

# Taiwan's Role in the US-China Competition For Critical Minerals

By Ling-Tuan Linda Liu

## Summary

Competition between the United States and China to secure critical minerals is intensifying. China dominates in the mining and processing of graphite, cobalt, nickel, and rare earth elements. US efforts to curtail China's dominance are rising, and concerted efforts to push back against China's dominance in rare earth elements (REEs) is especially strong, given their role in energy transition and defense weapon systems.

China has not shied away from stepping up their export bans, including germanium and gallium in August 2023. That was followed several months later by banning the export of certain graphite products as well as rare earth element processing technology. Yet China is aware that efforts to protect its advantages in the rare earth element market may not always achieve the results it wants. Beijing's ultimate goal is to use its resource advantages to retaliate against tech and trade sanctions by the United States and its allies. Chinese response may actually be counter-productive by fast-forwarding the restructuring of US-led supply chains.

Taiwan sits amid this complex and evolving Sino-American competition. Taiwan too cannot thrive without critical minerals for its energy transition and its pledge to achieve net zero carbon emissions by 2050. Close trading ties with China have allowed Taiwan to import raw as well as processed materials and to exchange refining and recycling technology when cross-strait relations are relatively benign. This relationship, however, may be in jeopardy given ever-rising tensions between the United States and China. The biggest issues for Taipei are China's repeated attempts to blockade Taiwan and China's tightening grip on critical minerals trading and technology sharing.

As its critical minerals engagement with China has been reduced, Taiwan must increase cooperation with the United States in the critical minerals supply chain. At the same time, Taiwan needs to make regulatory as well as policy shifts in order to be part of a more resilient global critical minerals supply chain.

### Policy Implications:

- China is expected to continue rolling out more export bans on raw and processed critical materials, and on technology sharing as part of its foreign policy goals. The bans are not expected to be long-lasting, as they will not only affect China's targeted countries. Moreover, it will directly hinder the export outflow of Chinese products, which in turn will exacerbate the existing overcapacity problem in its rare earth elements industry.
- The United States needs to have long-term as well as medium-term policy responses to Chinese dominance in the global rare earth elements industry. In addition to stockpiling to better prepare for potential short-term price hikes or supply shortages of critical minerals import products, the United States needs to keep expanding its cooperation with allies and partners in these areas, particularly working with trusted partners such as Taiwan. It should also draw on technology innovations from the existing bilateral collaborating bonds with countries such as Japan, Canada, Australia, and the EU, as part of a larger multilateral effort.
- Taiwan must leverage both its R&D strengths and financial investment in order to contribute to global efforts to further resiliency of the global critical minerals supply chain. Potential areas of cooperation include processing and recycling technology of rare earth elements materials, and should be done through collaborations among the government, business and academia. This could yield a greater possibility of scaling up the pilot projects in rare earth technology innovation and make it commercially viable.
- Domestically, Taiwan's government can further efforts to promote recycling efforts, update critical minerals lists, and enhance public transparency to better manage critical minerals in a circular economy.
- Taiwan should continue to maintain its current trading and technology sharing with China on rare earth elements products yet be mindful of China's potential crackdown. Taiwan also needs to consider the safety of Taiwanese personnel who are involved in related activities in China.

The global quest for critical minerals has intensified as countries adopt more green technologies to implement energy transition. Global appetite for advanced technology is also feeding into this demand for minerals. In response, countries are securitizing their own respective critical minerals resources. China has been dominating the rare earth elements market since the 1990s.<sup>1</sup>

China has not shied away from utilizing its advantages in critical minerals and rare earth elements for political gain. Export bans in the latter part of 2023 on germanium, gallium, certain graphite products, and rare earths processing technology as a response to trade restrictions from the United States, the Netherlands and Japan on advanced semiconductor products exporting to China was part of this strategy.<sup>2</sup> In 2010, China banned rare earths export to Japan for political reasons.<sup>3</sup>

## Expect More Bark Than Bite from China

Yet despite China's disruption strategy on critical minerals, its effects are not likely to be long-lasting. Instead, it could be an opportunity for the US-led supply chain to speed up its restructuring efforts and grow more resilient. There are two issues that help lead to a better understand China's endgame.

First, there are vulnerabilities and limitations existing in China's export bans. The PRC's overregulation and over-weaponization of rare earths have led to market distortion and has also prevented the Chinese rare earths industry to upscale.

Secondly, there is a better understanding of what US-China competition over rare earth supplies means for the like-minded partners of the United

States including Taiwan. To be sure, Chinese control measures hurt global rare earth supplies, but at the same time they could open up new possibilities for Taiwan and other to cooperate to develop a more resilient rare earths supply chain. Given that Taiwan sits at the heart of US-China competition, they can provide a unique perspective for the US-led supply chain coalition to expand and explore future cooperation possibilities. As tensions in cross-strait relations from impact bilateral ties in the rare earths sector, the pressure for Taiwan to enhance its supply chain resilience has risen. During the relatively benign period of cross-strait-relations from the late 2000s to mid-2010, Taiwan built up positive relations with China and both sides have benefited from rare earths trading. Joint visits to mine as well as Chinese factories were enhanced with information sharing on processing and recycling technology. A steady relationship between Taiwan and China has also spared Taipei from getting a direct hit when China's factories went against Japan over rare earths in the 2010s.<sup>4</sup>

Changes in the political wind have altered once benign cross-strait relations on rare earths. Since 2023, however, concerns within Taiwan have increased about what about China's increasing clamp down on the alleged technology espionage in strategic sectors actually means. Chinese nationals working for foreign rare earths trading companies being accused of technology espionage by the Chinese national security agencies is alarming.<sup>5</sup> China will likely continue to roll out additional actions such as cracking down on espionage and increasing security measures together with export bans on REEs products and technology.

Despite the seemingly dim prospects of China's ever tightening grip, it is worth noting that, on the refining and processing products of REEs or other critical minerals, China's export

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bans might not last long, and could even incur countereffects on the development of its own REEs industry. This could be seen from examples such as slightly more than one month after China placed initial export bans on gallium and germanium in August, 2023, it resumed export licenses on those products. Also, two weeks after China placed initial export bans on certain graphite products in early December 2023, it then again approved export permits on some of the graphite items to corporations of certain countries such as Korea.<sup>6</sup> Going back to the 2010 REEs export bans to Japan, the Chinese government also lifted the ban two months after the initial one.<sup>7</sup>

## Market Distortion and Overcapacity Hurting the Rare Earths Industry

China's export bans on rare earths have made Beijing's rigid and over-regulated approach to the industry clear. It has in effect become a stumbling block to the development of its own minerals industry. Excessive weaponization of resources by the China highlights Beijing's lack of accurate understanding about how the rare earths industry actually functions. State media aggravates the situation further still by providing inaccurate information.<sup>8</sup> One major misunderstanding is China's claim that it only has 23% of the global REEs reserve, which makes it very difficult to bear the burden of providing more than 90% of the global REEs products. As a result, China's own reserves are declining.<sup>9</sup> By only emphasizing China's supply role and neglecting the fact that China actually accounts more than 60% of the global demand. This has further presented a myth to the Chinese public by portraying the West as taking advantage of China's cheap environmental and labor costs, causing China's rare earths being sold at a cheap 'cabbage' price.<sup>10</sup>

Drawing from partial information, Chinese media has then mistakenly formed its own propaganda of "safeguarding China's strategic and precious REEs resources from outflowing to other countries," which not only affect how the public perceives the topic, but also serve as the policy-making tone of the Chinese government, prompting the government to impose export bans, industry controls and reserves on its rare earths products ranging from raw materials to refining and processing products.<sup>11</sup> Yet the key to the advancement and prosperity of the rare earths industry lies in the promotion of the lower-end application of the industry, which include functional materials applied in areas such as permanent magnets, luminescence, catalysts, and hydrogen storage; rather than the mining, raw materials, refining, and upstream processing. With many of the technologies of lower-end advanced rare earths functional materials have been seized by countries such as Japan, Korea, the United States, and the EU, China still has a great gap to catch up.<sup>12</sup> China's measures such as export bans and reserve mechanisms on rare earths upstream products have appeared to be a cart-before-the-horse policy direction.

The wrong policy direction that China has held to over the years involves measures such as exports amounts, reserves, directive production plans, creating rare earths, all of which carry some level of detrimental effects on the Chinese own industry development.

First, limiting the export amount of rare earths has not only caused market distortion and price fluctuation internationally, but domestically as well. Furthermore, it prevents the advancement of China's own industry. For instance, China's export bans on rare earths in 2011 have caused a five- to ten-fold price hike in its domestic products within only six months despite a short-term windfall thanks to price hikes, some

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products have thus been replaced by cheaper non-rare earths alternatives, such as neodymium magnets being replaced by ferrite magnets.<sup>13</sup>

Second, by implementing their reserve system on rare earths that are in high demand, China has failed to achieve its goal of setting favorable market prices. Instead, it is causing market disruptions.<sup>14</sup> Examples include China's focus on purchasing and reserving rare earths such as neodymium, praseodymium, and terbium that are widely used in the making of permanent magnets, which although are in high demand (accounting more than 60% of the market need) due to energy transition needs, actually within the REEs processing yield only accounts for only 20% of the total, compared to other rare earths.<sup>15</sup> This has further caused the serious over-stocking and price plunge of other processing products, such as such as lanthanum, cerium, samarium, dysprosium and yttrium.<sup>16</sup>

Third, China has failed with its attempt to regulate its industry by allowing only a limited number of corporate conglomerates and implementing directive production plans to reduce the plethora of rare earths small and medium sized enterprises and crack down on illegal mining and processing activities. China believes doing so could enhance the environmental protection capacity, reduce the over-surplus of REE resources and increase the global economic competitiveness of its mining industry through the bargaining ability of big corporations.<sup>17</sup> Yet this in fact has been countereffect. Corruption and inability to enforce laws locally have made illegal rare earths supply chains more rampant.<sup>18</sup> Corruption too at both the state and local level also complicate matters further.<sup>19</sup>

Fourth, China's attempt to monetize its mineral resources by setting up regional rare earths exchange has also proved problematic. The intention has been to rectify poor 'cabbage' pricing. By commanding higher prices on the global markets, China would have further control of rare earths worldwide.<sup>20</sup> However, this planning has gone against the fact that China's industry has only a few hundred tons of trading quantities domestically. The market is still relatively small and cannot well survive market volatility.<sup>21</sup> China's ambition to bolster its rare earths exchange is unrealistic, given that its market remains firmly controlled by the government. Additionally, despite the high demand of rare earths, the need for minerals has not necessarily led to higher prices.<sup>22</sup> In fact, its pricing is often associated with extremely complex and variable market factors and that pricing should not be regarded as the only aspect that reflect demand ice.<sup>23</sup>

Lastly, China's ever-tightening control of rare earths could impede industry development at home. As China faces a gap to fill regarding upgrading its industry in the lower end of the supply chain, close collaboration and exchange on information and technology know-how with the international community is required. A closed-door approach could further hinder the much-needed technology innovation and shortcuts to enhance competitions of China's own REEs products.

### **Taiwan's role in the global rare earths supply chain**

China's domestic policies is hurting its rare earths advantages. Yet the United States and its allies still need to actively seek for effective

solutions to address the potential short-term supply chain disruptions, at least in the near- and medium-term.

Taiwan must play a key role in securing the resilience of global rare earth supply chains. At the same time, Taiwan has its own challenges in contributing to the global rare earths industry.

Internationally, it has been difficult for Taiwan to directly engage with the US-led supply chains, as Taiwan has not been part of any major international rare earths or critical minerals initiatives such as Minerals Security Partnership, Sustainable Critical Minerals Alliance, or related initiatives in platforms like the G7, the Quadrilateral Security Dialogue, or the Indo-Pacific Economic Framework. Thus, the most viable solution for Taiwan to engage with the United States and its allies, such as Japan, Canada, Australia, and the EU would be to utilize and build on the existing bilateral negotiation mechanisms, and even further upscaling those bilateral efforts into mini-lateral ones. This could yield better synergies and collaboration opportunities.

To be sure, Taiwan has similar needs and challenges with the international community. First and foremost is an increasingly need for permanent magnet motors containing rare earths used in green technology, including components used in wind turbines, hybrid or electric vehicles, and hard disk drives.<sup>24</sup> As Taiwan strives to achieve its net-zero carbon emissions pledge by 2050 through energy transition, demand for rare earths will only increase. In addition, Taiwanese manufacturers have been moving back to Taiwan from China since 2018 due to the US-China trade war. Some products used to be made in China have now been made in Taiwan instead.<sup>25</sup> Yet one of the main challenges that Taiwan has faced is that it lacks sufficient refining and processing

capacities, with only one or two companies running in the upstream section of Taiwan's rare earths supply chain. At present 95 percent the of Taiwan's rare earths is imported from China.<sup>26</sup>

Taiwan must seek alternative sources for its upstream rare earths products, either through establishing new procurement and sourcing routes from other countries,<sup>27</sup> or by working directly with overseas mining activities, such as setting up processing and refining capacities in collaboration with foreign mining projects. However, some foreign mining projects are located in areas that lack sound investment and regulation settings. Frequently there have been past cases where such cooperation investments failed halfway through its implementation due to insufficient transparency and unsound decision-making from the cooperating countries. Therefore, the Taiwanese government should carefully assess the feasibility of each investment cooperation, and prioritize cooperating with countries that have sounder investment and regulations so as to increase the success proceeding of those cooperation projects.

Taiwan also needs Chinese rare earths for its semiconductor industry as well as its liquid crystal display panel industry. Cerium oxide, for instance, is widely used in silicon wafer-grinding and optical glass polishing.<sup>28</sup> Potential disruptions to much-needed products could be reduced through sourcing substitute oxides from other countries though there remains likely cost increases, or through 'urban mining' – i.e. recycling electronic wastes (e-waste).<sup>29</sup> Currently in Taiwan, most of the pilot projects of recycling domestic e-waste for rare earths up-stream or mid-stream products have been done at the research or individual corporation level. To scale up the recycling efforts domestically will require collective cooperation and financial investments from the government, business and the academia

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sectors. Meanwhile, recycling foreign e-waste for rare earths products has been discussed, as this is seen as a hope to increase the recycling REEs amount overall in Taiwan. Yet owing to the tight environmental regulations and high environmental expectations from the vibrant civil society that Taiwan has, it would be difficult to set up designated industrial areas to process imported electronic waste, and further used domestically or shipped abroad and exported to other countries. This is a critical limitation on Taiwan's ability to contribute to the US-led REEs supply chain.

Nevertheless, Taiwan remains a hub for innovation and technology innovation talent. Taipei must find the best way to leverage its R&D strengths and financial investment in contributing to the upscaling and resiliency of critical minerals supply chains worldwide. Potential areas of cooperation could be in advancing the refining, processing and recycling technology of materials. This could enhance the possibility of scaling up the pilot projects in rare earths technology innovation and make it commercially viable in the future. Taipei

## Managing Cross-Strait Risks in Securing Rare Earths

Taiwan also needs to handle its interactions with China carefully, bearing in mind that there were frequent technology exchanges and trading between Taiwan and China in over critical minerals.

In the near term, reducing reliance on China's product imports and technology exchanges will not be easy. Taiwanese businesses and analysts should pay careful attention to the possibility of getting mistakenly caught up, or even being accused by the Chinese officials for technology espionage when visiting China for

any related activities. Meanwhile, Taiwan should signal to China that international exchanges of technology are one of the keys to advancing the critical minerals industry, and that excessive and rigid state control will ultimately stifle the development of China's own industry.

Taiwan can still find its own path amid of the US-China competition over critical minerals. Taiwan's leading edge in technology innovation and workforce development, coupled with its agility in managing global trade realities puts itself in good stead to meet the challenges ahead.

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*Ling-Tuan Linda Liu is the 2024 Taiwan Scholar of the Wilson Center's Indo-Pacific Program. She is also a policy analyst at the Institute for National Defense and Security Research (INDSR), Taiwan.*

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Woodrow Wilson International Center for Scholars  
One Woodrow Wilson Plaza  
1300 Pennsylvania Avenue NW  
Washington, DC 20004-3027

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