

Week of 3 January 2022

China tightens its grip around rare earths supply

On 23rd December 2021, China Rare-Earths Group was officially established by merging rare earths assets from three state firms, including Aluminium Corporation of China (Chinalco), China Minmetals Corporation and Ganzhou Rare Earth Group. Ganzhou Rare Metal Exchange and Ganzhou Zhonglan Rare Earth New Material Technology will also be folded into the new entity. After the formation, the new company will be one of the 97 central enterprises controlled by the State-owned Assets Supervision and Administration Commission (SASAC) of the State Council, also known as Central SASAC, which will own 31% of the equity.

Central SASAC exerts control over the most strategically important State-Owned Enterprises of China. The newly formed China Rare Earth Group will control 37.6% of China's rare earths mining production, including a close to 70% share of heavy rare earths mining production. This move should be seen as China's government strengthening its grip over the supply chain of rare earth materials.

As background information, in February 2021 President Biden issued an executive order to recommend numerous steps to increase the independence of critical material supply chain. The White House highlighted a US\$30 million investment in Australia's Lynas Rare Earth Ltd — which the Pentagon described at the time as being the "largest rare earth element mining and processing company outside of China" — to establish a light rare earth processing facility in Texas.

In July 2021, the Australian government granted US\$11m to Lynas to commercialise a new mineral refining process. The European Union also funded an initiative aimed at developing a process for recycling permanent magnet waste into new alloys and materials. Japan is reportedly set to increase funding for rare earths exploration. These show that other economies have been seeking to reduce their dependency on rare earth imports from China.

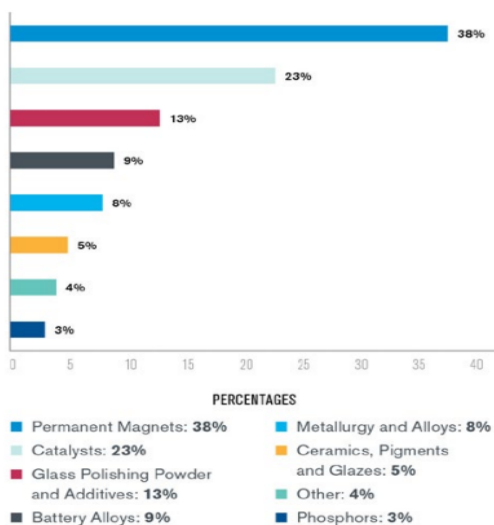
Before going deeper, one needs to understand why rare earths are so critical. The rare earth elements (REE) are a set of 17 nearly indistinguishable lustrous silvery-white soft heavy metals. Despite their name, rare earth elements are relatively plentiful in Earth's crust. But they are typically dispersed and not often found concentrated in rare earth minerals, which makes economically exploitable ore deposits sparse. These 17 elements are subdivided into light rare earths (LREEs) and heavy rare earths (HREEs) subsets based on their atomic weights. LREEs are produced in global abundance and are in surplus supply while HREEs are produced mainly in China and are in limited

supply. According to data from China Northern Rare Earth (CNRE), HREEs accounted for 10% of global demand volume but represented 36% of global value.

Rare earth elements are used in a variety of industrial applications, including electronics, clean energy, aerospace, automotive and defense. Of the light rare earth metals, neodymium is considered one of the most critical. The metal is used in everything from mobile phones and electric cars to medical equipment. Neodymium is also the main light rare earth used in the manufacturing of permanent magnets for electric motors and wind turbines. Dysprosium, yttrium and terbium are considered critical elements in the heavy rare earth metals group. Dysprosium oxide is used in nuclear reactors to help cool fuel rods to keep reactions under control while terbium is used in TV screens and solid-state hard drives for data storage.

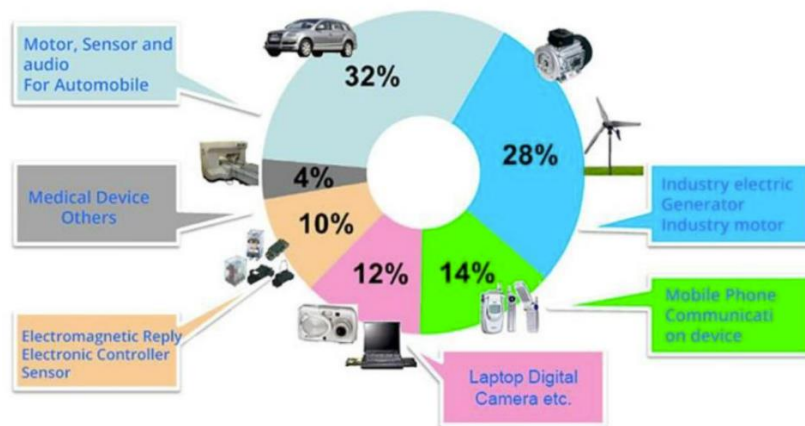
Technologies related to clean energy are expected to increase demand for REEs considerably, because strong magnets are critical in the construction of direct drive wind turbines and permanent magnet motors are critical to electric vehicles.

Breakdown of 2019 Rare earth elements use



Source: Kleinman Center for Energy Policy, University of Pennsylvania

Rare earth permanent magnet applications



Source: Trinity College Berlin

As far back as 1992, Deng Xiaoping stressed that “the Middle East has oil; China has rare earths.” China tops the list for mine production and reserves of rare earth elements, with 44 million tons in reserves and 140,000 tons of annual production. Most rare earth enterprises in China are located in three major bases 1) Northern base dominated by Baotou mixed rare earths; 2) medium and heavy rare earth production base in Jiangxi and other southern provinces; 3) bastnaesite (another type of rare earth) in Sichuan.

China’s market share was even higher around the year 2000, approximately 90%. Since then, China’s market share dropped to 57.5% as a result of China curbing domestic output (China’s output is limited by mining output quotas set every year), tougher regulations and growing ex-China mine production (e.g. the development of Lynas in Australia-Malaysia, and the re-opening of Mountain Pass mine in the US).

China’s equally dominant position in refining and mining in REE makes it both the biggest importer and exporter of rare earths. Lynas is the only sizeable ex-China separator (processor) of rare earths and is limited just to light rare earths (Neodymium and Praesodium).

World's REE production overview (2020)

Country	Mine Production 2020 (ton)	% of Total production 2020	Reserves (ton)	% of Total Reserves
China	140,000	57.5%	44,000,000	38.0%
Vietnam	1,000	0.4%	22,000,000	19.0%
Brazil	1,000	0.4%	21,000,000	18.1%
Russia	2,700	1.1%	12,000,000	10.4%
India	3,000	1.2%	6,900,000	6.0%
Australia	17,000	7.0%	4,100,000	3.5%
United States	38,000	15.6%	1,500,000	1.3%
Greenland			1,500,000	1.3%
Tanzania			890,000	0.8%
Canada			830,000	0.7%
South Africa			790,000	0.7%
Other Countries	100		310,000	0.2%
World Total	243,300		115,820,000	100%

Source: United States Geological Survey

China has low production and labour costs of mining and refining rare earths compared to the US and other developed countries. The considerable profits related to mining and processing at low cost and exporting incentivises massive growth of unregulated smelters. Such rampant capacity expansion resulted in ill-regulated market competition, much cheaper export prices and falling industry profits. It is estimated a third of exports in 2008, or 20,000 tonnes, were illegally exported from China. Irrational exploitation of rare earth resources has caused serious damage to local ecologies.

In Baotou, Inner Mongolia, water pollution due to illegal mining threatened the water quality and the safety of downstream sections of the Yellow River, while in Ganzhou, in Jiangxi province, excessive mining and extraction of rare earths have severely damaged the Dongjiang river.

As some of our readers may remember, back in 2010 China retaliated to a maritime dispute with Japan by blocking rare earth exports to Japan and by cutting export quota by 40%, which led to prices rising 10-fold. Prices returned to normal two years later as unofficial supplies continued to be smuggled out of China and a wave of supply investments was ushered overseas.

Since 2010, China has been continually consolidating and regulating the production of REEs. In 2014, the Ministry of Industry and Information Technology (MIIT) required China's rare earth

industry to integrate and restructure into six large SOE groups (as detailed in the table below). The Chinese government allocates annual rare earth mining output quotas to these six SOEs to limit domestic production.

In 2019, Xi Jinping visited Ganzhou, where he highlighted China's expertise in the rare earth industry. By 2020, all rare earth industry mining, smelting and separation activities have been incorporated into the six groups. In December 2021, the newly established rare earth company involved three out of these six SOEs (including Chinalco, China Minmetals Corporation and Southern Rare Earth Group).

China's six rare earth groups

Six Rare Earth Groups	Listcos involved	Regions involved
Northern Rare Earth Group	China Northern Rare Earth Inner Mongolia BaoTou Steel Union	Inner Mongolia Gansu
China Aluminum Group	China Rare Earth Shenghe Resources	Guangxi, Jiangsu Shandong, Sichuan
Xiamen Tungsten Group	Xiamen Tungsten	Fujian
China Minmetals Group	China Minmetals Rare Earth	Hunan, Guangdong, Fujian, Yunnan
Guangdong Rare Earth Industry Group	Rising Nonferrous Metals China Nonferrous Metal Industry's Foreign Engineering and Construction (NFC)	Guangdong
Southern Rare Earth Group	(Subsidiary of) Jiangxi Copper	Jiangxi, Sichuan

Source: Citi, MIIT

In summary, China's rare earth industry has long been disrupted by illegal mining operations and smuggling despite export quotas. Domestic resources conservation and environmental protection have also become an additional concern that influences today's rare earths industry.

There have already been trade conflicts between China and the rest of the world when China used rare earth as a retaliatory tool against hostile actions taken by foreign countries. More specifically rare earths were used twice in history as a political tool, once in 2010 amid a heated dispute with Japan (as mentioned above) and once in 2019 when Beijing raised export tariffs on rare earths exports to the US from 10% to 25% as a reaction against import tariffs imposed by the United States. In our views, the setting up of large State-Owned rare earths conglomerate that gathers

producers under the same roof is meant to strengthen China's position in case rare earth is to be used once again as a retaliatory tool against actions taken by foreign countries against China.

As rare earth prices are surging and the control of supply gets tighter, rare earth is fast becoming a powerful strategic card in China's hand.

The information contained herein is issued by JK Capital Management Limited. To the best of its knowledge and belief, JK Capital Management Limited considers the information contained herein is accurate as at the date of publication. However, no warranty is given on the accuracy, adequacy or completeness of the information. Neither JK Capital Management Limited, nor its affiliates, directors and employees assumes any liabilities (including any third party liability) in respect of any errors or omissions on this report. Under no circumstances should this information or any part of it be copied, reproduced or redistributed.