FASTCOMPANY.COM
Where ideas and people meet
Article location:http://www.fastcompany.com/1773009/how-the-us-could-end-up-with-a-plentiful-cheap-supply-of-rare-earth-metals
August 15, 2011
Tags: Innovation, Technology, Ethonomics, Social Responsibility

Can The U.S. Break China's Stranglehold On Rare Earth Metals?

By Ariel Schwartz

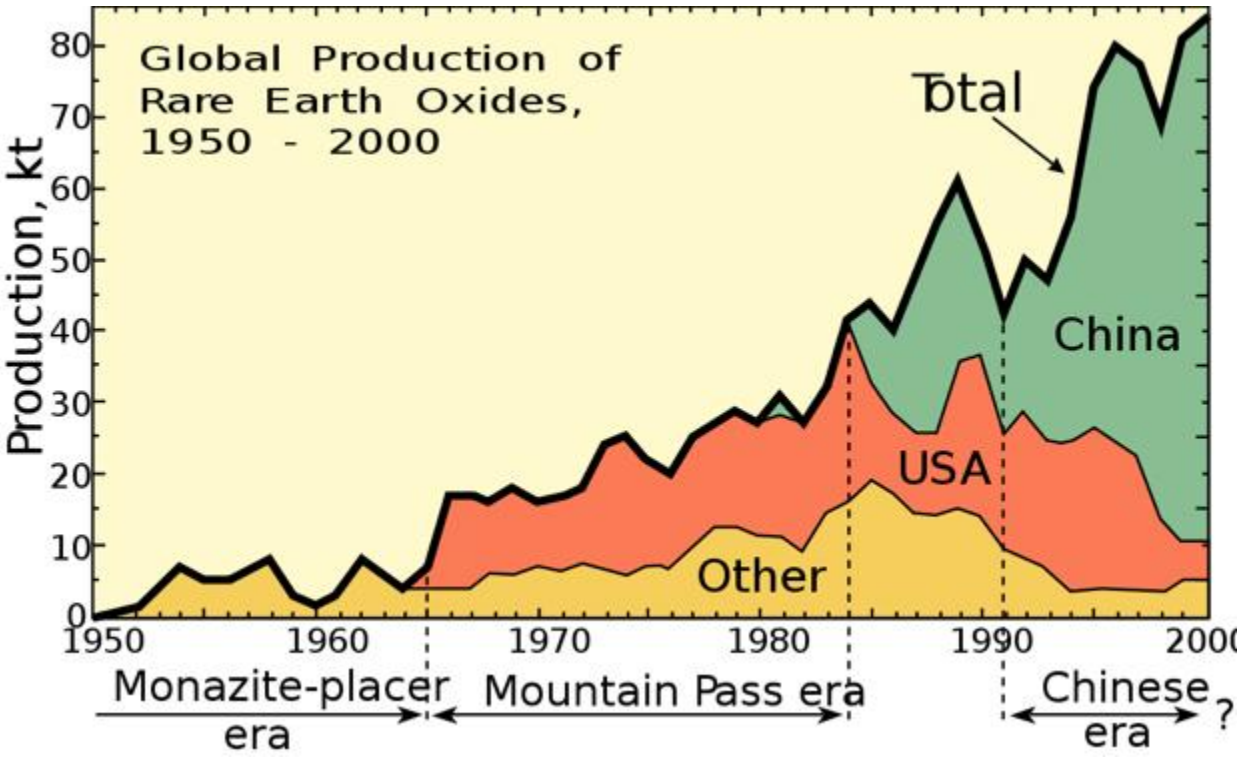
You may not know what rare earth metals are, but they probably feature prominently in your life: These 17 chemical elements, which are buried in the Earth's crust, are found in common electronics (lithium-ion batteries, laser pointers), and many clean technologies (electric car motors, solar panels, wind turbines). It's not surprising, then, to learn that our demand for dysprosium, neodymium, terbium, and the like have increased in recent years. As it stands, the Western hemisphere is almost entirely beholden to China for its supply of rare earths. And China is willing to play hardball with its mineral deposits, putting the U.S. in a dangerous position [1] where a key part of our economy and society is controlled by a not altogether friendly country. But that may be about to change.

Rare earth metals, paradoxically, are actually not that rare at all--in fact, many rare earths are more common than gold. But up until now, the economic incentives to mine them just haven't been there. Recently, however, China started to curb [2] exports and raise prices of these previously cheap metals, realizing both that they need a large domestic supply and that much of the world is dependent on them. Outside of China, rare earth metals are seen in high concentrations in select sites in the U.S., Canada, Australia, and elsewhere. And that's creating a burgeoning rare earth industry in the U.S.

In the 1960s and 1970s, the USGS flew over the U.S., using airborne magnetometers to find anomalies in the Earth's magnetic field that could signify big rare earth deposits. In recent years, mining companies have taken it upon themselves to confirm the presence of these deposits. They use everything from satellite technology to "almost old-fashioned prospecting. They go out in the field looking for interesting rocks and minerals, and indications of spots of interest," says Gareth Hatch, Founding Principal of Technology Metals Research [3].

There are hurdles for ambitious companies to jump through. The U.S. used to produce rare earth metals at the Mountain Pass Mine in California, but it was shut down in 2002 largely because of lack of demand and environmental issues (the mine spilled a large amount of radioactive water into a neighboring lake). In 2008, Chevron sold the site to Molycorp, a company interested in reviving the old mine. Molycorp is currently expanding and modernizing the mine--a process that will yield 40,000 metric tons of rare earths by 2013, or 25% of the world's supply.

The company, which is spending [4] $2.4 million a year on environmental compliance and monitoring, says it plans to keep the process as clean as possible. "If what they say is what they do, you're looking at a much more environmentally friendly process than in China, with the recycling of water and reducing effluent into the environment," says Hatch. "But at the end of the day, you're still messing around with some pretty nasty chemicals, and you still have waste piles of rock and radioactive material." *Fast Company's* calls to Molycorp have not been returned.



In China, rare earth mines are often responsible for egregious environmental violations, including air pollution and the production of wastewater that contains large amounts of radioactive material and acid. The pollution makes people sick, and it destroys local farmland and waterways.

California's Mountain Pass is huge, but it isn't enough to supply all of America's rare earth metals. This is partially because it will produce mainly light rare earths instead of heavy rare earths, a group of chemicals that are often found in smaller concentrations. We need both types to manufacture the electronics and gadgets we enjoy so much.

There is hope for American independence in the heavy rare earth arena, however. The Pea Ridge iron mine in Missouri has a known deposit [5], and Quest Rare Minerals [6] is exploring some major heavy rare earth mines in Quebec, a place that probably isn't as likely as China to cut off the U.S. from imports or jack up prices impossibly high.

And the U.S. may soon have another major rare earth mine to count on in Nebraska, where Quantum Rare Earths is working on [7] what may be the biggest untapped rare earths deposit in the world. But there's a catch: Actually mining this deposit may not happen for a while. "It needs to be further explored and defined," says Scott Wescott, a corporate communications representative for Quantum Rare Earths. That means it will take at least two to three years just to figure out the economics of mining and work on gathering permits for construction.

The permitting process is a major hurdle for U.S. companies. "The time it takes to get through the red tape is mind-boggling," says Hatch. One DOE report [8] claims that it will take 15 years to break dependence on Chinese rare earth metals (Hatch believes it's more like eight to 10 years).

But we don't necessarily have to wait for companies outside of China to get moving on their rare earth projects. In the meantime, it's worth paying attention to companies like Nanosys, which manufactures more sustainable replacements for some of the rare earths found in LED backlighting.

Even with multiple mines and creative companies working on replacements, the U.S. will likely remain at least partially dependent on China for rare earths. It's the classic problem of competing with China: Multiple layers of red tape may do some good in protecting the environment, but they really slow things down.

[*Images: Top, Wikipedia [9]; Bottom, Wikipedia [10]*]

Reach Ariel Schwartz via Twitter [11] or email [12].

Links:
[1] http://www.fastcompany.com/1763984/how-do-you-build-an-energy-independent-electric-car
[2] http://www.fastcompany.com/1690821/the-new-resource-wars-what-happens-if-china-stops-exporting-rare-earth-elements
[3] http://www.techmetalsresearch.com/
[4] http://www.theatlantic.com/magazine/archive/2009/05/clean-energy-apos-s-dirty-little-secret/7377/
[5] http://www.popsci.com/technology/article/2011-03/rare-earth-mine
[6] http://www.questrareminerals.com/strangelakeproject.php
[7] http://www.washingtontimes.com/news/2011/aug/2/rush-for-rare-earth-may-create-nebraska-boomtown/?page=all#pagebreak
[8] http://www.fastcompany.com/1710110/doe-it-will-take-15-years-to-break-american-dependence-on-chinese-rare-earth-materials

[9] http://en.wikipedia.org/wiki/File:Rareearthoxides.jpg
[10] http://en.wikipedia.org/wiki/File:Rareearth_production.svg
[11] http://twitter.com/#!/arielhs
[12] mailto:ariel@fastcompany.com