

Jack Lifton on the real challenge of China Incorporated on the global supply of rare earths

China's recent re-enactment of its export "prohibition" list illustrates the differences between the impact of the West's "financial globalization" and of China's approach to globalization under "Socialism with Chinese Characteristics" on the individual nations' security of supply of critical materials (rare earths) as enabled by what are the two principal competing economic systems in today's world, "free market" capitalism and state-controlled capitalism (also known as Socialism with Chinese characteristics).

It's easy to say that China's recent revisions to and the republication of the law that makes the export of named technologies from China either subject to governmental approval or simply illegal, is retaliation for the American (Trump[?]) (and now also the Japanese and EU) administrations' technology import and use bans applied recently to Chinese cybertechnology, but for the Rare Earths these restrictions have been in place for more than a decade, and their updating and reaffirmation in Chinese law tells a much more nuanced and worrisome story.

Looking carefully at those of China's export restrictions that are focused on rare earth "processing" technology, they show that China does not want any of its companies, state-owned or "private", to give any assistance to foreign entities to develop any aspect, at all, of a total rare earth supply chain.

I have been told that China originally acquired rare earth

separation (by solvent extraction) technology from the first Molycorp in the early 1980s when that company was seeking to lower its costs by exporting the rare earth separation technology it had developed in the 1960s and 70s to China where bastnaesite, the same mineral as was being mined at Mountain Pass by Molycorp, was being recovered in large quantity as a byproduct of iron ore mining in Baotou, Inner Mongolia. I believe that Molycorp also then began sending some ore or ore concentrates from California to China at that time for separation in China. I have been told that the "blueprint" for a rare earth separation plant supplied by Molycorp was stolen and illegally "sold" into alleged operatives from China in the first Chinese "rare earth processing rush" in the 1980s during which dozens of dedicated solvent extraction systems for rare earths were built outside of Molycorp's control.

Deng Xiaoping, the real founder of modern China's economic system famously said during this period of rapid growth for China's rare earth "processing" industry that **rare earths were to China what oil was to the middle east**. Besides encouraging the development of a rare earth industry and to support it, this pronouncement also encouraged the creation in Chinese universities of departments of "separation science" in departments of chemistry and chemical engineering. Today, in 2020, thousands of Chinese chemists and chemical engineers specialize in rare earth "processing." The State Key Laboratory for Separation Science at Peking U., alone, has four locations with more than 400 researchers, more than 150 of whom hold PhDs! It is estimated that several thousand Chinese researchers are dedicated today to the field of rare earth studies in China.

All of the raging commentary about Chinese intellectual property theft from the West, America in particular, has masked the fact that regarding rare earth processing downstream of ore concentration China has an existing and growing advantage technologically over all of the West. While

it is certainly true that we do not know the true costs of mining and refining rare earths in China, because China doesn't seem to capitalize health and safety concerns that are both significant and also highly regulated in the USA and almost all other Western countries, we must also concede the advantage of extensive experience to China in the effective production of rare earth metals, alloys, and magnets. The current method of choice, for example, for the production of rare earth metals, the electrolytic reduction of molten salts, has never even been practiced commercially in the USA.

The unfortunate truth is that the US and the West needs technological help. Particularly in scale-up, from China's large reservoir of downstream (of mining) rare earth processing knowledge and experience if, and only if, the goal is global competition with China for the 150,000 mta rare earth permanent magnet markets. If the goal is regional or national self sufficiency and security of supply then governments will have to either subsidize or get much smarter, with regard to economics and the selection of companies that have the necessary skill sets, about (re) establishing total domestic supply chains for critical materials and, especially, the components manufactured from them.

The American federal bureaucracy is an assembly of the industrially inexperienced but well credentialed (not necessarily well educated!) who first and foremost speak with each other, and, when and if they must reach outside of their group, go only to academics for advice on policy.

Implementation of policy is simply not considered, and the excuse for that is it would look like overstepping their authority, favoritism, or worst of all, a mistake might be made that would reflect badly on the bureaucrat.

China's mandarin bureaucrats are chosen primarily for their experience and skills as well as their education and (Chinese

Communist) Party connections. The China "State Council" sets the nation's industrial policies. The bureaucrats implement those policies. Those bureaucrats, speaking with the authority of the State Council and President, have a great influence on the lending policies of the People's Bank of China.

The current Chinese "President" has decreed (not recommended) that by 2025 China will be independent of the rest of the world in 10 key high technologies. Several of these technologies are critically dependent upon rare earth enabled components, especially rare earth permanent magnets.

China is today cleaning up its rare earths industry to meet global standards of health and safety. This has necessitated a sharp restriction on rare earth mining within China. China is today, in 2020, on a track to import nearly 40% of its needs for rare earth bearing ores for ALL of the rare earths.

In fact, heavy rare earth production from so-called ionic clays has essentially halted within China. Yet, notwithstanding the rare earth mining pollution "problem" the implementation of China 2025 is advancing rapidly.

What does this mean for Western rare earths mining, refining, metal and alloy making, and rare earths enabled products' manufacturing? It means that China, Incorporated, is your competitor at every stage of the total supply chain. It means more importantly that as China's consumer economy grows and as long as China requires outside raw materials the rest of the world will be completely subjugated to Chinese pricing and export policy.

Neither the US (or any other allied) defense establishment can take the risk of having its rare earth permanent magnet and alloy supply cut off or curtailed by the Chinese government. Even more dependent upon China today, in permanent magnet volume alone, are the global OEM automotive and consumer appliance industries.

Investment outside of China in a total rare earths supply chain is a necessity for US defense and the continuation of an independent American manufacturing base for high technology consumer products. It is certainly not wise to put all of your eggs in one basket, but it is also very unwise to plan on just one company or one technology to solve America's (and the West's) dependency on the Chinese rare earth industry. The solution is to choose only those participating companies that understand the need to manage or have a total rare earth supply chain in view. The poor economics of some of the component operations of the total rare earths supply chain can be solved by legislation (e.g., the Cruz rare earth components tax relief bill) or by the distribution of costs among the supply chain components so that the whole is profitable.

It's time for a serious discussion of the rare earths supply problem. China is not planning to assist the development of competitors in this field.