Geopolitical Power Through Critical Mineral Resources: The Strategic Role of Rare Earth Elements in China's Post-2010 Foreign Policy and Its Implications for Energy Security and Global Alliances

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Abstract

This thesis examines the relationship between China's shift in its strategic use of rare earth elements (REEs) in its policy framework post-2010 and the change in global power dynamics in international relations and global alliances. The main research question is whether China's strategic leveraging of its REE dominance has led to more substantial international trade partnerships or heightened tensions, particularly between China and the United States. The conclusion drawn at the end of this paper is that there is a dual dynamic at play: China has formed stronger global partnerships, while at the same time, tensions have increased due to power-balancing mechanisms used by REE buyer countries and major powers. The methodology used in this thesis comprises policy analysis, case studies, and data analysis and visualizations. The significance of this research lies in its comprehensive analysis of China's REE policies and their broader geopolitical implications. This study contributes to the broader discourse on resource-driven power dynamics in the discussion of international security.

Acknowledgments

I shall first thank my academic advisor, Dr. Etel Solingen, whose guidance and support have been invaluable throughout this process. Dr. Solingen's exceptional work in East Asian Security, Geopolitics, and Global Value Chains has been instrumental in sparking my interest in this field and narrowing down my research interest to this specific thesis topic. I am deeply grateful for her mentorship and willingness to supervise my honors thesis.

I shall then thank my father, who instilled in me the ethos of soldier at the start of my life: never to surrender on the battlefield to one's own physical pain or psychological fear; and who recognized and nurtured my potential in the field of politics when I was but a child whose voice had yet to be heard by the outside world.

I thank him and my mother, Pauline, eternally, for giving me life and strength, love and hope, courage and perseverance, which I have carried with me from our home to every inch of soil I have since stepped upon.

Never could each word of my work have been written without them.

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Introduction

Rare Earth Elements (REEs) have become increasingly crucial in the modern geopolitical landscape due to their significant applications in advanced military equipment, high-technology industries, and green technology transitions. The dominance of any single nation in the REE sector allows that nation to exert substantial influence over global supply chains, impacting national security and international stability. China, the world's largest producer and holder of REEs, has strategically leveraged its position in the REE market to enhance its geopolitical influence for the past two decades.

Since the early 2010s, China has transitioned from using REEs primarily for domestic development to employing them as a strategic tool in its foreign policy. This shift has been marked by a series of assertive policies such as export restrictions, domestic consolidations, and strategic partnerships aimed at consolidating its hold on REEs and influencing global power dynamics. This thesis examines the extent to which China has utilized its dominance in REEs to project political power and shape global alliances. The central research question addresses whether China's REE policies have strengthened its global partnerships or heightened tensions with other major powers, particularly in the context of the "collective resilience" emphasized by REE buyer countries.

To address this research question, the study employs a blend of qualitative and quantitative approaches. The theoretical frameworks of resource realism and economic statecraft are used to explore the strategic importance of REEs in national security and international relations, examining how nations utilize critical resources like REEs to achieve political objectives. Policy analysis focuses on China's REE export policies and domestic regulations over the past decade, including initiatives such as export bans and trade restrictions. Case studies

provide in-depth examinations of specific instances where China's REE policies have impacted global markets and international relations, such as the 2010 Diaoyu Dao incident and the 2023 ban on REE extraction technologies. The global trend of green technology transition is also included as a broader context for this section. Quantitative analysis, including data analysis and visualization, illustrates the impact of China's REE policies on global markets, with charts and graphs showing changes in REE export volumes, trade values, and market shares over time.

Chapter 1

Thucydides Trap in the Modern Era

The research objective of this paper is to identify the relationship between China's increasingly assertive stance on REE policy and the ever-evolving global alliances driven by countries' reliance on China for REEs for military equipment production and green technology transition. In this part, theories of 'resource realism' and 'economic statecraft' provide essential insights into how nations use critical resources to achieve political objectives by explaining the strategic importance of these resources in national security and international relations. Chen and Evers' "War without Gun Smoke" highlights the role of global supply chains in power transitions through its integration into the economic statecraft, illustrating explicitly how critical minerals like REEs can be used for political power leverage in the modern era. By applying these theories, we can better understand the strategic rationale behind China's REE export restrictions and domestic consolidating policies and their potential yet significant impact on global alliances.

Growing Significance of Securing Supply Chains

The political theory of Thucydides Trap indicates that war and conflict occur when a dominant state is in decline and perceives a threat from a rising competitor (Chen and Evers 2023, 2). While Thucydides' age-old theory explains power dynamics primarily based on the pure physical power competition between Athens and Sparta, modern technological innovations and the interwoven relationship between resource sustainability and national security have shifted the battle lines between modern-era countries more to the economic front. As described by Chen and Evers (2023), a modern dominant state in decline that perceives a threat from a rising competitor often seeks to cut off the latter's access to supply chains in order to contain its

economic growth. For example, the United States restricted sales of advanced semiconductor technology from U.S. companies to Huawei during the Trump administration, and China, in turn, upgraded its respective technological bases to circumvent U.S. trade barriers. This two-way interaction competing on the economic front regarding resources can be seen in many fields and industries between China and others. Rare earth elements (REEs) are among the most important ones for China to either project the power to influence other countries' political stance or defend itself as a countermeasure to cope with barriers imposed by the more dominant powers such as the United States. In this paper, both directions within this two-way interaction between China and the rest of the countries will be examined, with the primary focus of the power projection/counter-measuring tool centered on China's dominance over REEs.

Securing the stability of critical minerals like rare earth elements in global supply chains has become one of the most pressing issues. Even the great powers nowadays must ensure their reliable access to it to build their national defense system. Gaining access to or being denied access to vital global supply chains can significantly alter the trajectories of both rising and dominant powers (Chen and Evers 2023, 2). This uncertainty and friction contribute heavily to insecurity, which can potentially ignite conflicts between states. Historically, we can see how this struggle for resource dominance has influenced alliances, shaped power structures, and changed the global order. Examples include the Middle East Oil Crisis of the 1970s and Russia's ban on crude oil exports to European countries during the Ukraine War in the 2020s. China, as a rising power with a similar economic size and military capability to Russia, and an equivalent dominant position on REEs as Russia has with crude oil, is likely to have the capability to exert a comparable amount of influence over the global community.

Moreover, while the conventional wisdom held the belief that the shift from traditional energy resources like fossil fuels and crude oil to new sources of green energy would put an end to the troublesome geopolitics of the old energy order, the energy transition is merely shifting the focus of conflicts from traditional energy sources to new ones, such as REEs - which are crucial for this energy revolution - as predicted by Bordoff and Sullivan in their 2023 article.

From Domestic Economic Statecraft to Global Power Dynamics

Chen and Evers (2023) also demonstrates the methods that could effectively wage these wars on the economic front: “establishing policies that incentivize private businesses within their jurisdiction to act in accordance with their geopolitical goals.” This method is also called ‘economic statecraft’ in the term. In the case of China, this approach has been evident in its REE sector, where government-related incentivization has strengthened its dominance over REEs. For instance, China has implemented export quotas and production caps to control the global REE market, and it has used its REE dominance to build trade partnerships and strategic alliances, such as the Belt and Road Initiative, thereby influencing global power dynamics. This scenario again underscores the role of economic statecraft in managing strategic resources - like the REEs in this case - which transcends traditional economic considerations to become a critical component of geopolitical strategy for power projection. Just as what has been described by Chen and Evers (2023), with global supply chains of strategic resources becoming a critical battleground for great power competition, economic statecraft, involving state policymaking that mobilizes private enterprises to achieve national political objectives, has become equally important in understanding the dynamics of power transitions and the conflicts that arise.

Chapter 2

Strategic Importance of Rare Earth Elements

REEs in Military and High-Technology Applications

Rare earth elements (REEs) constitute a set of 17 metals. These elements are crucial for energy storage and permanent magnets, which are key components that are integral to various sectors, from civilian production to national defense. REEs are critically important in the applications of guidance and control systems, defense electronic warfare, and targeting and weapon systems (Menezes 2021, 14). Their unique properties make them one of the most essentials for high-tech applications and military equipment productions - the more advanced the military sector is developed, the more REEs are needed (Dreyer 2020, 3). As specified in Runde & Hardman's latest report on "Elevating the Role of Critical Minerals for Development and Security" (2023, 3), the F-35 multipurpose fighter jet requires over 900 pounds of REEs, and each Virginia-class submarine needs ten times that amount - about 9,200 pounds - to produce. Securing the supply of REEs ensures a country's sustainability in national defense development.

Due to the increased reliance on technology for defense purposes in the modern era, the strategic utilization of REEs has significantly grown over the last two decades. Their applications have also extended to high-tech industries for the production of smartphones, electric vehicles (EVs), and renewable energy technologies. Beyond their direct use in military production and high-tech innovations, countries that dominate the REE sector can influence others through foreign policies, such as setting export quotas, imposing restrictions, or building alliances. Entering the era of modern warfare, the implications of REEs extend beyond internal self-strengthening processes for countries to external geopolitical power projections.

Global Market Overview and Geopolitical Concerns

Geographical Concentration Leads to High Level of Price Volatility

REE mine production contains a great level of geographical concentration, that is, the REE mine production is predominantly concentrated in a few specific regions. This naturally uneven distribution makes the global market for REEs volatile and heavily influenced by policy changes and international relations. For the past decades, China and its state-owned enterprises are significantly ahead of the United States in production and ownership of smelting, refining, and mining assets, thereby giving it a natural advantage to global processing (Runde and Hardman 2023, 3). Over the past decade, increasing geopolitical tensions between China and the United States and growing concerns about supply chain fragmentation and the availability of critical resources for energy transitions have brought China's role in the REE supply chain into sharp focus (Andrew-Speed and Hove 2023, 1).

According to the US Geological Survey, as of the end of 2023, China remains the world's leading producer of REEs, controlling approximately 68.5 percent of global mine production and holding around 44 million metric tons of reserves. This dominant position enables China to significantly influence the global REE market through mechanisms such as export restrictions, bans, and quotas. Notably, there have been two significant REE price surges since 2010, both closely correlated with Chinese policies. The first severe spike occurred from 2010 to 2011, resulting from China's export restrictions to Japan during the Diaoyu Dao territorial dispute. The second spike happened from 2021 to 2022, driven by COVID-19-related supply bottlenecks and increased demand projections for clean energy technologies (Andrew-Speed and Hove 2023, 7). For example, the REE neodymium prices have fluctuated between USD 50/kg and USD 280/kg since 2011, and the REE dysprosium prices surged from a low of USD 238/kg in 2018 to a high

of USD 528/kg recently (Müller et al. 2015). It is noteworthy that dysprosium prices once peaked at USD 3,410 in early 2011 following the Diaoyu Dao incident and China's temporary restriction on REE exports to Japan.

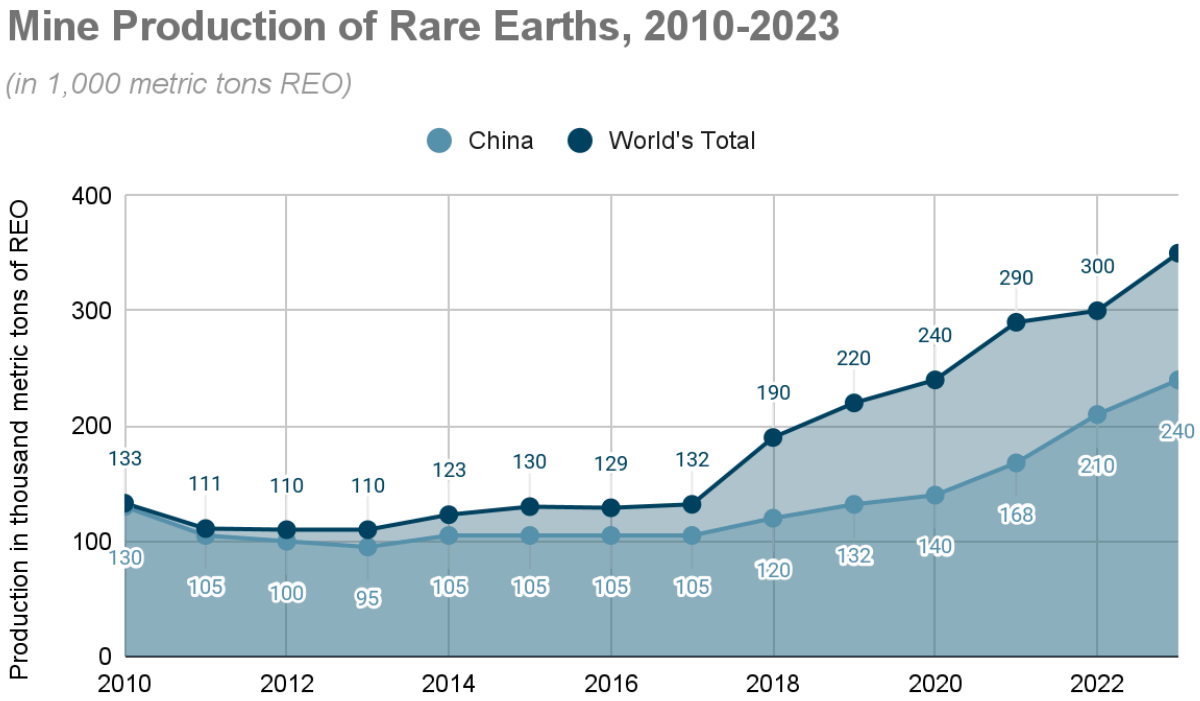

Figure 2.1. *Mine Production of Rare Earths, 2010-2023*.
Description: This figure illustrates the annual mine production of rare earth elements (REEs) from 2010 to 2023, comparing China's production with the global total. The graph shows a steady increase in China's REE production over the years, highlighting significant milestones:

- In 2010, China's REE production was approximately 130,000 metric tons.
- By 2018, the global REE production surged to 190,000 metric tons, while China's REE production decreased to 120,000 metric tons.
- In 2023, China's REE production again increased to 240,000 metric tons.

The global total production also shows a consistent upward trend, with significant contributions from other countries, but China remains to be the dominant producer in the REE sector.
Source: US Geological Survey.

Regarding Mastro and Scissors (2022), China's control over REE is crucial not only for its economy but also for its strategic capabilities, particularly in the military and high-technology sectors. Despite facing economic challenges caused by declining demographics, China's

dominance in critical minerals, led by the REEs, has enabled it to maintain and even enhance its competitive stance in these key areas relative to other major powers, including the United States.

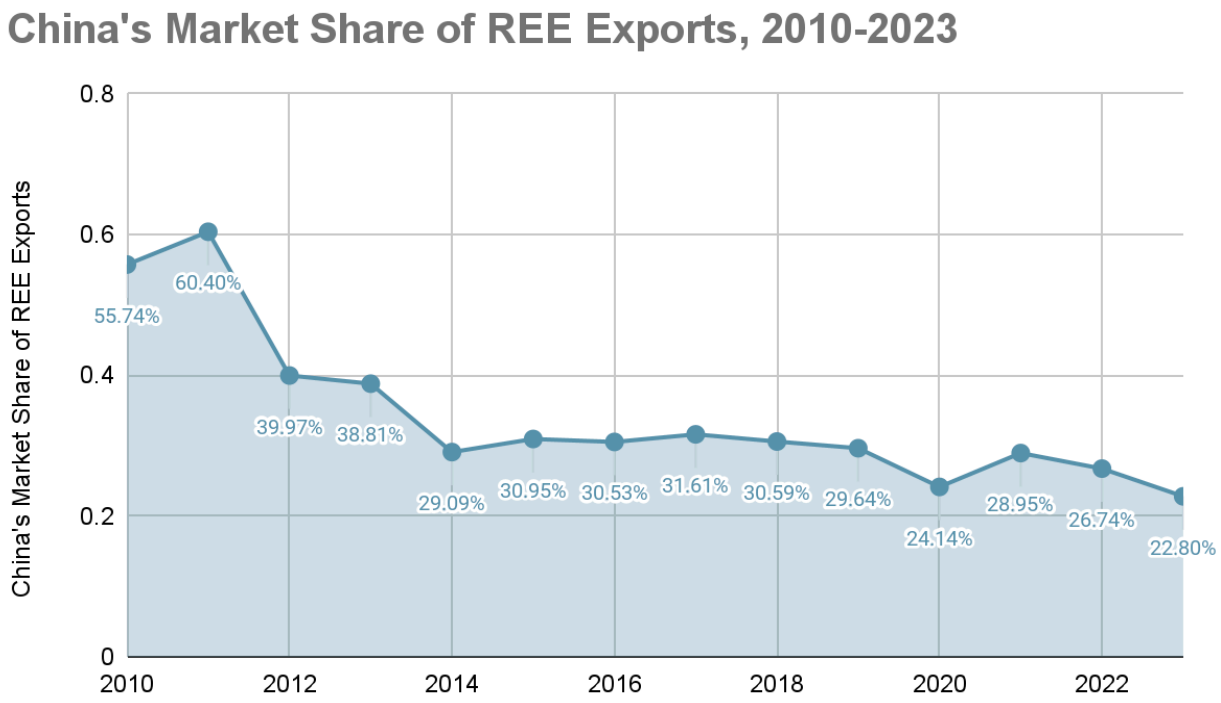

Figure 2.2. *China's Market Share of REE Exports, 2010-2023.*
Description: This figure depicts China's market share of REE exports from 2010 to 2023. The graph indicates fluctuations in China's market share over the years, especially following the 2010 Diaoyu Dao incident:

- In 2010, China held approximately 55.7 percent of the global market share.
- The share dropped significantly in 2012 to around 40 percent and then stabilized around 30 percent from 2014 to 2020.
- By 2023, China's market share dropped to 22.8 percent.

Source: Trend Economy, UN Comtrade Database.

Chapter 3

Evolution of China's REE Policy

China's evolving REE policies from the early 1990s to the present have profoundly impacted the global supply chains, international trade relations, and geopolitical dynamics. Over the past three decades, China's approach to REE policy has transitioned from focusing on domestic development and self-sufficiency to leveraging REEs as a tool for projecting geopolitical influence and economic statecraft. Key phases in this evolution include the early stage of development with restrictive measures of foreign enterprises entering the Chinese domestic REE market, the strategic pivot following the 2010 Diaoyu Dao incident, post-2014 constructions on domestic consolidation and global partnership, and the recent restrictions on REE extraction technology to the United States under Xi Jinping's administration. By examining these phases, we can understand how China's stance on REE policy has changed over time and how such a shift has influenced the international trade environment.

Early Stage of Development

From Early-1990s to Late-2000s

In the early 1990s, the Chinese government classified REEs as "protected and strategic materials." This designation limited foreign enterprises, restricting them to mining REEs only through joint ventures with Chinese companies under stringent government supervision. During this time, the major REE industry base gradually shifted from the United States to China, exemplified by the closure of Magniquench, a former leading REE company in the United States, and its relocation to China in 2003. In alignment with Deng Xiaoping's Super 863 Program, designed to procure advanced technologies primarily for military use, China's REE policy in the

early 2000s focused on achieving self-sufficiency and boosting domestic growth and technological advancements (Dreyer 2020, 2). The aim was to catch up with the Western countries in the industry.

A Turning Point

The 2010 Diaoyu Dao Incident Between China and Japan

The early stage of development was essential as the foundation for China's later dominant position in the global REE market, but a significant turning point came with the 2010 Diaoyu Dao incident, which marked a strategic pivot in China's approach to its REE policy. By 2011, China had become the 'powerhouse' of the global REE market, producing 96,900 tonnes of REE smelting separation products, constituting over 90 percent of the global total output. This dominance in REEs was dramatically underscored during the 2010 Diaoyu Dao incident, when a confrontation in the East China Sea between a Chinese fishing boat and Japanese Coast Guard vessels escalated into a significant territorial dispute, following Japan's and the global community's response to seek an alternative market for REEs. During this process which lasts until nowadays, the global value chains (GVCs) have undergone a series of realignments, and the international collaborations over REEs have brought a new era of both strengthened and more divided global alliances.

In September 2010, a Chinese fishing boat rammed two Japanese coast guard vessels in the contested waters of the East China Sea. The Japanese government intended to put the fishing boat's captain on trial. In response to the Japanese government's decision to detain the Chinese captain, China imposed a temporary embargo on all REE sales to Japan (Dreyer 2020, 2). Japan heavily depended on China for over 80 percent of its REE needs at that time, marked by 23.2 thousand metric tonnes of REE imports net weight in 2010. With China's REE export

restrictions, despite its temporary basis, Japan faced a significant risk of raw material shortage for its automobile industry (Dreyer 2020, 2). This action taken by China has ignited Japan's transformation into finding alternative sources of REEs and building more collaborations with Southeast Asia as well as the U.S. allies like Australia, as the Japanese Economy, Trade, and Industry Minister Akihiro Ohata has reinforced the idea that the country needed "to craft a long-term strategy to procure rare earths" (Hurst 2011, comment on Kyodo et al. 2010).

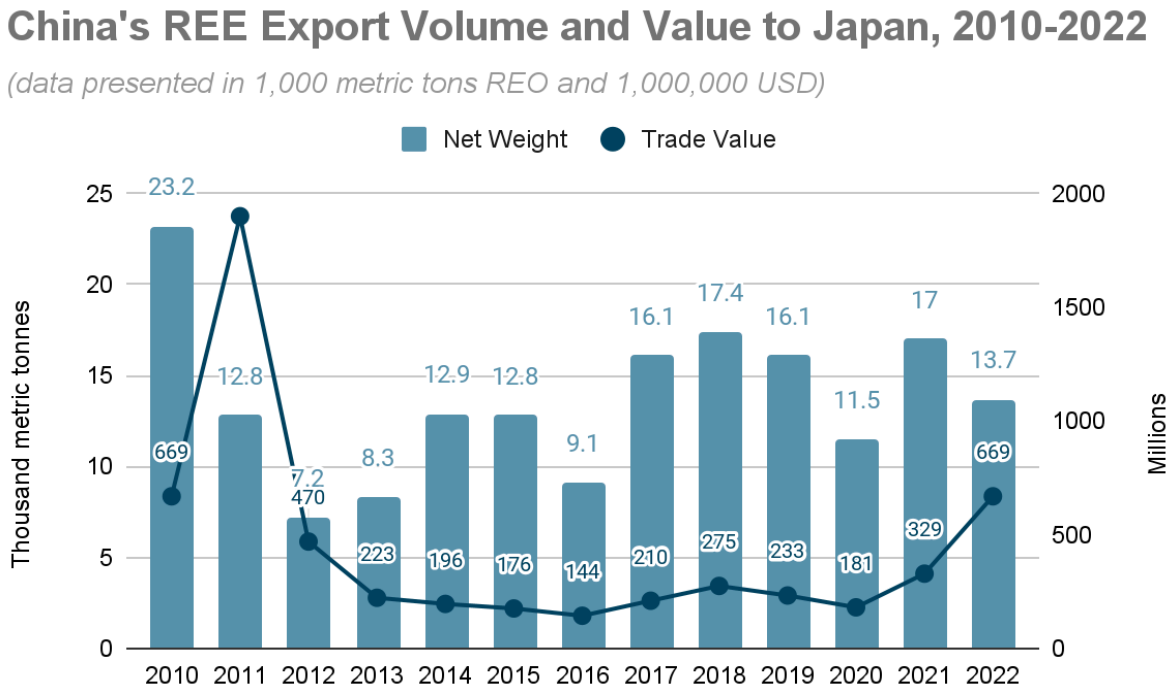

Figure 3.1. *China's REE Export Volume and Value to Japan, 2010-2022.*
Description: This figure illustrates China's rare earth element (REE) export volume and value to Japan from 2010 to 2022. The data is presented in terms of net weight (in 1,000 metric tons REO) and trade value (in 1,000,000 USD). Key observations include:

- A significant drop of China's REE export to Japan in 2011 to 12,800 metric tons following China's export ban on REEs to Japan on a temporary basis.
- At the same time, the trade value has also peaked nearly double in 2011 despite the reduced volume by half, indicating a dramatic REE price surge during this period.
- Gradual recovery in subsequent years, especially starting in 2014-15 following WTO's ruling.

Source: ResourceTrade.earth, Chatham House, UN Comtrade Database.

Japan has a high demand for REEs, with global demand for Japanese products including nickel-metal hydride batteries, auto catalysts, and digital cameras - all of which require REEs for production. Japan's hybrid electric vehicle industry has particularly driven its reliance on REE imports from China. Japan is the largest global producer of hybrid electric vehicles (HEV) and relies heavily on REEs. Each HEV contains up to 25 pounds of REEs; in 2007, Japan produced 443,253 units of HEVs, moving to 2010, this number nearly doubled to approximately 883,000 (Hurst 2011). This high demand for HEVs, coupled with China's reduction in REE quotas, has prompted the Japanese government to assist and collaborate with its top domestic manufacturers, such as Toyota Motor Corporation And Sojitz Corporation, to secure REE sources outside of China to ensure uninterrupted production.

In December 2010, the Daily Yomiuri Online reported that Sojitz Corporation signed a contract with Lynas Corporation, an Australian mining company that owns the Mount Weld mine, following China's temporary ban on REE sales to Japan. This new trade contract was assisted by the state-owned Japan Oil, Gas, and Metals National Corporation (JOGMEC) (Oh et al. 2021). Under this deal, Sojitz served as the distribution company and agreed to supply Japan with more than 9,000 tonnes per year for ten years (Oh et al. 2021). Similarly, the Mitsubishi Material Corporation also signed a contract with Molycorp, a U.S. mining company that owns the Mountain Pass Mine in California, to import 750 tonnes of REEs yearly (Hurst 2011). The Japanese government implemented a $1.25 billion integrated policy to mitigate further disruptions. According to Mr. Shigeo Nakamura, President of the Advanced Material Japan Corporation, there was $490 million going toward enhancing REE production through technological innovation, recycling, and improved efficiency; and $370 million going toward supporting Japan's foreign REE mining ventures (Hurst 2011). Then, in 2012, the Minister of

Education, Culture, Science and Technology (MEXT) launched the Elements Strategy Initiative, a ten-year R&D project focused on substitution, regulation, reduction, and recycling, aiming to replace REEs with more readily available, less environmentally damaging materials (Oh et al. 2021). These collective efforts made by the Japanese government and its domestic manufacturers have diversified Japan's REE supply chain. Japan's reliance on China for REE - metal and compound - imports dropped from 82 percent in 2010 to 58 percent in 2019, with the government announcing its plan to achieve an overall REE import to less than a 50 percent reliance by 2025. Furthermore, Japan has strengthened its strategic economic cooperation with the Quad members: the United States, Japan, Australia, and India (Oh et al. 2021).

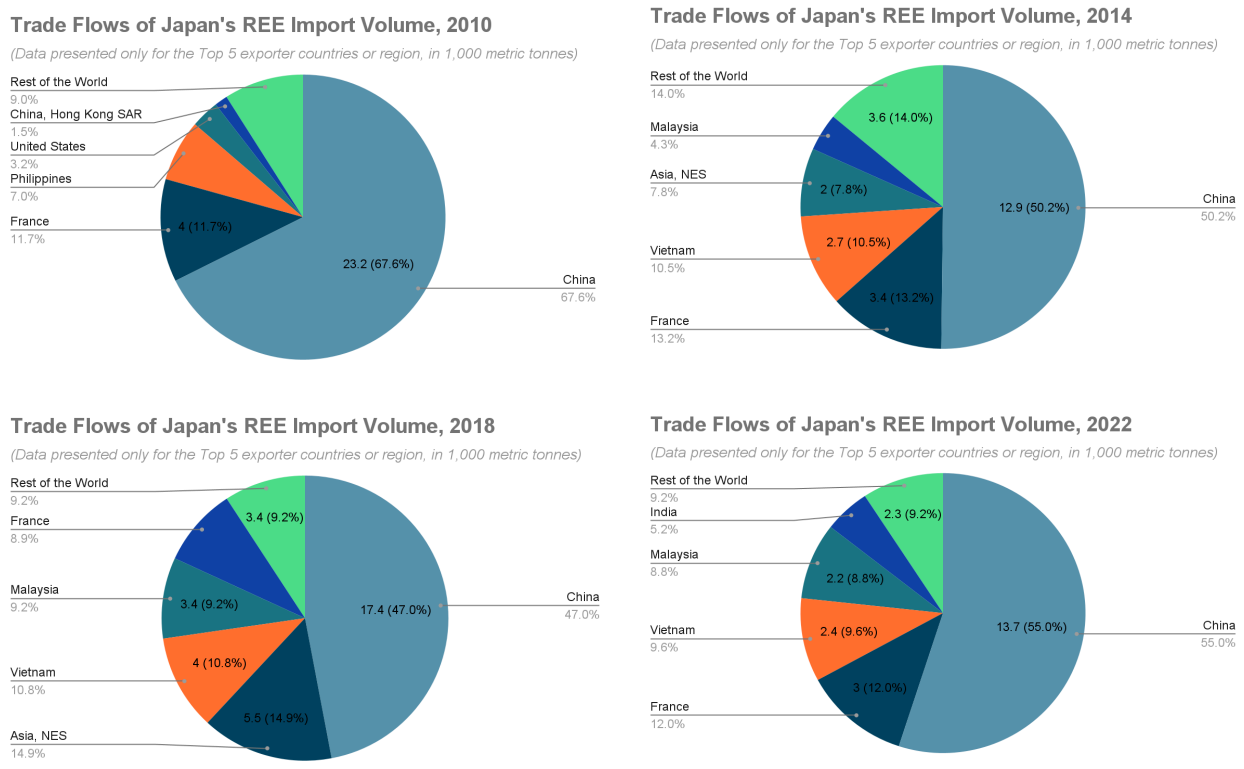

Figure 3.2., 3.3., 3.4., 3.5. *Trade Flows of Japan's REE Import Volume (2010, 2014, 2018, 2022).* Description: These figures show the trade flow of Japan's REE import volume from China marked by specific years of 2010, 2014, 2018, and 2022, highlighting the percent change of China's dominance. *Source: ResourceTrade.earth, Chatham House, UN Comtrade Database.*

Beyond the 2010 Diaoyu Dao incident, China has gradually adopted a more assertive stance in its REE policy through various measures. The Chinese government reduced export quotas from 65,580 metric tons in 2005 to 30,185 metric tons in 2011 and raised export taxes from 10 percent to 25 percent in 2012 (Sutter 2019). According to the Chinese government, these measures were part of a broader strategy to bolster domestic industries by ensuring a steady, low-cost supply of REEs crucial for developing advanced technologies, particularly in green technology sectors, rather than as economic retaliation as speculated by the international community.

Domestic Consolidation and Global Partnership

From Mid-2010s to Early-2020s

In the mid to late 2010s, the Chinese government significantly increased its direct control of the REE industry by regulating the domestic market and extending its global reach through strategic industry consolidation, regulatory adjustments, and global infrastructure partnerships, as outlined in several key policy documents and initiatives. As analyzed by scholars like Pitelis and Müller on a contemporary basis, the Chinese government established its dominant position in the global market of REE by not only controlling the majority of the world's extracted REEs but also implementing policies that impact the institutional, mesoeconomic, and macroeconomic environments of this market (Müller 2016, comment on Pitelis 2013).

Post-2014, after losing a series of international trade disputes, including the WTO suit concerning REEs, China shifted its stance from implementing export restrictions to focusing on internal market mechanisms (Shen 2020) and standard setting (Patrahau 2020, 91). Since 2014, China has implemented more nationalistic policies through vertical integration. According to Patrahau in 2020, this vertical integration, while justified as measures to stop illegal production

and protect the environment, has a similar effect to licensing mechanisms. For example, from 2018 to Patrahau's publication of this article in 2020, no new licenses for the exploration or mining of REEs have been passed. Setting strict standards inhibits the activity of foreign companies that cannot adjust. Instead, the same strict standards would favor Chinese state-owned enterprises with the means to restructure their activity accordingly with the help of high subsidies from the Chinese government (Patrahau 2020, 91). By implementing this measure, the Chinese government has gained more solid control over domestic production capacity over REE resources. This vertical integration method ensures that domestic companies, directly supervised by the government, control the entire industry. Foreign companies' activity is thus significantly limited to a level described as 'virtually terminated' in Patrahau's 2020 report (89).

This shift towards domestic consolidation through nationalistic policies became more apparent in the 2016-2020 National Mineral Resource Plan, which implemented an advanced monitoring system within the REE sector. This plan encouraged the establishment of strategic mineral detection and warning mechanisms for the REE industry, including creating warning indicators, threshold values, and a comprehensive evaluation model to aid government decision-making and guide the industry's growth (MLR 2016b). The plan highlighted the designation of energy and resource bases as strategic areas critical for ensuring national resource-supply safety (Shen et al. 2020). In a decisive move to further consolidate its domestic market, China launched the China Rare Earth Group in the early 2020s. This action assumed direct control of about 70 percent of national REE production, allowing the Chinese government to monitor and regulate the industry. This consolidation was further emphasized in December 2021 when the number of major REE mining and processing companies was reduced from 6 to 4. In January 2021, the publication of a draft on Regulations on the Administration of Rare

Earths marked a significant step towards tightening state control and securing China's dominance in the global REE industry (Andrew-Speed and Hove 2023).

With a further consolidated domestic market, China effectively used its abundance of REE resources to extend its influence through strategic global partnerships on resource investments. As described by Patrahau in 2020, China not only has about 37 percent of the world's REE reserves but has also been actively acquiring concessions (Patrahau et al. 2020, 89). Since the early 2010s, several big moves have been made by Chinese corporations in the REE sector, all connected closely with the Chinese government. China's Shenghe Resources Holding Co. Ltd. acquired 9.9 percent of MP Materials, the consortium that owns the Mountain Pass mine. China also purchased a 25 percent share of Arafura Resources Ltd., an Australian developer, and a stake in a separation plant project in Vietnam in 2017 (Patrahau et al. 2020, 89). In 2018, the Chinese government announced plans to develop a Polar Silk Road. In the same year, China purchased 12.5 percent of Greenland's Kvanjefjeld REE mining project. China's initiatives in Greenland aim to improve Arctic shipping routes and involve significant investments in constructing airports, ports, and research facilities, as well as expanding into the mining and energy sectors. Although Greenland's new government decided to halt one project and withdraw the license from another - both involving Chinese interests - the new government proceeded with existing plans to open a new representation in Beijing in November 2021. According to Menezes (2021, 8), China's move in Greenland aims to secure a foothold in critical strategic resources and establish a more pronounced geopolitical presence in the Arctic region. These investments and international ventures above illustrate China's efforts to control key global REE resources, and the newly formed global partnerships further solidifying China's dominance in the REE market and its ability to influence global supply chains.

REE Export Policy in Facilitating Green Technology Development

Electric Vehicles, Battery Manufacturing Industry, and Photovoltaic System

REEs have played a significant role in China's domestic green technology transition, which has broader global implications. As the global energy system is in the process of a major transition to clean energy and green technology, China, with its dominance in the REE sector, has gained a natural advantage over other countries when coping with this transition process. Though China is still trying to catch up on high technology, its abundance in REE resources has given it a significant capacity to build a strong foundation for related manufacturing industries like electric vehicles (EVs), lithium batteries, and photovoltaics. The series of export restrictions and domestic consolidations on REE resources that China has implemented since 2010 have allowed the Chinese government to maintain direct control over a large portion of these resources. This control is crucial not only for domestic green technology development but also for shaping the global REE market and influencing international policies on economic incentives and government subsidies to the private sectors.

According to scholars like Jiang, after 2010, China's economic growth faced a consecutive decline from double-digits to 6.9 percent in the fourth quarter of 2015 (Jiang 2016, 23). Added to domestic challenging factors like the demographic decline, China is losing its comparative advantages in low-cost labor production in industrial sectors to other developing countries like Bangladesh, Vietnam, and Cambodia (Jiang 2016, 23). Since 2011, the Chinese government has announced a series of domestic policies to strengthen its R&D sector in technology and restructure its manufacturing industries to address domestic challenges. In China's 12th Five-Year Plan, 2011-2015, green development and environmental protection were key components. The new energy structure aims to reduce the energy consumption per unit by 16

percent and increase the share of non-fossil energy in total energy use to 11.4 percent. In the Industrial Restructuring and Upgrading Plan from 2011 to 2015, REEs were included in the consolidation goals for eight traditional manufacturing industries (Jiang 2016, 26). Following the State Council's 'Guideline for the Development of Rare Earth Industry, issued in May 2011, this plan included industry entry restrictions and export controls on the REE resources. It significantly reduced the number of REE mining and refining corporations (Jiang 2016, 26).

The EV revolution marked a significant industrial transition on a global scale. Many countries in the recent decade have invested a lot into this market, with the collective goal of seeking alternative transportation methods apart from traditional energy resources like fossil fuels. In the EV industry, REEs are essential for permanent magnets that are vital for wind turbines and EV motors (IEA 2021, 5). Despite recent strategic investments by the U.S. government in REE production, China's dominance across the entire value chain - from mining to processing and magnet production - means that the U.S. still relies on shipping mined ores to China for processing its domestic REE resources. According to the IEA's 2021 report, the long-term potential for structural change from the EV revolution is enormous, alongside the surge in demand for raw resources in the REE sector (IEA 2021, 155). As of Haque's report article published in 2014, the use of REEs in rare earth magnets comprised 21 percent of the total use in this sector. Rare earth magnets have widespread application in the EV industry. With the increasing demand for building a cleaner world with green technology, these rare earth magnets are expected to expand consistently for the next decades (Haque et al. 2014). As for China, China's New Energy Vehicles policy developed in 2010 has significantly boosted EV sales through subsidy schemes and other financial and non-financial incentives for both consumers and producers. Global EV sales are projected to reach 27 million by 2030. China is expected to

dominate approximately half of the global EV sales (IEA 2021, comment on Johns et al. 2020), reflecting its strong position in green technology with REE resources.

CRM		Technology	HS Codes for CRMs[88]
Light Rare Earth Elements	Cerium	Electric vehicles	2805
	Lanthanum	Electric vehicles	
	Neodymium	Wind turbines, Electric vehicles, Digital technologies	
	Praseodymium	Wind turbines, Electric vehicles	
	Samarium	Electric vehicles	
Heavy Rare Earth Elements	Dysprosium	Wind turbines, Electric vehicles, Digital technologies	
	Terbium	Wind turbines, Electric vehicles	

Figure 3.6. *Applications of Light and Heavy Rare Earth Elements in Green Technologies*.
Description: This figure provides an overview of the REEs which, given China's active efforts at growing and modernizing its market and considering the EU-projected demand from within strategic sectors, emerge as disproportionately relevant to the coming energy transition (Patrahau et al. 2020, 25)
Source: Patrahau, I., Manen, H., Feijter, T., Rademaker, M. (2020). Standards for Critical Raw Materials: Strategic standard setting in China, the EU and the Netherlands. *Hague Centre for Strategic Studies*.

According to Haque et al. (2014), the use of REEs in rare earth magnets, such as neodymium-iron-boron (NdFeB) magnets, makes up 21 percent of their total use in this sector. These magnets are renowned for their high strength and are pivotal in enhancing the efficiency and performance of electric vehicles (EVs). The demand for these magnets is expected to grow consistently in the coming decades as the world shifts towards cleaner, greener technologies. The battery manufacturing industry, particularly in association with the EV industry, relies heavily on these REE-based magnets to ensure that electric motors operate at optimal efficiency and performance.

The photovoltaic (PV) industry is another sector that heavily relies on REEs to boost system efficiency and durability. As Haque et al. (2014) highlight, REEs such as europium and terbium are used in phosphors for LED lights and displays, which are integral to PV systems.

Moreover, neodymium is employed to enhance light absorption in high-efficiency solar cells, while yttrium and cerium provide UV protection and enhance the overall efficiency and durability of PV systems. As the demand for renewable energy solutions escalates, the role of REEs in PV systems becomes increasingly critical, playing a significant part in the transition to cleaner and more sustainable energy sources.

The 2023 Ban on REE Extraction Technologies to the U.S.

Another Pivot Since 2010?

The 2023 ban on REE extraction and separation technologies in the U.S. represents another significant policy shift in China. Many scholars interpret it as a direct response to the U.S. ban on semiconductor technology in China. This policy adjustment underscores China's continuing efforts to adapt its REE strategies to cope with politics-driven affairs, especially given the increasing tensions between the U.S. and China.

Entering the 2020s, China increased its production of light rare earth elements (LREEs) within its own country, specifically in regions like Inner Mongolia and Sichuan. Despite a decrease in China's global share of REE mining due to the 2010 Diaoyu Dao incident and the 2014 WTO lawsuit, China still controlled 63 percent of global REE mining in 2022, with large reserves of 44 million metric tons. Furthermore, China holds an overwhelmingly dominant position in the REE processing sector, handling over 90% of global processing activities.

In December 2023, China announced a ban on the extraction and separation of rare earth elements (REE). Researchers such as Andrew-Speed and Hove predicted this move earlier in the year, suggesting that China might extend the ban to include the export of specific REE technologies, such as magnets, in response to the U.S. ban on semiconductor exports (2023). Other scholars, such as Baskaran who observed the recent ban imposed by the Chinese

government, believe it will have significant implications for U.S. national security, economic interests, and REE security (2024). This policy shift by China could signify another important turning point in the global REE market, similar to the strategic adjustments seen in 2010.

In addition to the LREEs, China has an even more dominant position in the heavy rare earth elements (HREEs), which are the REEs vital for applications in national defense and military applications. China processes nearly 90 percent of the world's REEs, separating 99 percent of the HREEs. In his 2012 article, "The Strategic Implications of China's Rare Earths Policy," Bilsborough discusses the potential for China to exert significant pressure on the U.S., particularly in the sector of HREEs, since the U.S. has limited domestic deposits that are difficult to develop without extensive and time-consuming geological analysis. Despite efforts to shift to international sources, the U.S. continues to face challenges in its rare earth supply situation. As Bilsborough pointed out, "In light of the paucity of HREE (heavy rare earth elements) production outside of China, the United States would find slim pickings in the event of a supply cut-off (2012).

Chapter 4

Global Responses to China's Rare Earth Policy

The 2014 WTO Dispute

Legal Challenges on The 2010 Diaoyu Dao Incident

In 2009, the United States and the European Union filed a complaint against China with the World Trade Organization (WTO). They claimed that China's export restrictions, such as quotas, export taxes, and minimum export price settings, violated WTO rules. According to Mancheri (2018), the U.S. and the European Union then challenged China's allocation and administration of these measures as attempts to satisfy domestic demands internally while also manipulating international mineral prices.

In turn, China defended its policies by citing Article XX of the General Agreement on Tariffs and Trade (GATT) for reasons of natural resources conservation and environmental protection (Mancheri and Marukawa 2016, 49), in which the article officially recognizes this protective action taken by China in the REE sector by allowing trade-restricting measures for the purpose of conserving exhaustible natural resources only if such measures are made effective in conjunction with restraints on domestic production or consumption (Mancheri and Marukawa 2016, comment on Price and Nance 2010). This provision of the GATT has been used in several WTO disputes involving the use of environmental measures (Mancheri and Marukawa 2016, 49). The Chinese government also cited other provisions allowing the temporary use of export restrictions to prevent or relieve critical shortages of foodstuffs or other products essential to the exporting countries. However, these provisions had not been used in any GATT or WTO disputes before 2011 (Mancheri and Marukawa 2016, 49, comment on Bridges Weekly 2011).

The tension in the trade dispute came to a head in the 2010 Diaoyu Dao incident, when China imposed restrictions on REE supplies to Japan during a territorial dispute. This move not only alarmed Japan but also raised global concerns over energy security and the stability of critical mineral supply chains (Mancheri et al. 2018). According to Müller and Schweizer, given China's quasi-monopoly in the REE sector, the international community has raised awareness that China will misuse its dominant position to maximize its profits at the expense of other REE user industries. These export restrictions prompted the U.S. to lodge a formal complaint against China at the WTO in 2012 (Müller and Schweizer 2016). In August 2014, ruling in favor of the U.S., the E.U., and Japan, the WTO mandated China to remove export tariffs and quotas, asserting that such practices were against the rules set forth for international trade (Müller and Schweizer 2016, comment on WTO 2014). In response to this ruling and mounting international pressure, China officially abolished its quota system in January 2015.

Building Collective Resilience and Alternative Supply Chains

Securing the Global Supply Chain within the "Buyers' Club"

Buyer countries often respond to weaponized interdependence by practicing trade diversification. In the case of China's dominance in the REE sector, when China disrupts trade with the target state, the target state finds alternative export markets for those same goods (Cha 2023, 103). Beyond legal challenges, affected countries have also taken strategic steps to build resilience against China's REE dominance through international collaborations. By diversifying supply chains and securing alternative sources, countries have reduced their dependency on China for REEs. Major movements like Japan's long-term supply agreements with Australia's Lynas Group and the Five Eyes critical mineral alliances in Greenland illustrate these efforts. These agreements and collaborations exemplify how nations outside China proactively address

the risks associated with China's control over REEs and strengthen their economic and geopolitical security, illustrating the logistics underneath the global alliances in a more thorough way.

International Trade Agreements. China's imposition of export quotas has directly impacted global supply chains, influencing international prices and reducing system resilience. According to Machacek and Fold, the significant price increase due to China's export curbs from 2010 to 2011 catalyzed investment in non-Chinese primary REE production. Countries like the U.S., Australia, and Canada capitalized on these circumstances by opening new mines or reviving production facilities domestically (Mancheri et al. 2018, comment on Machacek and Fold 2014). Following the Diaoyu Dao incident in November 2010, Japan also negotiated a tentative long-term supply agreement with Australia's Lynas Group. According to Dreyer, this trade agreement between Japan and Australia, confirmed early the following year and expanded until 2020, now secures 30 percent of Japan's REE needs from Lynas (Dreyer 2020, 3). Starting in 2011, the U.S., Australia, and Russia began to increase or restart their production. Production outside China increased from 3,380 tons in 2010 to 21,200 tons in 2016, reducing China's market share to 83 percent (Shen et al. 2020).

Collaborations in Greenland. The formation of a Five Eyes (FVEY) critical mineral alliance focusing on Greenland illustrates the U.S.' and its allies' strategic efforts to counterbalance China's dominance in the REE sector. The cooperation within FVEY has been seen as an effective strategy to address U.S. concerns about energy security, with the three most prolific countries in Greenland's mining sector being the United Kingdom, Australia, and Canada (Menezes 2021, 8). During the Trump presidency, the increased focus on Greenland in U.S. foreign defense and security policy was more understandable when considering Greenland's

significant natural resources and the heightened competition between the United States and China. Greenland's abundant deposits of critical minerals, including REEs, provide the U.S. and its allies a strategic opportunity to lessen their dependence on China for resources, enhancing their resource security and strategic competitiveness in defense, renewable energy, and high-tech sectors (Menezes 2021). As of February 2021, there were 41 entities holding mineral exploitation, exploration, and prospecting licenses in Greenland. Notably, 27 companies are primarily British, Canadian, or Australian. Among them, Hudson Resources Inc. and Hudson Greenland A/S (Sarfartoq Project), as well as Rimbal Pty Ltd. and Tanbreez Mining Greenland A/S (Kringlerne Project), are exploring REEs (Menezes 2021, 11-13). These two projects, led by key U.S. allies Canada and Australia, highlight the collective efforts to diversify the global REE supply chain.

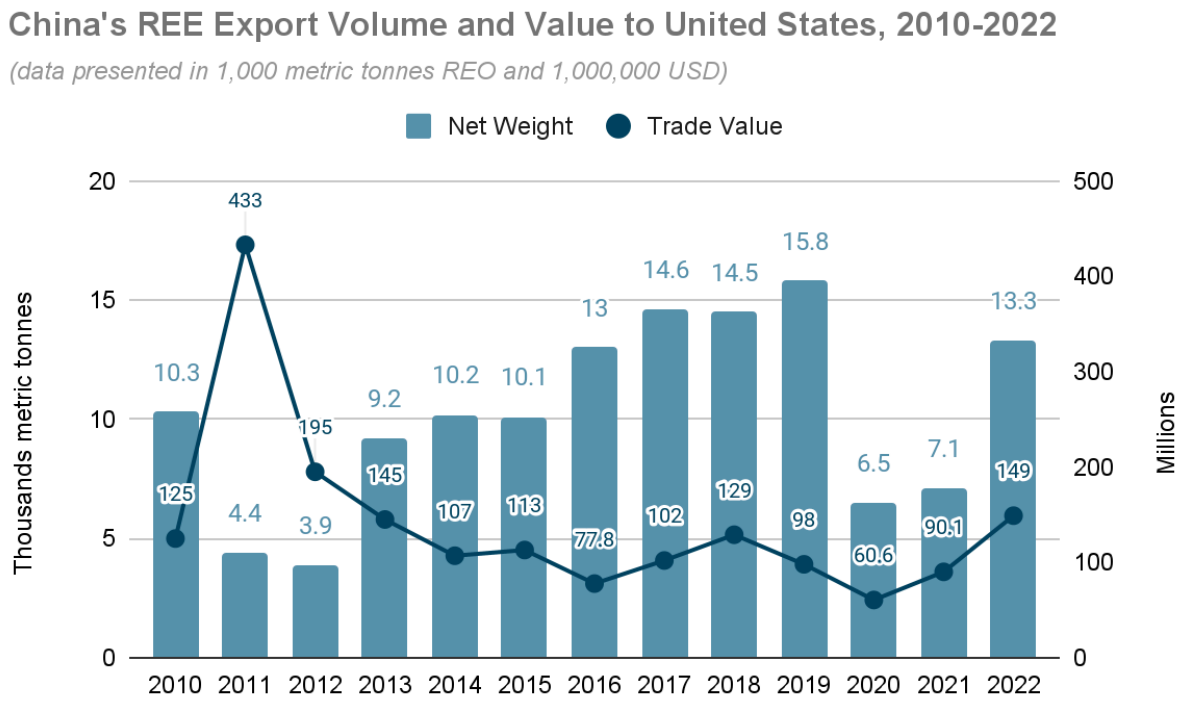

Figure 4.1. *China's REE Export Volume and Value to United States, 2010-2022.*
Source: ResourceTrade.earth, Chatham House, UN Comtrade Database.

Chapter 5

Geopolitical Implications

China's focus on energy security concerning REEs has been around for a long time. Deng Xiaoping, the Chinese leader responsible for launching the country's economic reform and opening up, famously equated China's wealth of REEs to the Middle East's oil reserves, stating that "The Middle East has oil. China has rare earth metals." In the 20th century, the world experienced energy shocks due to a lack of supply chain resilience and diversification, concentration of energy resources, and geopolitical events such as the Arab Oil Boycott of 1973 and the Iran Hostage Crisis (Cohen 2023). As countries transition from fossil fuels to green energy, these GVC vulnerabilities on the supply chain seem to continue to persist in the 21st century, bringing the same amount of risks and insecurities. As Cohen mentioned, Europe was only able to move away from Russian energy supplies due to a warm winter, renewable energy infrastructure, gas storage, reduced consumption, and alternate suppliers in the Middle East and North America (2023).

Growing Partnership or Growing Tensions?

Scholars tend to divide the opinion regarding this topic into two distinct ways. For example, driven by China's rising assertiveness and its strategic foreign policy behavior, in the past decade, discussion on the future geopolitical map - especially in East Asia - tended to vacillate between two alternative narratives: one marked by robust economic growth, increased interdependence, and the growth of Asia regionalism, and the other characterized by 'increased tensions, rising military budgets, and slower economic growth' (Yeo 2019, 446, comment on Hass 2013). While many scholars have been arguing whether China's strategic leverage of REEs

has led to growing partnerships or has increased tensions and the spiral of insecurities among the international system, empirical studies conducted have shown that it has created a dual dynamic of both - just on different sides of the geopolitical context and countries involved. While China has leveraged REEs to form new partnerships, particularly with increasingly growing developing countries within the BRICS and resource-rich regions like the Middle East, its actions have also intensified geopolitical tensions and increasing scales of competitions with existing great powers such as the United States. This phenomenon has also been described by Yeo (2020, 464), that China's rising assertiveness has led to an intensification of balancing behavior adopted by other countries, especially within East Asia. Understanding these contrasting yet concomitant outcomes of both cooperative and adversarial international trade partnerships and diplomatic relations is essential for comprehending the geopolitical implications of China's REE policies.

European Union's Green Technology Transition and Increasing Demand for REEs

The need for a green technology transition has made European countries more dependent on China for REE imports. According to the European Council on Foreign Relations' report "The Geopolitics of the European Green Deal," driven by the need to transform the economy to an environmentally sustainable level, the European Union introduced the European Green Deal in December 2019. The European Green Deal outlines that the E.U. must develop new trade and investment agreements and adopt a new form of international diplomacy to encourage sustainable investment and development. The E.U.'s third goal within the framework was to build a 'greener Europe,' which will depend more on imports of products and raw materials that serve as inputs for clean energy and clean technologies (Leonard et al. 2021, 3). REEs are among the most important critical materials essential for battery production. Importing REEs from

China is vital, as Europe has no significant mining or processing activities for these critical minerals (Leonard et al. 2021, 12).

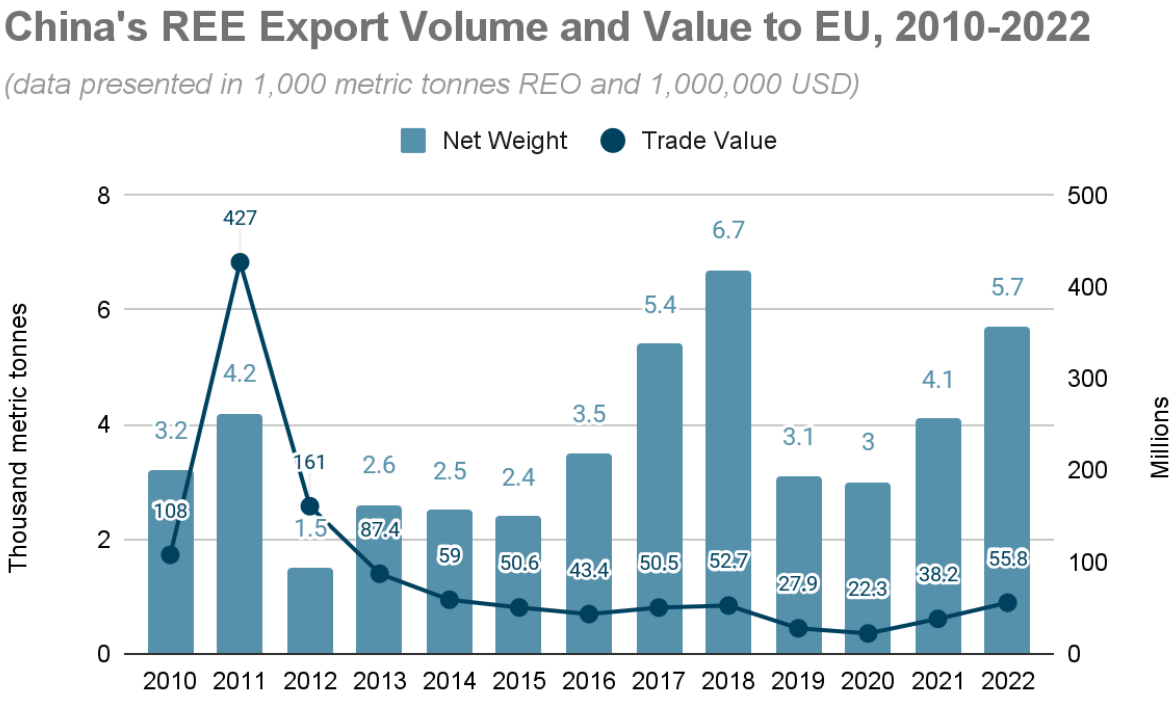

Figure 4.2. *China's REE Export Volume and Value to EU, 2010-2022*.
Description: This figure highlights the impact of China's export policies on the European Union (EU)'s REE imports. The gradual recovery in export volumes from 2020 to 2022 suggests a strengthened trade relations after the European Green Deal launched in December 2019, although fluctuations in trade values indicate ongoing market adjustments by the EU to diversify its REE sources.
Source: ResourceTrade.earth, Chatham House, UN Comtrade Database.

Though China is a major supplier of minerals like REEs that are of essential importance to the European Green Deal, its ability to use this dependency for strategic leverage is limited in practice (Leonard et al. 2021, 23). Due to domestic economic challenges and geographical constraints, China is losing its advantage in low-cost labor in the REE sector from the lower end (Jiang 2016, 23). More countries prefer importing REEs from other developing countries like Malaysia, Vietnam, and Myanmar in Southeast Asia. China has made significant investments in developing the medium- to high-end REE industry. However, these sub-sectors are still mainly

dominated by developed countries such as the United States and European countries, showing that China has a long way to go. The European Green Deal encourages stronger ties between the E.U. and China, giving China more influence in the global market for REEs and potential high-tech innovation acquisitions through deals with the E.U. With its abundant REE resources, China also has the leverage to gain more knowledge in high-tech sectors from European countries. Given China's current challenges and its pressing need for medium- to high-end technological innovations, it is not surprising that China prefers to collaborate rather than use its geopolitical power to engage in competition. The E.U. is anticipated to engage in more trade and agreements with China on the international stage.

China's Strategic Alliances Through the BRICS Expansion

In 2009, BRICS was first formed with four countries: Brazil, Russia, India, and China; after one year, South Africa joined this multilateral forum at the invitation of China, and here came the 'BRICS.' The impressive gross territorial-demographic characteristics determine the global role of BRICS. The enormous territorial areas of its member countries and the diversity of geological settings endowed them with various solid mineral resources, providing an exclusively important role in the supply of mineral resources to the world economy (Dergachev 2021, 471). Within the BRICS, China has been a primary provider in the REE sector as it is the world's largest producer. In 2023, Chinese President Xi Jinping advocated expanding the grouping to become a geopolitical rival to the G7 (Baskaran and Cahill 2023). Twenty-three countries submitted applications to join the BRICS, and six of them were selected: Argentina, Egypt, Ethiopia, Iran, Saudi Arabia, and the United Arab Emirates (UAE) (Baskaran and Cahill 2023).

As promoted by China, this expansion of BRICS has geopolitical significance in continuing to build on its REE sector. The selection of new member states is also strategic in this

part, as over half of the newest cohort of the BRICS are engaging with “fuels of the future,” especially REEs, which are vital for all green technology. The addition of Argentina will strengthen the bloc’s lithium supply, positioning BRICS with three of the five largest lithium producers in the world alongside China and Brazil (Baskaran and Cahill 2023). Egypt has massive solar potential in the desert, significant REE endowments, and human capital to match (Cohen 2023). Ethiopia also has a wide array of REEs and industrial minerals dispersed throughout its mountainous landscape (Cohen 2023). After this expansion, BRICS would have 72 percent of REEs and three of the five countries with the largest reserves (Baskaran and Cahill 2023). According to Cohen, BRICS’ Chinese-driven monopoly on REE refining would be further consolidated with plenty of resource inputs from this extension (2023). Regard to the CSIS Critical Questions by Gracelin Baskaran and Ben Cahill on August 25, 2023 - one week after Chinese President Xi Jinping’s announcement to expand the BLOCS - it is likely that the expanded BRICS will take a similar approach to the Minerals Security Partnership (MSP), which is a U.S.-led initiative to strengthen critical energy security for itself and 13 of its allies, as it brings together large mineral resource holders and the fastest growing energy consumers.

Increasing Tensions in the U.S.-China Relations

As early as before the 2010 Diaoyu Dao incident, the U.S. government has begun to pay attention to China’s dominant position in the REE sector. During the Trump Administration, the U.S. government prioritized diversifying away from relying on China for REE imports and increasing mining and processing capacity through domestic and international partnership diplomacy (Oh et al. 2021, 18). In 2018, the U.S. Defense Department published “Assessing and Strengthening the Manufacturing and Defense Industrial Base and Supply Chain Resiliency of the United States,” which listed among its key findings the growing risk of U.S. over-reliance on

China for strategic and critical minerals, including REEs. In 2020, the Trump Administration issued another executive order targeting REEs to rebuild domestic production (Oh et al. 2021, 19).

On the international partnership diplomacy level, the U.S.-China competition has increased international cooperation initiated separately by each country. Increasing threat perceptions of China have resulted in these balancing efforts, which are marked by aligning more closely with the U.S. allies (Yeo 2020). The State Department in 2019 launched the Energy Resource Governance Initiative (ERGI). Under this initiative, the U.S. has sought to promote the development of minerals and metals sectors in countries endowed with these natural resources that have not yet been developed at a commercial scale. Ten countries joined this initiative: Canada, Australia, Brazil, Botswana, Peru, Argentina, the Democratic Republic of Congo, Namibia, the Philippines, and Zambia (Oh et al. 2021, 19).

Moreover, the U.S. has also been trying to build a closer relationship with developed countries within the E.U. and the U.K. to eliminate their over-reliance on REEs from China. Apart from China's expanding route on BRI and BRICS for further connections with other countries through REE resources and relevant infrastructure and technology constructions, according to Cohen's "Resource Realism: The Geopolitics of Critical Mineral Supply Chains," the U.S., the E.U., Japan, and the U.K. are exploring creating a critical mineral "buyers club" to reduce their reliance on China for REEs. The U.S. has launched the US-UK Atlantic Declaration on a critical mineral agreement, which would allow UK-sourced components to become eligible for credits. This US-UK Atlantic Declaration aims to "build resilient, diversified, and secure supply chains and reduce strategic dependencies." It has also mentioned that the Western world faces "new challenges to international stability - from authoritarian states such as Russia and the

People's Republic of China (PRC); disruptive technologies; non-state actors; and transnational challenges like climate change." The U.S. and the E.U. have also entered into similar negotiations, and the U.S. and Japan signed a critical minerals agreement in March 2023 (Cohen 2023).

Future Trajectory of China and East Asian Security

Despite having helped China build alliances with developing countries in Africa and Latin America, China's REE policies for the past decade have simultaneously caused Western countries to raise their awareness and start cooperating in responding against China's nearly quasi-monopoly in the REE sector. This perspective can be traced back to many scholarly articles published in 2010, when China had, for the first time, leveraged its REE dominance in forcing Japan into the territorial dispute. Yeo (2020, 463) pointed out that the global-shared perception of China's rising assertiveness in the late 2000s, especially its embargo on Japan in 2010, has dramatically changed East Asia regional projects, and practitioners turned to more pragmatic interpretations of security practices considering the power balancing and institutional rivalry that has been escalated over the past two decades. Driven by the 2010 Diaoyu Dao incident and China's growing assertiveness in the South China Sea, not only the United States has started to build a closer relationship with East Asian countries - China's neighbor countries - but these regional state actors have also correspondingly aligned themselves more closely with the United States. According to Yeo (2020, 445), this scenario can be interpreted as a sign of increasing balancing behavior from several actors who are fearful of China's intentions.

Since 2010, China has been seen as taking a more assertive stance toward incorporating its dominance in the REE industry into its foreign policies. It has been widely asserted that by observing the Western world's use of economic sanctions as a tool, China has already learned to

utilize this strategy for its purposes. As mentioned by scholars like Bilsborough, China's questionable REE export cut-off following the detainment of the aforementioned Chinese ship captain has given rise to the worrying perception that China's REE objectives and motivation are more than its quest for economic growth (2012). From a broad perspective, coupled with the difficulty of penetrating China's decision-making logic concerning REEs, the situation also offers fertile ground for security spirals (Bilsborough 2012). The analysis by Feigenbaum and Szubin in 2023 also sheds light on how China's strategy concerning its REE trade is increasingly focused on leveraging international partnerships rather than purely economic interests. This strategic shift is likely to be informed by observations from the Ukraine War, which underscored the strategic value of international alliances beyond straightforward economic transactions. Given China's comparable political positioning to Russia in the international system, but with a significantly larger economic capability, it is positioned to adopt similar strategies for geopolitical influence (2023).

The security dilemma is not only centering on China's growing assertiveness, or we can say that it is only a point of the initiation; the real problem, which is even harder to solve, is the correspondingly changed balancing behavior of the rest of the world, which seems to only work for escalating the tension and forces China to take a further step to maintain its current status of internal development and external global partnerships. In other words, China's growing assertiveness in recent years might also be a reaction to the collective countermeasures taken by the U.S. and U.S. allies, which aimed to reduce their dependence on China for REEs - for example, the U.S. ban on the semiconductor industry to China. As Liff and Ikenberry (2014, 86), cited by Yeo (2020, 459) have summarized, 'China's growing power and regional relationships, marked by widespread uncertainties and insecurities about the future, appear to be important

facts of life in the contemporary Asia-Pacific. Political frictions and mistrust among major actors in this unfolding drama are exacerbating the effect of objectively measurable and rapid material shifts.'

Conclusion

This thesis examines how China has strategically used rare earth elements (REEs) in its foreign policy since 2010 and the impact on global energy security and international alliances. The paper concludes that China's control of the REE market has given it significant geopolitical influence through export restrictions, industry consolidation, and strategic partnerships. This has affected global supply chains and trade relationships, especially in the context of the growing demand for REEs in green technology transition. These strategic actions have both strengthened global partnerships and increased tensions with other major powers, particularly among countries that are major buyers of REEs.

This research highlights the crucial role of REEs in geopolitics and the necessity for strategic international cooperation to ensure energy security and stability in a rapidly changing world. The findings not only underscore the need for coordinated efforts among nations to manage the risks associated with the concentration of REE resources, contributing to a more resilient and secure global supply chain, but also emphasize the complex dynamics of cooperation and tension characterizing China's interactions with other major powers and developing countries. This provides a nuanced understanding of the multifaceted impact of China's REE strategies on the global stage and the global response to China's security challenges, which also serve as a catalyst for China's further steps in defending itself.

Reference List

Bordoff, Jason, and Meghan L. O'Sullivan. 2023. "The Age of Energy Insecurity: How the Fight for Resources Is Upending Geopolitics." *Foreign Affairs*. https://www.foreignaffairs.com/world/energy-insecurity-climate-change-geopolitics-resources

Cohen, Jared. 2023. "Resource Realism: The Geopolitics of Critical Mineral Supply Chains." *Goldman Sachs*. https://www.goldmansachs.com/intelligence/pages/resource-realism-the-geopolitics-of-critical-mineral-supply-chains.html

Feigenbaum, Evan A., and Adam Szubin. 2023. "What China Has Learned From the Ukraine War." *Foreign Affairs*. https://www.foreignaffairs.com/china/what-china-has-learned-ukraine-war#:~:text=In%20the%20wake%20of%20the,behalf%20of%20a%20third%20party

Runde, Daniel F., and Austin Hardman. 2023. "Elevating the Role of Critical Minerals for Development and Security." *CSIS*. https://www.csis.org/analysis/elevating-role-critical-minerals-development-and-security

Cha, Victor D. 2023. "Collective Resilience: Deterring China's Weaponization of Economic Interdependence." *International Security, 48* (1), 91-124.

Mastro, Oriana. S., and Derek Scissors. 2022. "China Hasn't Reached the Peak of Its Power: Why Beijing Can Afford to Bide Its Time." *Foreign Affairs*. https://www.foreignaffairs.com/china/china-hasnt-reached-peak-its-power

Yeo, Andrew. 2020. "China's Rising Assertiveness and the Decline in the East Asian Regionalism Narrative." *International Relations of the Asia-Pacific, 20*(3), 445-475. https://doi.org/10.1093/irap/lcz013

Mancheri, Nabeel A., Benjamin Sprecher, Gwendolyn Bailey, Jianping Ge, and Arnold Tukker. 2018. "Effect of Chinese Politics on Rare Earth Supply Chain Resilience." *Resources, Conservation and Recycling, 142*, 101-112. https://doi.org/10.1016/j.resconrec.2018.11.017

Andrew-Speed, Philip, and Anders Hove. 2023. "China's Rare Earths Dominance and Policy Responses." *The Oxford Institute For Energy Studies*. ISBN 978-1-78467-208-9.

Dreyer, June T. 2020. "China's Monopoly on Rare Earth Elements - and Why We Should Care." *Foreign Policy Research Institute*.

Sutter, Karen M. 2019. "Trade Dispute with China and Rare Earth Elements." *Congressional Research Service*.

Menezes, Dwayne R. 2021. “The Case for a Five Eyes Critical Minerals Alliance Focusing on Greenland.” *Geopolitics of Minerals Journal, 4*(2), 115-134. ISBN: 978-1-8384420-0-2.

Bilsborough, Shane. 2012. “The Strategic Implications of China’s Rare Earth Policy.” *Journal of Strategic Security, 12*(4), 45-64.

Müller, Maximilian A., Denis Schweizer, and Volker Seiler. 2016. “Wealth Effects of Rare Earth Prices and China’s Rare Earth Elements Policy.” *Journal of Business Ethics, 138*, 627-648. https://doi.org/10.1007/s10551-015-2773-3

Chen, Ling S., and Miles M. Evers. 2023. “‘War without Gun Smoke:’ Global Supply Chains, Power Transition, and Economic Statecraft.” *International Security, 48*(2), 164-204. https://doi.org/10.1162/isec_a_00473

Baskaran, Gracelin. 2024. “What China’s Ban on Rare Earths Processing Technology Export Means.” *CSIS*. https://www.csis.org/analysis/what-chinas-ban-rare-earths-processing-technology-exports-means

Shen, Yuzhou, Ruthann Moomy, and Roderick G. Eggert. 2020. “China’s Public Policies Toward Rare Earths, 1975-2018.” *Mineral Economics, 33*, 127-151. https://doi.org/10.1007/s13563-019-00214-2

Jiang, Chun. 2016. “China in Global Value Chains: Implications for Industrial Policy and Development.” Master’s thesis, Duke University.

IEA. 2021. “The Role of Critical Minerals in Clean Energy Transitions.” *IEA*. https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions

Mancheri, Nabeel A., and Tomoo Marukawa. 2016. *Rare Earth Elements: China and Japan in Industry, Trade, and Value Chain.* Institute of Social Science, University of Tokyo.

Hurst, Cindy. 2011. “Japan’s Approach to China’s Control of Rare Earth Elements.” *China Brief, 11*(7). https://jamestown.org/program/japans-approach-to-chinas-control-of-rare-earth-elements/

Patrahau, Irina, Ankita Singhvi, Michel Rademaker, Hugo van Manen, René Kleijn, and Lucia van Geuns. 2020. “Securing Critical Materials for Critical Sectors: Strategies applied by the Netherlands, the EU and China.” *Hague Centre for Strategic Studies*. ISBN/EAN: 9789492102805. https://hcss.nl/wp-content/uploads/2021/01/Securing-Critical-Materials-for-Critical-Sectors.pdf

Patrahau, Irina, Hugo van Manen, Tycho de Feijter, and Michel Rademaker. 2020. “Standards for Critical Raw Materials: Strategic standard setting in China, the EU and the Netherlands.”

Hague Centre for Strategic Studies. ISBN/EAN: 9789492102775. https://hcss.nl/wp-content/uploads/2021/01/Standards-for-Critical-Raw-Materials.pdf

Leonard, Mark, Jean Pisani-Ferry, Jeremy Shapiro, Simone Tagliapietra, and Guntram Wolff. 2021. "The Geopolitics of the European Green Deal." *European Council on Foreign Relations*. https://ecfr.eu/publication/the-geopolitics-of-the-european-green-deal/

Oh, Miyeon, James Hildebrand, and Harry Ws Lee. 2021. "Enhancing US-Japan Cooperation on Global Supply Chain." *Atlantic Council Scowcroft Center for Strategy and Security*. https://www.atlanticcouncil.org/in-depth-research-reports/issue-brief/enhancing-us-japan-cooperation-on-global-supply-chains/

Dergachev, A. L. 2021. "The Mineral Resource Sector of BRICS Countries: Mutual Supplies and Regulation of the Global Market of Mineral Raw Materials." *Moscow University Geology Bulletin 76*, 471-481. DOI: 10.3103/S0145875221050070.

Cohen, Ariel. 2023. "BRICS Expansion: China's Energy Victory?" *Forbes*. https://www.forbes.com/sites/arielcohen/2023/09/13/chinas-fake-victory-from-brics-energy-expansion-global-energy/?sh=452b549c543b

Baskaran, Gracelin, and Ben Cahill. 2023. "Six New BRICS: Implications for Energy Trade." *CSIS*. https://www.csis.org/analysis/six-new-brics-implications-energy-trade

Haque, Nawshad, Anthony Hughes, Seng Lim, and Chris Vernon. 2014. "Rare Earth Elements: Overview of Mining, Mineralogy, Uses, Sustainability and Environmental Impact." *Resources, 3*(4), 614-635. https://doi.org/10.3390/resources3040614

Resource Trade Earth. 2024. *Chatham House, UN Comtrade Database.* Accessed May 24, 2024. https://resourcetrade.earth/?year=2018&importer=392&category=187&units=weight&autozoom=1

US Geological Survey. 2024. "Mine Production of Rare Earth Elements Worldwide from 2010 to 2023 (in 1,000 Metric Tons REO)." Graph. In *Statista*. Retrieved April 10, 2024.https://www.statista.com/statistics/1187186/global-rare-earths-mine-production/

TrendEconomy. 2024. "Trade of Commodity 2805: Total for 2010-2022." Accessed April 10, 2024. https://trendeconomy.com/data/commodity_h2?commodity=2805,TOTAL&indicator=TV,tv_wrld_share&trade_flow=Export,Import&time_period=2022