

Why China rules the rare metal roost

27 April 2010 | 19:11

A group of seventeen little-known metals are vital in a range of hi-tech applications. But China produces up to 97 per cent of them - and is slowly turning off supply to the rest of the world.

'The Middle East has its oil, China has rare earth'
Deng Xiaoping, 1992

We don't often think about it, but metals are a crucial aspect of our modern lives.

Our bridges and aeroplanes, our cars and our ships, our railway tracks and machinery all rely on them, but so do the millions of ever-smaller high-tech consumer goods we can't seem to live without.



Gadgets - Many of the group of seventeen rare earth metals are used in phones, cameras, hard drives, and the spoils of our digital age. (Reuters)

Many of the devices we take for granted on a day to day basis, such as mobile phones, cameras, or computer hard drives, are composed of what geologists call 'rare earth metals'.

Production of these vital metals, which are also crucial in other applications, from fibre optic cables to x-ray units, to hybrid electric motors and batteries, is dominated by China, which churns out 97 per cent of supply - much of it from the one mine.

Australia is thought to have significant reserves, but currently, exploitation of these riches is at the infant stage.

What are rare earth metals?

Rare earth metals are a group of 17 chemically similar metallic elements. While the metals themselves may be far from familiar, their uses won't be.

Lanthanum, cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, scandium, and yttrium make up the group of 17.

What are rare earth metals used in?

Lanthanum, cerium;

Commercial Product: Hybrid electric motors and hybrid batteries.

Neodymium, praseodymium, terbium, dysprosium;

Commercial Product: Computer hard drives, mobile phones, and cameras.

Promethium;

Commercial Product: Portable x-ray units.

Scandium;

Commercial Product: Stadium lights.

Europium, yttrium, terbium, lanthanum;

Commercial Product: Energy-efficient light bulbs.

Europium, yttrium;

Commercial Product: Fibre optics.

Cerium, lanthanum, neodymium, europium;

Commercial Product: Glass additives.

(Source: US Government Audit Office.)

So what's the problem with China running the show?

Only Chinese companies are producing and selling commercial quantities of rare earth metals on any scale, with up to 97 per cent of all rare earth metals come from China, much of it from the one mine.

This situation could lead to supplies being affected, and is already causing widespread concern outside of the People's Republic.

As well as decreasing its export quotas, China has also increased export taxes on its rare earth metals. It's not a matter of declaring economic war - put simply, its manufacturing industry needs them. Yet what Beijing is saying, is that Chinese companies are going to come first.

They had the foresight to pursue an industry, the logic goes, and they will reap the rewards.

Several years in a row, China has reduced the amount of rare earth - and the rare earth metals in it - that can be exported. It was even last year proposed that five of the rare earth metals were banned from export altogether, but none was eventually imposed, according to [the New York Times](#).

When a Chinese firm attempted to get in on Australian rare earth supplies held by Lynas (see below), it was blocked by Australian authorities.

Strategic concerns from Washington

The US, in particular the military, has started to take note. An April 2010 report from the US's Government Accountability Office was [stark in its warnings of Chinese dominance of the sector](#).

It's not just worried about consumer goods - the fact that the report was commissioned by the National Defense Authorization Act shows the real concern in the US that Chinese dominance of the sector will be a strategic problem in the near future.

"Government and industry officials have identified a wide variety of defense systems and components that are dependent on rare earth materials for functionality and are provided by lower-tier subcontractors in the supply chain", the report states, listing precision-guided munitions, lasers, communication systems, radar systems, avionics, night vision equipment, and satellites.

The US has gone from being the primary producer to seeing its rare earth industry disappear - and now it

finds itself almost wholly reliant on its emerging geopolitical rival for the production of what it sees as far too much of its military hardware.

Japan's hybrid car fears

Where do hybrid cars come in?

Japan is also concerned. "China's got Japan's manufacturers by the throat," one Japanese energy official reportedly commented back in 2007, in concern at Chinese attempts to keep hold of its rare metals, crucial to Japanese industry, particularly hybrid cars.

And demand is surging, driven by consumer technologies, but also partly due to the 'green' consumerism powering demand for hybrid cars.

Despite their sustainable credentials, many hybrid cars are reliant on a range of rare metals - from rechargeable batteries with lanthanum requirements to neodymium magnets found in the motors. And while lithium - which has its own limitations - is used in the batteries of the Toyota Prius, it still requires rare earth metals for the motor's magnets.

And so companies are getting worried - Toshiba recently signed deals with Kazakhstan to **start a joint venture aimed at exploiting rare earth potential in Central Asia.**

In the next few decades, these crucial metals will grow in importance. They may not be as 'rare' as the title initially suggests - but they're very rare for the purpose of manufacturing if manufacturers cannot get their hands on them.

Where does Australia come in?

The GAO report lists Australia as having the fifth highest known mineable reserves of rare earth oxide - 5,400,000 metric tons of a global 99,000,000. But like the US, and unlike China, Brazil, India, Malaysia, Russia, or other countries with significant reserves - rare earth metals are not being mined on any real scale in Australia.

Lynas's Mt Weld project in Western Australia has **significant rare earth potential**, and is currently in the early stages of development.

Other small companies such as Alkane Resources are looking into rare earth as a side product of producing other metals, **such as the zirconium and niobium being tested at Alkane's mine in Dubbo.**

But despite a widespread belief that Australia is a world leader in mining - a belief based on fact, where coal, iron ore, plutonium or a host of other important resources are concerned - these elements, vital to sustaining our consumer lifestyles, are not yet being seized upon en masse.

Supply of rare earth metals - and rare metals in general - could soon face problems, leading to issues for high-tech industries. And if these problems are to be avoided, a range of solutions need to be looked at.

From finding new virgin resources - not least outside of China - to recycling, looking at the designs of products, and essentially changing consumer behaviour, the challenges are clear.