into more useful forms such as gasoline, jet fuel and diesel.	**6%** 

Polishing Powders Cerium Oxide polishing powder is one of the best polishing materials. It is used for polishing glass, lenses, CRTs, jewels, silicon chips, TV screens and monitors.	**15%** 
Glass Additives Cerium reduces transmission of UV light and Lanthanum increases the glass reflective index for digital camera lenses.	**4%** 
Phosphors Europium, terbium and yttrium are REEs used extensively in the electronics industry to manufacture LCDs and colour TVs. Used as phosphors they enable colour changes as electrical currents are transmitted through them. Terbium and Europium are used in energy efficient lighting applications. Light emitting diodes (LEDs) are 80% more efficient than incandescent lighting and 40% more efficient than compact fluorescent bulbs.	**30%** 

** CIBC World Markets*

REEs Play a Key Role in the Green Energy Sector

Electric and hybrid cars can contain 20-25 pounds of rare earths, which is double that found in a standard gasoline vehicle. The battery itself is made from several pounds of rare earth compounds. REEs are also used in regenerative braking systems and electric traction motors. The motors consist of powerful magnets made from neodymium and dysprosium.

REEs on the Critical List

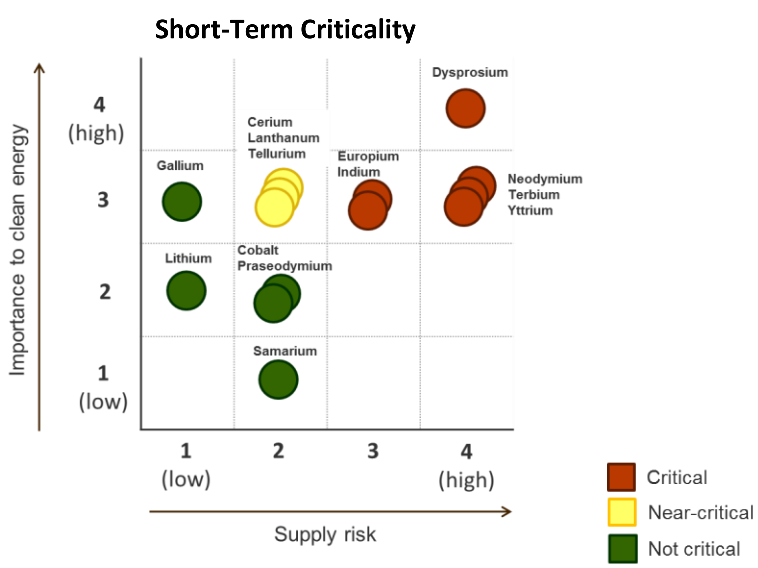
Demand is driven in large part by two of the fastest growing sectors: energy and high-tech. The criticality of each element depends on the end application demand pattern.

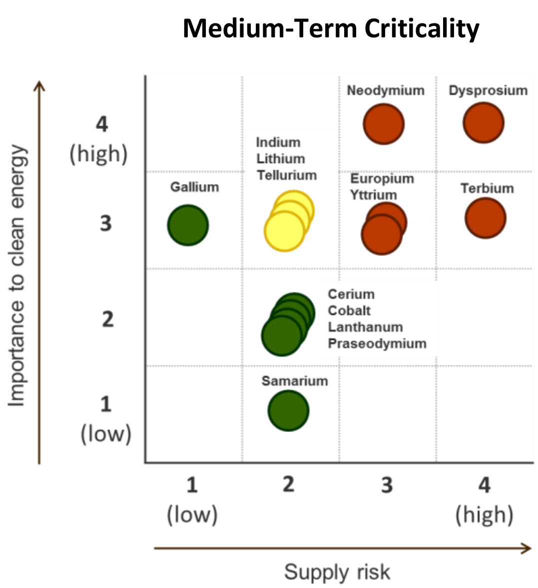
Supply and demand calculations are complicated because each REE has different applications and is produced in varying quantities. This means that certain rare earths will be in short supply and others will be in surplus, depending on the supply and demand fundamentals of the end markets. The fastest growing market segments are permanent magnets, rechargeable batteries, and phosphors, particularly given their application in the fast growing green energy and high tech segments. In 2010, The U.S. Department of Energy classified the five REEs critical to these markets to be in short supply. Four of these are the HREEs. China's Ministry of Commerce has indicated that China's HREEs could be depleted in the next 15-20 years.

REE on the Critical List		Applications	Estimated Compound Annual Growth Rate 2010-2015
Light	Neodymium	Permanent magnets, auto catalysts, petroleum refining, lasers	16%
Heavy	Dysprosium	Permanent magnets, hybrid engines	16%
	Europium	Phosphors, fuel cells, neutron absorbers	20%
	Terbium	Phosphors, permanent magnets	30%
	Yttrium	Red phosphor, fluorescent lamps, ceramics, metal alloys	30%

Source: IMCOA and CIBC World Markets

These minerals, with the exception of Yttrium are expected to be in short supply over the next 10 years. The magnitude and duration of these shortages will mainly depend on the success of REE exploration projects. Various governments and industrial users worldwide have begun to develop strategies to safeguard their REE supplies in order to overcome future supply problems. Some industrial users have established joint ventures with mining companies. Market mechanisms should ensure serious shortages are averted in the long term. This supply gap has led to increasing attention from governments, exploration companies and end users.





Source: U.S. Department of Energy, Critical Materials strategy, Dec. 2010

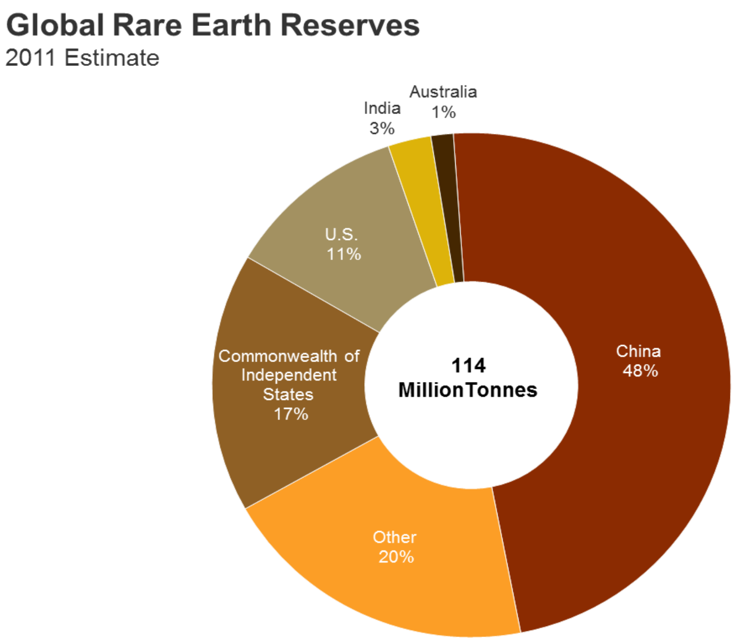
Supply and Demand Fundamentals

Large and Growing Market

Demand for rare earth elements is growing at 9-15% a year *(CIBC World Markets)*, and according to a report by *Ernst & Young - Technology Minerals – The Race is On – April 2011,* the market for REEs is currently valued at *$2-3 billion* and is expected to double to $4-6 billion by 2015.

China Accounts for 48% of the World's Reserves

Global rare earth reserves were estimated at 114 million metric tons in 2011, with China accounting for 48%. Only a small proportion of REE deposits are of sufficient size, type and concentration to be exploited economically using existing technology.



Note: IMCOA – "Reserve figures encompass a wide range of mineral qualities and do not necessarily comply with the internationally recognized codes for the definition of reserves."

China Accounts for 94% of Global Production

In 2010, global REE production was about 125,000 metric tonnes; up 54% from 80,000 tonnes in 2000. China is by far the dominant producer of rare earth elements, accounting for 94% of global production. Significant amounts of REE are produced in only a few other countries, such as Brazil, India and Malaysia.

More than 70% of light rare earth elements are supplied from one mine in China: the 56 million tonne Bayan Obo deposit in Inner Mongolia, which commenced production in 1957 and is the largest deposit in the world. In 2010, it produced 55,000 tons of REOs, representing 46% of Chinese production and 42% globally. Before the Bayan Obo deposit came on stream, the largest producer was Molycorp's Mountain Pass deposit in California. However, China started selling rare earths at such low prices in the early 1990's that the Mountain Pass mines and others in the world were unable to compete. Mining at Mountain Pass ceased in 2002 but was recently re-commissioned and is expected to return to full production in 2012.

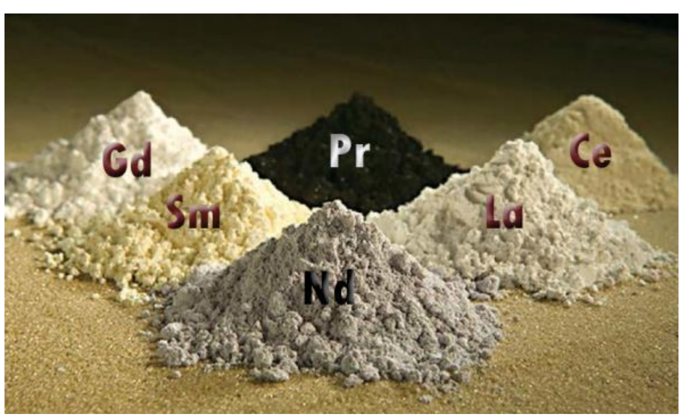
China is the World's Largest Consumer
China is also the world's leading consumer of rare earth elements, accounting for about 60% of global consumption.

China Takes Measures to Protect its Supply
It is believed that the resource grade of China's Bayan Obo deposit may be dwindling – resulting in a reduced forecast over next five years. Therefore, China has taken multiple measures to protect its supply, and some feel that China could go from being a net exporter to a net importer. In 2010, China began to restrict exports so as to ensure an abundant supply for its downstream technology sector. Export quotas in 2010 were down 40% from 2009. When a single country controls almost all of the production and then reduces exports, the entire supply is threatened and prices quickly rise. The panic buying that was triggered by the reduction in export quotas resulted in rare earth prices surging to record high levels in early 2010. The significant price increases in 2010 led to a drop in demand, which in turn restored pricing stability. At the end of December 2011, the Chinese Ministry of Commerce announced that "in order to protect international demand and maintain the basic stability of rare-earth supplies, the total export quotas for 2012 will be basically the same." China also took steps to nationalize the industry, bringing 11 REE mines under State control, and to crack down on illegal and environmentally questionable mining practices.

China's Actions Prompt a Rare Earth Race
The steps taken by China have raised concerns that the world is reliant on a single source for rare earths. Currently, the world is nearly 100% dependant on Chinese exports of a commodity that is essential to certain high-tech, renewable-energy, and defense-related technologies. Thus the race is on for the rest of the world to develop rare earth deposits.

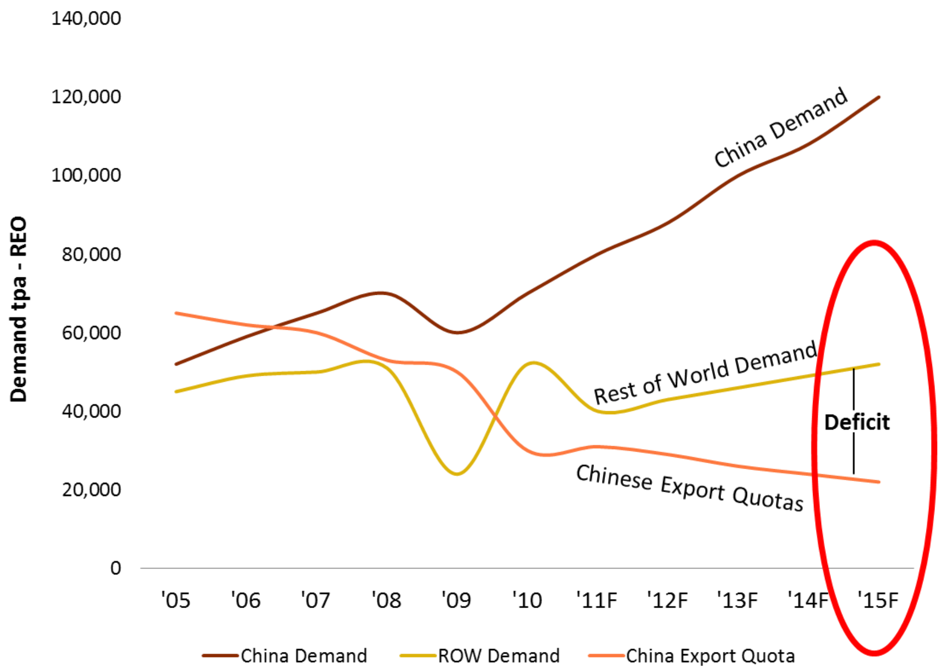
The U.S. considers REEs as a strategic material and in April 2011 legislation known as Rare Earths Supply Chain Technology and Resources Transformation Act HR 1388 (RESTART) was introduced to avert a rare earth crisis by re-establishing a domestic rare earth industry. Subsequently, California based Molycorp signed a Joint Venture with Daido Steel and Mitsubishi to manufacture high power magnets. It is expected that this first non-Chinese Joint Venture should pave the way for other western producers to establish rare earth joint ventures outside of China – leading to a tripling in demand for neodymium over the next three years. (*Source: Rare Earth Market - December 2011)*.

As a result of China's actions, two separate markets have been created – the China market and the rest of the world market (ROW).



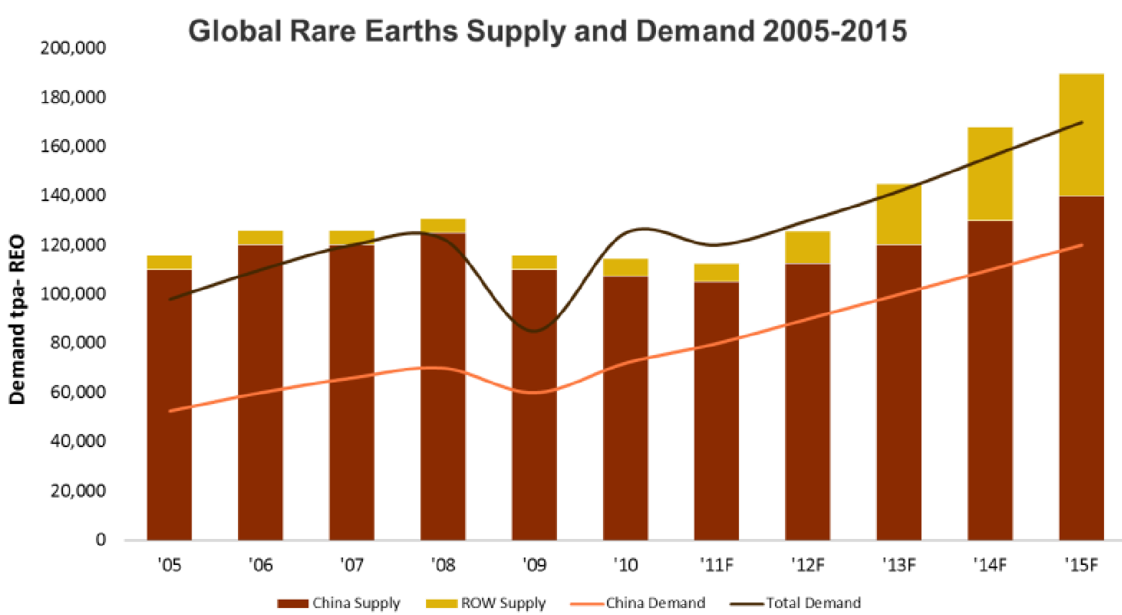
Gap between Supply from China and Rest of World Demand is Growing

The following chart illustrates the widening gap between the supply from China and the demand from the rest of the world:



Rest of World Production Expected to Fill the Growing Gap

While China accounted for 94% of production in 2011, this is expected to fall to 70% by 2015 as new projects in the rest of the world come on stream.



Source: D. Kingsworth IMCOA 2011

Speed to Market Critical

It is expected that the supply shortfall will continue for the next few years. There are insufficient REEs available to meet growing demand. Given the very attractive supply/demand fundamentals, bringing deposits into production as fast as possible is critical.

While there are known deposits in countries outside of China that are potentially economic to mine, it can take 10 years to bring a deposit into production. High grade deposits close to infrastructure and in mining friendly jurisdictions are hard to come by. According to *Technology Metals Research*, it's estimated that there are 165 companies with 251 projects in 24 countries. Most of these companies are small.

Major REE production projects expected to come on stream in the near future are listed below:

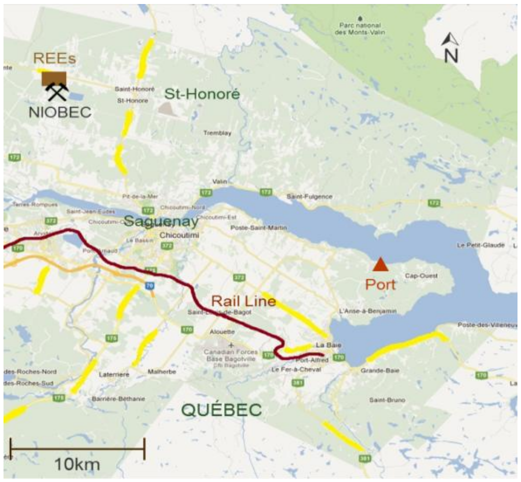
Company	Project	Expected Production(mt)	Targeting Production in:
Lynas (Australia)	Mount Weld	22,000	2011*
Molycorp (California)	Mountain Pass	40,000	2011*
Arafura (Australia)	Nolans Bore	20,000	2013
Greenland Minerals	Kvanefjeld	44,000	2015
Avalon (Canada)	Thor Lake	10,000	2015
Quest Rare Minerals	Strange Lake	12,000	2015

*Molycorp's Mountain Pass and Lynas' Mount Weld mines are expected to reach full production in 2012.

Source: IMCOA

IAMGOLD Advantage

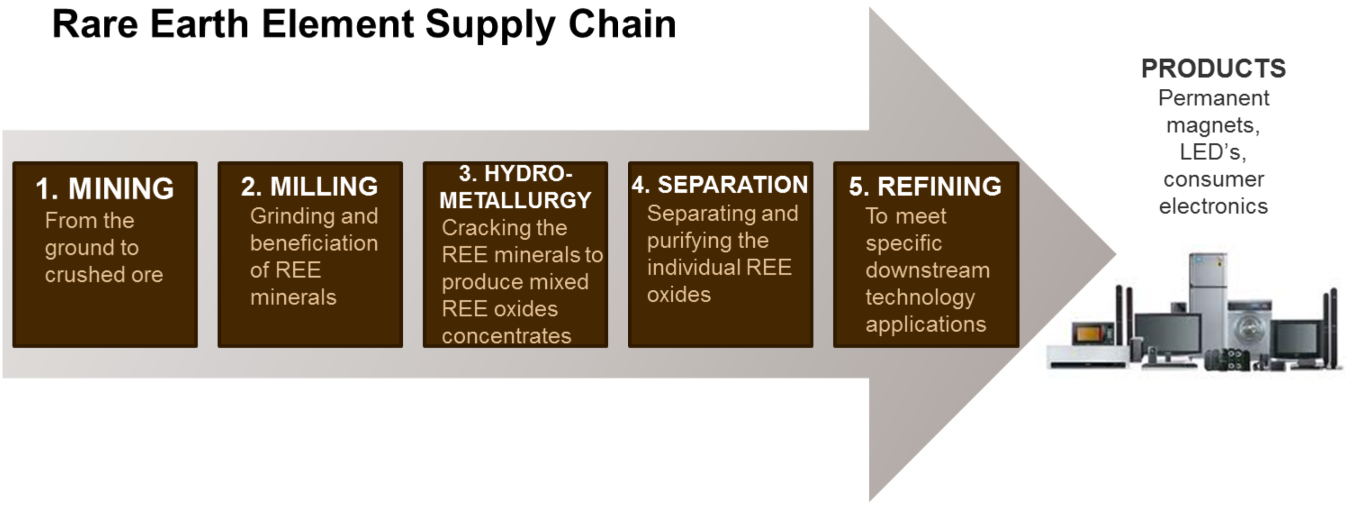
IAMGOLD's rare earth resource is located one kilometre north of its Niobec niobium mine in the mining friendly jurisdiction of Quebec, Canada. The Niobec mine has been operating for more than 35 years and IAMGOLD has established excellent relations with the local community and all levels of government. The region has a long mining history and draws on an experienced and well educated pool of labour in the area. In addition to its close proximity to an existing mine infrastructure and the Saguenay River which, within a short distance of the deposit widens and deepens enough for a deep water ocean port, the Company has access to very competitive power rates of 4.5 cents per kWh. These factors, together with access to funding and development expertise provide a "speed to market" advantage.



The Rare Earths Value Chain – Ground to Market

REEs are principally found in carbonatites, which are igneous rocks comprising more than 50% carbonate minerals. Less important sources are secondary deposits which form when rare earth and heavy minerals are concentrated by the physical weathering of primary mineralization.

Most REE mines produce only REEs although there are a few where REEs are produced as a by-product. Most use large-scale techniques, involving drilling, blasting and hauling. Separation of the ore from the waste is carried out in a variety of ways. The production process is quite involved as one rare earth mineral may contain up to 17 different elements which must be separated from one another. The following diagram summarizes the basic steps of mining and processing REE.



REE Pricing

Prices increased dramatically in 2010 following China's decision to reduce exports. This led to reduced demand which in turn restored pricing stability. As the world races to secure REE supply outside of China, future pricing projections indicate a strong market sustained by growing demand.

($/kg)

REE	2009	Nov. 2011	Jan 25, 2012	2012(E)*
Lanthanum	6	60	62	17
Cerium	4	55	100	29
Praseodymium	16	60	250	150
Neodymium	16	235	295	154
Samarium	5	87	150	32
Dysprosium	107	2,000	2,600	688
Europium	473	4,000	3,850	1,393

**CIBC World Markets*

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