

China's green advantage

From electric cars to wind turbines, environmentally-friendly technology around the world needs rare earth metals. But China - where over 90% of these minerals are mined - is saying it now wants to keep more for its own industry.

Tom Heap, BBC News, 5-20-10

The leafy banks of the Birmingham and Worcester canal may be an unlikely place to discuss a looming industrial crisis but it was here that Professor Rex Harris of Birmingham University took me on his hydrogen-powered electric barge.

The super efficient motor, like most electric vehicle motors, uses rare earth magnets.

Rex gave me two matchbox sized neodymium-boron magnets, offering me £50 to push them together.

His money was safe, the magnetic field was too strong. Such power is vital to green technology, so much of which is based on the efficient generation, use and storage of electricity.

So we need to be sure of good supply of rare earth magnets.

"We worry about peak oil," he says, "we should worry about peak magnets as well."

Dangers of dependence

Rare earth metals are relatively abundant in the Earth's crust, but they are difficult to extract.

Most came from the United States in the 1960s but tightening environmental regulations and a price war closed the last Californian mine, handing China a virtual monopoly.

American strategic metal consultant, Jack Lifton has been warning the US government of the dangers of dependence.

"Last year the Chinese announced their regular five year plan, looking ahead to 2010 to 2015.

"They said they would continue to reduce the export of these materials to the West and that they were considering stopping the export of certain of them."

The Chinese motives are pretty clear. They want Western users to do their manufacturing in China and they need supplies for their own ambitious wind energy program.

They plan to build 120 GW of wind generated electricity by 2020, more than Britain's entire electricity production.

That alone demands a full year's supply of rare earth metals.

The former Chinese leader Deng Xiaoping once remarked "There is oil in the Middle East, there is rare earth in China."

Environmental concerns

Japan has already woken up to the implications of this by building up stockpiles.

Toyota, who make the rare earth guzzling Prius hybrid car, is considering opening its own mine in Vietnam.

The United States is worried about supplies for the military while the UK government has examined the risks for our own plans for more electric cars.

The search is now on for alternative sources of rare earths, with mines planned for California, Australia, Arctic Canada and even Greenland.

But they are delayed by environmental concerns stoked by the Chinese experience.

Their principal source is Baotou in Chinese Inner Mongolia where enormous open-cast mines scar the landscape whilst refineries leak vast quantities of polluted water into the landscape.

Independent expert, Jack Lifton says we can't demand zero impact. If we want green technology then we need to mine, he says. "The green road always starts with black earth."

Cleaner alternative

However, Professor Animesh Jha at Leeds University thinks he may have a cleaner alternative.

He has discovered that titanium dioxide ore could be an important source.

The purification of this chemical, commonly used in paints, leaves a residue of rare earths. He believes this could by-pass the Chinese and the environmental problems of mining.

"There are very nice deposits of titanium oxide all over the world... Norway, India, Brazil, US. They all have rare earths in them."

Combine Professor Jha's technique with the fruits of new mines and the careful recycling of rare earth metals currently in use in our laptops and mobile phones and we may be able to provide sufficient supplies in the future.

But new processes take time to perfect and new mines take years to come on-stream.

That still leaves a long gap when the green revolution will rely on the economic and political judgment of China's exporters.