Power Politics of Rare Earth Elements: A Strategic Contest Between the US and China

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Abstract:

This paper argues that the race for rare earth elements (REEs) has become a defining feature of contemporary great power rivalry. At the center of this contest is China's near monopoly across the REE value chain. While holding a majority in global mining output, Beijing's decisive advantage lies in processing and refining because it processes over 80% of the world's rare earth. In contrast, the United States has reserves but lacks domestic capacity, which forces it to ship raw materials to China for separation and production. This asymmetry has enabled China to convert supply chains into instruments of coercion. Through exports and technology control measures, China has demonstrated how resource leverage can be deployed against adversaries in defense and high-tech industries. The US and its partners are now moving to break this dependency, aiming to build domestic capacities and resilient supply chains. This paper argues that this rivalry is shifting towards geopolitical control, technological supremacy, and control of foundations of advanced industries.

Keywords: Critical Minerals, Rare earth elements, United States, China, national security, global supply chain, vulnerability, strategic competition

Introduction:

In 21st century geopolitics and economic policy, critical minerals have gained great importance. According to the US Energy Act 2020, a mineral is deemed "critical" if it is essential to economic or national security, its supply chain is vulnerable to disruption, it cannot be replaced in manufacturing without major consequences whether higher costs for vital technologies, slower growth of clean energy or risks to defense and communication systems. Examples include lithium for EV batteries and gallium for semiconductors, along with cobalt, nickel etc. These

minerals are strategic assets for clean energy systems, advanced technologies and national defense. Their supply risk stems from geopolitical factors and technological shifts, such as increased demand that can outpace production capabilities. Within these critical minerals, rare earth elements (REEs) occupy a unique position.[1]

In the current era, technological supremacy and military capability are no longer determined only by capital and innovation. They are increasingly tied to these elements buried in the earth. Without them, modern defense, including AI-powered technology, and energy systems cannot function. This dependency has turned REEs into a strategic fault line. China spent four decades establishing its dominance in the REE market. Through state subsidies, vertical integration and tolerance for environmental costs, it came to control not only extraction, but the far more complex stage of separation and refining in the whole world. As a result, today it dominates supply chains, investments, technological expertise, processing capability and global patents. The US, by contrast, lacked this capacity due to high costs, environmental concerns and lack of proper infrastructure.

Today it mines ore but ships it abroad, largely to China, for processing. This imbalance has now become political. China has shown a willingness to restrict rare earth flows as diplomatic leverage, such as in 2010 and again with the 2023 export controls on processing technologies. The US has responded by treating rare earths as a national security issue. Funding, legislation, rare earth diplomacy and allied partnerships are being mobilized to construct supply chains that circumvent Chinese nodes. The shift from US-China cooperation to competition was slow. It happened when tariffs were imposed by US President Donald Trump during the 2017 trade war with China, which ended economic cooperation between them. This shift was prompted by concerns over China's military modernization, aggression and ongoing trade disputes.[2]

But China didn't respond with tariffs but instead reduced its exports of rare earths, which caused disruptions in US defense and EV supply chains. This demonstrated the vital role of REEs for a state's national and economic security. This paper uses US-China rare earth rivalry as a case

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[1] Chaitanya Gupta, "Critical Minerals Explained: Why They Matter for Geopolitics, Clean Energy & Tech." *The Belfer Center for Science and International Affairs*. October 30, 2025 https://www.belfercenter.org/explainer-what-are-critical-minerals.

[2] Ian Murphy and Kevin Johnston, "How China's Focus on Rare Earth Minerals Reshapes the World," *Journal of Advanced Military Studies, vol. 1*, November 1, 2025 https://muse.jhu.edu/article/966874

study to explain a broader shift: from competition over who owns resources to competition over who controls the chokepoints in processing and manufacturing. It argues that rare earths are not only a commodity dispute. They are revealing how economic interdependence is being re-engineered into geopolitical weaponry, and how states are attempting to build resilience in response.

The Strategic Significance of Rare Earth Elements (REEs):

In an era where global influence is determined more by semiconductor manufacturing and high-tech sectors rather than by oil reserves, the critical yet often overlooked rare earth elements (REEs) have surfaced as a geopolitical factor. The increasing strategic focus highlighted by talks of potential alliances such as those involving the US and Ukraine emphasizes the intensifying competition for technological independence and a competitive advantage. REEs consist of 17 metallic elements, which include 15 lanthanides along with scandium and yttrium. These metals have exceptional conductivity and magnetism, which makes them highly valuable when combined with other elements. Although REEs are comparatively abundant in Earth's crust, their separation and collection are difficult since they are rarely found in high quantities that are profitable to mine and process. Instead, they are usually mixed with other elements. Electric vehicles, chip production, renewable energy technology, and military applications all depend on wide range of these materials. Despite being dispersed throughout the world, many rich nations with unexplored deposits are increasingly using these resources to obtain a political and economic edge.

Extracting and separating REEs is a tough and cost-extensive process. In order to separate valuable ores from waste (tailings), rare earth mineral mining starts with excavating rock or sand from the ground and sifting it. After that, the ore is further processed to extract the various metals. Solvent extraction, which dissolves rare earth mineral ores into two immiscible liquids, is the method most frequently used. Then, different acids are added to the mixture in order to extract various elements from the ore. This procedure is done hundreds or thousands of times. Since REEs are known to be highly unstable and reactive, using different acids makes it easier to extract them and reach 99.9% of purity. Due to their expertise in precisely removing different elements, commercial extraction companies that have refined this technique over time have a

substantial advantage. Other cutting-edge techniques that provide more sustainable options include phytomining, which is the process of extracting elements from plants and extraction from commercial waste, such as tailings and outdated electronics.[3] Purifying REEs is extremely difficult because they occur together. That's the reason, despite their high natural abundance, they are named "rare" as their separation from one another is the most difficult and expensive task. [4]

Table 1: Strategic Applications of Rare Earth Elements

Name	Group	Usage
Lanthanum	Light REEs	Radar and sonar transducers, radiation detection, renewable energy (photovoltaic cells), energy storage and making jet fuel
Praseodymium	Light REEs	AI chips, aerospace alloys, wind turbines, fighter jets, drones and naval radars
Neodymium	Light REEs	EV motors, AI chips, wind turbines, sensors, smart bombs, guided weapons and cruise missiles
Promethium	Light REEs	Nuclear batteries
Samarium	Light REEs	Nuclear control systems
Scandium	Heavy REEs	Aluminum alloys for aerospace
Dysprosium	Heavy REEs	EV motors, wind turbines, AI chips, precision weapon systems and missile guided systems
Terbium	Heavy REEs	Missile guided systems, magnets, AI chips, wind turbines

[3] Taha Badar, "Global Geopolitical Scramble for Rare Earth Elements," *Center for Strategic and Contemporary Research*, August 4, 2025. https://cscr.pk/explore/themes/trade-economics/global-geopolitical-scramble-for-rare-earth-elements/

[4] Miao‐Miao Huang, Jun Tan, Liu‐Yin Xia, Kai Han, Hong‐Yan Cai, Xin Ma, and Shuai Wang. "A Comprehensive Review of Adsorbents for Rare Earth Separation: Design, Synthesis, Adsorption Performance, and Mechanisms," *Wiley Online Library*, December 26, 2025. https://onlinelibrary.wiley.com/doi/10.1002/rar2.70056

Yttrium	Heavy REEs	Aerospace, chip-making
Holmium	Heavy REEs	Nuclear reactors

Source: Author's compilation, information based on secondary source of data

Continuity and Change in Resource-Driven Conflicts:

The historical pursuit of resources has significantly shaped military campaigns and geopolitical strategies across various civilizations. Roman ambitions drove military campaigns throughout Europe, North Africa and Near East, with regions like the Po River Valley, Gaul, and present-day Tunisia becoming focal points for grain production. Egypt was often cited as the "Breadbasket of the Roman Empire." Similarly, Genghis Khan's conquests in China and Persia were motivated by the desire for fertile lands. The industrial revolution of 18th century marked a pivotal shift, as oil and natural resources gained prominence, which led to colonial conflicts like the Scramble for Africa where European powers exploited resources, as exemplified by Belgium's exploitation of the Congo Free State, the Anglo-Zulu war and Anglo-Boer wars. South Africa had been a battlefield of colonial powers due to its massive gold and diamond reserves. The Maji Maji rebellion demonstrated local resistance to German exploitation of cotton plantations. Opium wars were another example of resource conflicts in Asia.

World War II also saw the competition over natural resources, with battles such as Stalingrad centered on oil fields. During this time, Hitler's plans intended to transform Ukraine into a Reich breadbasket. Coal and iron ore forced Japan to invade Manchuria as well as its military moves in the Pacific were driven by resource security, notably after the US oil embargo due to Pearl Harbor attack. The post cold war era saw conflicts around oil reserves in the Middle East, such as the Angolan civil war. In the contemporary era, oil continues to dominate as a strategic source, with the Middle East as a focal point. The Gulf War was also resource-driven due to Iraq's influence on global oil prices. Moreover, water disputes have escalated in regions like North Africa, South Asia and Middle East, as exemplified by conflicts surrounding Grand Ethiopian Renaissance Dam.

Resource-driven conflicts in the 21st century are more complex than ever, shaping geopolitical alignments, economic strategies and even military doctrines. Modern economics is heavily reliant on REEs which are crucial for technology and green initiatives. China's 60-70% domination over this resource, and control over a significant share of global mining has edged into diplomacy, causing international tensions as its policies impact the global supply chain. China's cut in REEs export due to its realization of acute energy security challenges triggered a set of trade disputes in WTO. Allegations of using REEs as political leverage have emerged amidst US-China trade disputes, which poses risks to the US defense sector, semiconductor industry and clean energy transition. [5]

China has Long Sought for Rare Earth Dominance:

The emergence of China's dominance in rare earths began in 1964 with the Chinese geologists' discovery of a massive rare earth deposit at an iron ore mine near Baotou, a set of 17 metals that have vital materials for today's global economy. This discovery drew the attention of Deng Xiao Ping, a prominent Chinese Communist Party official. He stressed the need to develop both steel and rare earths. Rare earth metals and magnets made from them are widely used in various military and civilian technologies, from cars to fighter jets. They provide China significant leverage in global manufacturing, especially in clean energy sectors like electric cars and wind turbines. The development of this sector has been a product of long-term planning, domestic and overseas investment, particularly from the Chinese government.

In the 1970s, the launch of a "little-known" research program by People's Liberation Army (PLA) led to research in rare earth for military applications. Under the leadership of Wen Jiabao in the late 20th century, China streamlined a fragmented industry dominated by private firms into a cohesive government-managed sector. It closed illegal operations of smugglers and addressed pollution issues. The sector grew in size and expertise. Historically, China's rare earth industry traces its roots back to Xu Guangxian, who despite challenges during the cultural revolution, developed groundbreaking refining techniques that made rare earth extraction more efficient. The Chinese military wanted the samples to experiment with battlefield lasers.

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[5] Eman Fatima, "Resource Wars: The Hidden Fuel Behind Most Conflicts," *Modern Diplomacy,* March 3, 2025. https://moderndiplomacy.eu/2025/03/03/resource-wars-the-hidden-fuel-behind-most-conflicts/.

Xu's work at Peking University established methods still used today. During the 1980s, production soared as China implemented a “Five-Year Pan” from 1981-1985 to enhance output, which led to the establishment of state-owned refineries in more than 100 towns and villages, but created environmental problems. Initially, rare earth had limited manufacturing applications such as making steel stronger, refining oil and polishing glass, but later advancements in magnetic technology shifted their significance dramatically. Major developments by companies like General Motors and Sumitomo Special Metals in 1983 revolutionized their utility, integrating them into eclectic motors. By 1986 China was the world’s largest producer of REEs. China’s acquisition of western magnet technology culminated with the sale of the Magnequench subsidiary in 1995 to a consortium that included two Chinese companies with ties to Deng Xiao Ping, marking a pivotal moment in China’s ascension in the rare earths market. In Valparaiso, Magnequench decommissioned equipment for a magnet factory in Tianjin and upgraded China’s outdated processes.

Following its acquisition by a Canadian firm, Magnequench enhanced China’s REE magnet production but exacerbated pollution by contaminating Yellow River from rare earth mining. In response, China’s premier Wen Jiabao imposed annual export quotas and initiated cleanup measures starting in 2006. During a diplomatic conflict with Japan, China secretly embargoed REEs exports which compelled Japan to negotiate, while criminal syndicates continued illicit trading. This marked a pivotal moment for China’s rare earth industry, as it led to increased governmental control and the development of extensive educational programs. By 2019, President Xi Jinping declared rare earths a strategic resource, and employed them in trade negotiations, notably in the trade war with the US. Despite advancements, the US and Europe lag behind in REE expertise. In recent times, China restricted exports of REEs processing equipment and outflow of critical knowledge by taking away the passports of rare earth technicians. China also stopped the exports of dysprosium and six other kinds of REE to the US and its allies, which signals its intention to maintain technological superiority. [6]

[6] Keith Bradsher, “Inside China’s Six-Decade Campaign to Dominate Rare Earths,” *The New York Times*, December 31, 2025. https://www.nytimes.com/2025/12/31/business/china-rare-earths-history.html.

China: The Dominant Player

The geopolitical importance of rare earth elements has intensified due to their high production concentration in China. Approximately 70% of the world's production and 85-90% of its processing capabilities are under Chinese control. This dominance is not accidental. Decades ago, China realized how important these components were strategically. China imposed restrictions on REE exports in 2010 due to a territorial dispute with Japan Senkaku Islands, which resulted in a 500% increase in pricing. This move showed that these resources could be used to exert geopolitical influence. In response, Japan established alternative supply chains and recycling innovations, and by 2022, it successfully reclaimed some 1200 tons of REEs each year from electronic waste. Access to REEs and the ability to process them have emerged as key fronts in the strategic competition between the US and China. Particularly, the aim of the "Made in China 2025" initiative was to target businesses that rely heavily on REEs which reflected China's commitment in building a strong nation. On the other hand, the US has strived to rebuild its domestic capabilities. According to Trump, China's dominance in this industry poses a threat to national security and represents a strategic setback for the US. He has labeled REEs as essential components for American might. In the course of his 2024 campaign, he warned: [7]

"How did we let China take total control of these critical minerals? They have every rare earth element needed for out jets, missiles, and advanced technologies in their grip. This situation is unacceptable, and I will fix it."

Other countries with considerable production or potential that the US competes with, or seeks to collaborate with are Australia, Brazil, Canada, Myanmar, and Russia.

Table 2: Major Rare Earth Reserves Holders

Major Countries	Total Reserves (MT)	2025 Global Production Share (%)	2026 Current Production (MT)
China	44,000,000	69.23%	270,000

[7] Elaheh Sadat Mousavi Nejad, "The New Resource Race: Rare Earth Elements in Global Power Politics," *Institute for Political and International Studies*, March 15, 2025. https://ipis.ir/en/newsview/764221/the-new-resource-race-rare-earth-elements-in-global-power-politics

Brazil	21,000,000	0.51%	4,000-5,000
India	6,900,000	0.74%	2,900
Australia	6,300,000	7.44%	13,000
Russia	3,800,000	0.67%	2,500
Vietnam	3,500,000	0.04%	300
United States	1,900,000	13.08%	45,000
Greenland	1,500,000	0%	0

Source: Author's compilation, information based on secondary source of data

China's rare earth reserves predominantly comprise light rare earth, while heavy ones are rarer, and thus more economically and militarily important. Major sites like Bayan Obo in Inner Mongolia, known for "Rare Earth Capital of the World" mainly produces light REEs which accounts for over 80% of the total country's reserves, while Maoniuping and Weishan are also rich in light reserves. Whereas, heavy REEs are primarily found in seven southern provinces such as Jiangxi, Hunan, Guangdong, Guangxi, Fujian, Guizhou and Yunnan, with Ganzhou city in Jiangxi and Longyan city in Fujian. Rare earth reserves are always changing. They decrease with mining and expand with new discoveries. As reported by China Geological Survey (CGS) in early 2025, a rare earth deposit had been discovered in the Honghe region of Yunnan province, with expected amounts about 1.15M tons of heavy rare earth. This discovery will strengthen China's strategic foothold in the domain of medium and heavy rare earths.[8]

Table 3: Countries Dependent on China's Rare Earth Metals and Compounds

Countries	**Value (%)**
Japan	37%
US	33%
Netherlands	16%
South Korea	5%

[8] Our China Story, "Which Province in China Has the Most Strategically Valuable Heavy Rare Earths?," October 27, 2025. https://www.ourchinastory.com/en/15916/Which-province-in-China-has-the-most-strategically-valuable-heavy-rare-earths?

India	3%
Vietnam	2%
Russia	2%

Source: [9]

Although rare earths provide China with a market niche, they are also extremely toxic because chemical infusions are needed to separate the rare earth metals that poison the land and water. When Chinese President Xi Jinping visited Ganzhou in May 2019, which was known for its polluting rare earth mining, he promised to spend up to $5B to solve the city's environmental issues. [10] Ganzhou is known as the Rare Earth Kingdom and is a major center for in-situ leaching of REEs which has led to serious soil acidification and water contamination. Estimates since 2011 indicate environmental damages worth ¥ 38B (about $5.5B) worsening over time. Similarly, the Bayan Obo mining sites have resulted in severe degradation, for example rare earth processing facilities have released chemically contaminated waste into tailings reservoirs like the Weikuang Dam. This waste includes toxic chemicals and heavy metals which are polluting soils and groundwater, impacting agriculture, local herder communities, health and ecological systems. [11] To mitigate this issue, Chinese corporations are more and more engaging in international mining in other countries such as Greenland and many African countries as Chinese officials work to repair the damage to their domestic rare earth mining centers. [12]

Dominance through Processing and Weaponization of Supply Chain:

The rare earth faces a serious threat not from the abundance of raw deposits but from over-reliance on China for development. China dominates both mining and midstream operations, as well as holds extensive foreign mining rights, especially in politically unstable regions like Latin America and Africa. Its strategic advantage stems from supportive government policies and a vertically integrated supply chain, which enables it to process minerals such as

[9] Emmanuel Ashemiriogwa, "Visualized: Chinese Exports of Rare Earth Metals and Compounds By Country," *Data Explained*, May 1, 2026. https://dataexplained.com/news/chinese-exports-of-rare-earth-metals/?

[10] Elizabeth Wishnick, "Raring to Go Mining in Greenland: Shenghe and the Kvanefjeld Rare Earth Project," *China Resource Risks*, August 30, 2025. https://www.chinasresourcerisks.com/post/china-and-rare-earths.

[11] Dr Patrick Schröder, "The Rare Earths Race Risks Environmental Disaster," *Chatham House*, March 3, 2026. https://www.chathamhouse.org/2026/03/rare-earths-race-risks-environmental-disaster.

[12] Elizabeth Wishnick, Raring to Go Mining……..

rare earth, lithium, cobalt etc. at lower costs due to lax environmental and labor standards. The US lacks domestic processing capacity as it has currently only one active mine. As a result, the US ores are exported to China for refining and processing. This gives China extraordinary power to use economic coercion against its adversaries. This shows the vulnerability of having one country as the primary production center for the world.[13]

In recent years, notable legal developments in the rare earth sector have emerged in China. In December 2023, China issued a document titled "China's List of Export Regulatory and Prohibition Technologies" and introduced stringent export restrictions on rare earth extraction and refining technologies, with exceptions for specifically marked items. Additionally, comprehensive controls were imposed on modification and additive technologies, and companies were prohibited from using unprocessed rare earth minerals in production. In June 2024, China's State Council announced new guidelines that prioritized state ownership of resources, government oversight, promotion of advanced technologies, restricted extraction and processing, enhanced traceability and tightening import/export controls. Amid rising demand and geopolitical tensions, China is exploring new element deposits, for instance, in July 2025, two new minerals in the Bayan Obo deposit were discovered which could notably impact various industries, economic growth and social development of the country.[14] In 2019, after US tariffs on $250B Chinese goods, President Trump claimed that America was winning the trade war. China didn't retaliate with tariffs but instead reduced its export of rare earths, which caused disruptions in US defense and EV supply chains. This signified the rising significance of REEs in the 21st century, as noted by former Chinese Premier Wen Jiabao, who stated: [15]

"The Middle East has oil, China has rare earths."

Today, China refines 91% of the world's rare earths and leads in the production of key minerals, such as lithium, cobalt and manganese, as reported by the International Energy Agency. This dominance has become a tool for China in trade policies, especially amidst ongoing conflicts with the US. Over recent years, China has enacted a series of export controls that impact various

[13] Yan Bennett, "Securitizing the Critical Minerals Supply Chain, *Journal of Political Risk vol. 13, no: 9, Jpolrisk.Com.,* September 12, 2025. https://www.jpolrisk.com/securitizing-the-critical-minerals-supply-chain/.
[14] Raigirdas Boruta, "Rare earths. Seeking west's strategic responses to China's dominance," *GSSC*, 2025. https://share.google/HaMp7UyqGIIKXubEb
[15] Alexander Smith, "Rare Earths, Rare Power: The Global Race for the World's Most Strategic Resource," *Pinnacle Digest.* July 18, 2025. https://pinnacledigest.com/blog/rare-earths-rare-power-the-global-race-for-the-worlds-most-strategic-resource.

critical minerals crucial for semiconductor manufacturing and defense. In 2023, China imposed restrictions on gallium and germanium exports after President Biden's crackdown in China's semiconductor industry. By late 2024, China escalated these measures to an outright ban on all exports of gallium, germanium, and antimony to the US after further semiconductor restrictions. In April 2025, in response to President Trump's 54% tariff threats on most of its products, China announced controls targeting 7 medium and heavy rare earths, causing significant challenges for global automakers. A temporary truce between them provided some relief, but China's slow processing of export licenses raised tensions. Later, China expanded the export controls to apply all rare earths and lithium battery minerals despite the extension of truce. [16]

Recently, two rare earth manufacturers were subjected to export restrictions from China. China targeted USA Rare Earth Inc. and MP Materials Corp., two companies at the core of the US efforts to develop domestic sources of vital minerals and lessen dependency on China, which still dominates the industry. The most recent limitations coincide with non-Chinese manufacturers stepping up their efforts to increase production capacity. Roughly 51,000 tons of rare earth oxide were produced in 2025 by MP Materials. This amount increased from about 42,000 tons in 2021. In contrast, China Northern Rare Earth (Group) High Tech Co.Ltd produced roughly 95,000 tons of rare earth oxides in 2025. Analysts predict that production will reach 103,000 tons in 2026. China is expected to contribute about 68% of the total production volumes in 2026, according to consensus projections for seven listed rare earth companies on Visible Alpha Insights.

However, China's share is expected to drop to roughly 63% by 2030 when capacity expansions at MP Materials, Lynas, Iluka, and Meteoric come online. Although the change might seem small, it is a part of a larger reorganization of the global supply chain. To lessen their strategic reliance on China, governments in the US, Europe and other allied countries are progressively supporting domestic mines, processing and magnet production initiatives.[17] Moreover, China established a public reporting system for suspected violations regarding exports of critical resources to eliminate any remaining gaps. The enforcement network now includes workers,

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[16] Carsten Oyer, "As US works to end reliance on China for critical minerals, mining companies see opportunity," *Small Wars Journal*, July 21, 2026. https://share.google/2OMEcoNTfODZgueGH

[17] Arti Gupta, "Critical Rare Earth Race to Accelerate as China Tightens Grip," *S&P Global Market Intelligence,* June 26, 2026. https://www.spglobal.com/market-intelligence/en/news-insights/research/2026/06/critical-rare-earth-race-to-accelerate-as-china-tightens-grip.

rivals, freight firms, custom brokers, and financial service providers. Therefore, it is problematic from a legal standpoint to reroute materials through third countries, disguise controlled products, or assist an end user in getting over restrictions. [18]

The Peak of the US REE Industry:

The US was a major producer and exporter of rare earth around the mid 20th century. However, it collapsed in the 1980s, partly because of growing environmental concerns. [19] The manufacturing of REEs in the US began in 1949 with the discovery of radio-active minerals on Sulphide Queen Hill in Southern California's Clark Mountain Range. Molybdenum Corporation of America (Molycorp) started extracting REEs in 1952, primarily for government stockpiling during the Cold War. The Ames Laboratory founded by the US Atomic Energy Commission (AEC) created a cost-effective method to separate REEs. Demand surged in the mid 1960s, particularly for europium used in colour TV screens, leading to a six-fold increase in production. Throughout the 1960s and 1970s, Molycorp processed notable amounts of ore, satisfying 80% of global REE demand.

Union Oil Company acquired Molycorp in 1977 which boosted production capabilities and led to the creation of high-purity separation plants such as at Mountain Pass capable of separating high-purity Gd-203, Sm-203, and CeO2. Later, the company also started to build Dy-203 and Nd-2023 to fulfill the increasing demand for NdFeB permanent magnets. By this time, rare earth oxides in the US accounted for 99% of the world's heavy REEs. Concurrently, Magnequench focused on manufacturing defense-critical REE magnets, dominating the market in the 1980s. Noteworthy government funding for REE production research bolstered US's domestic industry. However, the US faced competition from China in the 1990s. [20]

Over time, the US became dependent on China for its REE applications. Between 2020 and 2023, China exported about 70% of rare earth to the US, which made it the country's biggest

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[18] Michael Kern, "China's Rare Earth Strategy is Forcing a US Manufacturing Revolution," *Yahoo*, July 27, 2026. https://finance.yahoo.com/energy/articles/china-rare-earth-strategy-forcing-000000920.html

[19] Jackie Northam, "The Global Race for Rare Earth Materials Is on, and the U.S. Is Losing It," *NPR*, March 26, 2025. https://www.npr.org/2025/03/26/nx-s1-5312979/the-global-race-for-rare-earth-materials-is-on-and-the-u-s-is-losing-it.

[20] Sulgiye Park, Cameron L Tracy, and Rodney C Ewing, "Reimagining US Rare Earth Production: Domestic Failures and the Decline of US Rare Earth Production Dominance – Lessons Learned and Recommendations," *ScienceDirect*, August, 2023. https://www.sciencedirect.com/science/article/pii/S030142072300733X

supplier. Malaysia, Japan and Estonia were in fourth place. [21] Many rare earth items critical to the US faced export restrictions due to Trump's imposition of 54% tariffs on China in 2025. Yttrium, samarium, gadolinium, terbium, dysprosium, lutetium, and scandium all faced export restrictions.[22] These are strategic assets for the US national security and defense sector. For example, yttrium oxide is used for chip-making and to make coatings that protect jet engines and power station turbines from high temperatures.[23]Similarly, Samarium is used in various military applications and it is largely produced by China, which holds the whole world's supply. [24] To lessen this reliance, and expand trustworthy sources, the US is taking a lot of measures to diversify its supply chain, build alternative supply routes, and secure its need for rare earths. The US counter strategy involves economic nationalism, building domestic capabilities, and increasing partnerships with allies.

America's Re-Entry in the REE Market:

In response to competition with China, the US aims to secure a stable supply of rare earths and critical minerals for economic and national security reasons. The US legal framework supports this initiative, particularly through the Defense Production Act (DPA) which empowers the President to ensure the availability of domestic industrial resources for national defense. Originally passed in 1950, the DPA continues to facilitate domestic production, exemplified by the Biden's administration 2021 funding initiatives to bolster supply chains for critical minerals. Legislation such as the Energy Act of 2020 promotes the development of domestic supply chains and encourages the Department of Energy (DOE) to invest in research and new technologies for REE exploration and processing. The 2021 Infrastructure Investment and Jobs Act further allocates funding for mining and processing these materials. To lessen external dependence on China, the US is prioritizing alternative sources and technologies. A noteworthy development is

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[21] Bruno Venditti, "Charted: Where the U.S. Gets Its Rare Earths From," *Visual Capitalist Elements*, May 1, 2025, https://elements.visualcapitalist.com/charted-where-the-u-s-gets-its-rare-earths-from/.
[22] Arendse Huld, "China's Rare Earth Elements: What Businesses Need to Know," *China Briefing*, August 29, 2025. https://www.china-briefing.com/news/chinas-rare-earth-elements-dominance-in-global-supply-chains/.
[23] Lewis Jackson, "China Approved Large Exports of Rare Earth Vital for US Aerospace in March," *Reuters*, April 30, 2026. https://www.reuters.com/business/aerospace-defense/china-approved-large-exports-rare-earth-vital-us-aerospace-march-2026-04-30/.
[24] Keith Bradsher, "China's Grip on an Obscure Rare Earth Metal Threatens the West's Militaries," *The New York Times,* June 9, 2025. https://www.nytimes.com/2025/06/09/business/china-rare-earth-samarium-fighter-jets.html.

the revitalization of the Mountain Pass mine in California, the only operational rare earths mine in the US since its opening in 2017 by MP Materials.

This mine, once a global leader in REE supply, had shut down in 2002 due to competition from cheaper extraction and processing in China. The US government has also launched the first domestic REE processing plant, allowing part of the extraction to remain in the country. Furthermore, both the government and private sector are investing in recycling technologies to reduce Chinese dependency. The DOE's Critical Materials Innovation Hub aims to develop sustainable extraction methods from electronic waste and alternative sources. For instance, in September 2024, the Department of Defense committed US$ 4.22M to Rare Earth Salts as it recycles fluorescent light bulls to recover rare earths like terbium. To mitigate geopolitical risks, the US is bolstering its strategic reserves. The National Defense Stockpile (NDS), managed by the Defense Logistics Agency (DLA), has been accumulating critical minerals vital for national security, which reached a value of US$ 912.3M in early 2023. [25]

The Trump administration has allocated substantial funding to accelerate critical mineral production by implementing a strategy that involves acquiring stakes in mining companies. This initiative, described as a "generational undertaking" aims to strengthen domestic supply chains. The administration has announced approximately $3B in conditional investments in 7 critical minerals companies. In July 2025, the Pentagon became the largest stakeholder in MP Materials by purchasing a $400M stake aiming to establish a rare earth magnet manufacturing facility. The deal also included a $150M loan and guaranteed that products such as neodymium-praseodymium oxide and metals would be used to develop magnets for the defense sector. Furthermore, the US government has awarded US Antimony Corporation (USAC) a $245M contract and $27M grant for boosting antimony production. USAC, the only North America's antimony smelter, has mines in Alaska and refining facilities in Mexico and Montana. Additionally, it expanded into tungsten and cobalt production, marking the return of tungsten mining to North America after nearly two decades. The Department of Commerce is also supporting the USA Rare Earth with an 8% stake and up to $1.3B in loans for achieving milestones, indicating a commitment to securing rare earth metal supplies. Furthermore, on July 20, 2026, Trump signed an executive order further restricting defense contractors from sourcing

[25] Raigirdas Boruta, Rare earths……..

materials from US enemies, mainly China and requiring the Pentagon to mitigate national security risks in supply chains. These measures are essential to ensure US national security and technological autonomy. [26]

US-China Resource Competition Abroad:

Several regions are currently at the heart of a growing strategic competition between the US and China due to their vast reserves of rare earth elements. Both countries are intensifying their attempts to grab access to mineral wealth outside their boundaries, leading to increased investments, diplomatic maneuvers and race for influence. Africa has roughly 30% of the world's critical mineral reserves. [27] The region is home to several rare earth deposits, particularly in eastern and southern countries like South Africa, Madagascar, Malawi, Kenya, Namibia, Mozambique, Tanzania, Zambia and Burundi. [28] One of the biggest rare earth projects outside China, the Ngualla rare earth project, is expanding quickly in Tanzania. The project's main goal is to produce neodymium and praseodymium, two essential components for wind turbines and electric motors.[29] China has strengthened its influence by securing control of this project through a $150M deal with Peak Rare Earths. This agreement surpassed a competing bid of approximately $160M from US firm General Innovation Capital Partners, positioning China to dominate one of the largest rare earth deposits globally. [30] Benchmark Military Intelligence indicates that 37% of further REEs is already committed to Chinese buyers, with the rest available for other markets. By 2029, eight new rare earth mines in Tanzania, Angola, Malawi and South Africa all are expected to begin manufacturing, potentially contributing 9% to the global supply. [31]In response, the US has intensified its efforts to bolster its foothold in the region

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[26] Carsten Oyer, As the US works to end…….

[27] Marvellous Ngundu and Julia Baum, "Africa Has Critical Minerals but Needs a Unified Strategy," *ISS African Futures and Innovation*, May 22, 2025. https://futures.issafrica.org/blog/2025/Africa-has-critical-minerals-but-needs-a-unified-strategy.

[28] Pier Paolo Raimondi, "The Scramble for Africa's Rare Earths: China is not alone," Italian *Institute for International and Political Studies*, June 21, 2021. https://www.ispionline.it/en/publication/scramble-africas-rare-earths-china-not-alone-30725

[29] Sahar Ragab, "Rare Earth War in Africa: Global Powers Battle for the Resources of the Future," *Africa Face,* May, 2026. https://africaface.net/en/rare-earth-war-in-africa-global-powers-battle-for-the-resources-of-the-future/

[30] Olamilekan Okebiorun, "US Counters China's Rare Earth Dominance in Africa by Securing 2 More Shipping Routes to Control Supply Chains," *Business Insider Africa*, April 15, 2026. https://africa.businessinsider.com/local/markets/us-counters-chinas-rare-earth-dominance-in-africa-by-securing-2-more-shipping-routes/k7063z4.

[31] "Rare Earth Minerals – Africa Green Minerals Observatory," https://www.africangreenminerals.com/about.html

for these strategic minerals. For instance, Harena Rare Earths has secured backing from the US government for its Ampasindava rare earth project in Madagascar, highlighting US's strategy to counter China's grip on the supply chains of critical minerals. Ampasindava is expected to produce about 4,000 tones of rare earth oxides annually, including 1,700 tones of high-value magnet rare earths NdPr and DyTb. The initiative reflects a major shift in Africa's critical mineral sector. [32]

Greenland, an Arctic region, is also at the center for great power competition in rare earths between China and the US. Two main drivers of this competition are new emerging sea routes and untapped resources which are becoming more accessible due to climate change. Greenland ranks 8 globally for REE reserves because it possesses 1.5M tons and contains two of the largest rare earth resources worldwide: Kvanefjeld and Tanbreez. Nevertheless, the island has not yet experienced any rare earth mining. In 2019, under Trump's first term, the US and Greenland signed a memorandum of understanding (MoU) to conduct joint surveys and share scientific and technical expertise in order to explore REE and vital mineral resources. The MoU is about to expire, though, attempts to extend it during the Biden administration were unsuccessful. Greenland's REE reserves seem to be the focus of the Trump administration's efforts. In June 2025, the US Export/Import Bank sent a letter of interest to Critical Metals Corp for a $120M loan to fund the company's Tanbreez rare earth mine. [33] The US company REalloys has now secured a 15 year long-term deal to get rare earths from the island's Tanbreez project, further strengthening US defense production independence. Tanbreez is rich in heavy REEs such as dysprosium and terbium, which are critical for US military technologies and are rare outside China. [34] China is also bolstering its influence in Greenland and the Arctic region, in line with its "2018 Arctic Policy." China has declared itself a "near-Arctic state" as its purpose is to become a "Polar Great Power" by 2030. In 2012, Chinese Minister of Land and Resources Xu Shaoshi suggested establishing a coalition of states that produce rare earth metals which marked the

[32] Canadian Mining Journal Staff, "US Enters China's Africa Turf with New Rare Earth Bet," *Canadian Mining Journal,* July 29, 2026. https://www.canadianminingjournal.com/news/us-enters-chinas-africa-turf-with-new-rare-earth-bet/.
[33] Meredith Schwartz and Gracelin Baskara, "Greenland, Rare Earths, and Arctic Security," *CSIS,* January 8, 2026. https://www.csis.org/analysis/greenland-rare-earths-and-arctic-security.
[34] Olamilekan Okebiorun, "Africa faces new competition for critical minerals investment as US secures Greenland rare earth deal in bid to cut China reliance," *Business Insider Africa*, June 1, 2026. https://africa.businessinsider.com/local/markets/africa-faces-new-competition-for-critical-minerals-investment-as-us-secures-greenland/mjplplw

beginning of Greenland-China's diplomatic relations. China's activities in Greenland includes NFC's minority stake in the Kvanefjeld mine in Southern Greenland and a joint venture between Shenghe Resources and Greenland Minerals and Energy for Uranium and rare earth projects. But challenges remain. Greenland revoked mining licenses of Chinese companies, and banned mining because some of the Chinese projects hampered or stopped without progress, such as Shenghe Resources Rare Earth venture's project. Indeed, mines such as that at Kvanefjeld could be an opportunity for China to strengthen its rare earth monopoly. To block China from gaining access to these resources and to create America's hold on vital REEs, Trump has been urging to purchase the island since 2019 but every time his demand got rejected by the Kingdom of Denmark. [35]

Similarly, Central Asia's substantial and largely untapped reserves have also grabbed the attention of both the US and China. Kazakhstan, Uzbekistan, Kyrgyzstan, and Tajikistan all have great rare earth potentials. In 2025, Kazakhstan's authorities discovered the Zhana Kazakhstan deposit, reportedly containing more than 20M metric tons of rare earth.[36] Uzbekistan recently announced the discovery of deposits containing more than 30 rare earth metals, including tungsten, magnesium, titanium, molybdenum and lithium, planning 76 extraction and processing projects totaling US$ 2.6B over three years. The race for grabbing REEs positions Central Asia as a potential focal point of a 21st century "great game." The Middle Corridor, which connects the region to Europe via the South Caucasus, makes Central Asia a desirable source of refined materials for Washington that depends on REEs. This strategic significance highlights the US interest in the region's untapped reserves. China holds nearly all rare earth mining leases in Kyrgyzstan and Tajikistan. In 2023, Kazakhstan exported critical minerals worth US$ 3.07B to China and US$ 1.8B to Russia, making them key importers. Due to China's export restrictions, the US is focusing on Central Asia for these minerals, facilitating negotiations for the development of Kazakhstan's tungsten deposits. On November 6, 2025, President Trump hosted five Central Asian leaders at White House for bilateral discussions, which showcased the

[35] Kanza Sohail, "US and China in the Greenland Power Play: Emerging Geopolitical Rivalry in the Arctic," *Maritime Centre of Excellence*, December 31, 2025. https://mcepk.org/PublishedOpinion1/USandChinaintheGreenlandPowerPlayEmerginggeopoliticalrivalryintheArctic

[36] Mathieu Lemoine, "What Lies beneath Central Asia? Rare Earths, Critical Minerals and the New Race for Resources," *Novastan*, June 15, 2026. https://novastan.org/en/economics/central-asia-critical-minerals-rare-earths/

growing engagement of the US in the region.[37] Additionally, Trump announced a trade and economic deal with Uzbekistan in 2025, which includes nearly $35B in US investments over the next three years, with projections suggesting the total investments could exceed $100B over ten years. This investment aims to cover various industries, including rare earth mining. [38] On the hand, China's rare earth diplomacy is evolving towards multilateral engagements, utilizing platforms like the Shanghai Cooperation Organization (SCO) and China-Central Asia Summit. This aims to create a regional governance framework for joint resource exploration, standard-setting, reserve coordination and supply chain integration. Kazakhstan's Tau-Ken Samruk national mining company seeks to develop rare earth resources with technical support from China.[39] Growing US interest may position the region as a reliable partner in supply chain and reduce its dependence on China and Russia.

Global Diversification Efforts Have Gained Momentum:

The dynamics of the rare earth industry are likely to change over the next few years, moving from mining to processing, refining, and magnet manufacturing facilities. Western and some other countries in the world, such as African and ASEAN have begun to build their own local supply chains, which will keep the market tight and fiercely competitive for years to come, even though China is expected to remain a dominant entity in producing magnets and components. In 2025, the US solidified its status as the second largest producer of rare earth by achieving an output of 51,000 tons, aided by initiatives like DPA. These measures facilitated funding and long-term contracts to enhance the Mountain Pass Mine and domestic refining capabilities. However, the US still lacks complete supply-chain independence, as it is only beginning to develop commercial scale refining.

Meanwhile, Australia produced 29,000 tons and is increasingly focusing on downstream processing and magnet supply chains through government-backed critical minerals programs and

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[37] Syed Fazl -e- Haider, "Competition Intensifies Over Central Asia's Rare Earth Elements," *Central Asia-Caucasus Institute's Substack,* December 2, 2025. https://centralasiacaucasusinstitute.substack.com/p/competition-intensifies-over-central.

[38] Syrian Arab News Agency, "Trump Hosts Central Asian Leaders amid U.S. Push for Rare Metals," November 7, 2025. https://sana.sy/en/international/2276332/

[39] Zhang Zeming and Lu Yipei, "The Rare Earth Race: Why China, Central Asia, and the Caucasus Are the New Axis of Global Resource Power," *The Hague Research Institute*, March, 2026. https://hagueresearch.org/the-rare-earth-race-why-china-central-asia-and-the-caucasus-are-the-new-axis-of-global-resource-power/.

collaborations with the US, and Japan. Myanmar contributed 22,000 tons, but its production remains unstable due to regulatory challenges and environmental concerns. Conversely, Nigeria's projection plummeted from 7200 tons in 2023 to 1500 tons in 2025 due to geological survey shortcomings and extraction issues. Nigeria is also attempting to revitalize its sector through international partnerships, such as the 2024 MoU with France aimed at strengthening supply chain security with France's technological expertise.[40]

Southeast Asia also contains substantial rare earth mineral reserves, notably in Vietnam, and Myanmar. Malaysia claims to have huge non-radioactive rare earth reserves, while Philippines has yttrium, neodymium, cerium, lanthanum, and nickel, estimated at over 1.2M tons. A key challenge for the region is the lack of downstream processing infrastructure, which often results in the exportation of raw materials of REEs to China. The region also faces irresponsible mining activities, especially in the Mekong region which causes environmental issues and health problems. However, there is a growing international push to create an ASEAN rare earth sector to diversify the global supply chain from China. Kuala Lumpur is engaging in discussions with Beijing about potential processing plants in Malaysia, leveraging China's technical assistance. But the countries are also partnering with nations such as the US, European Union, and Japan. For instance, Malaysia is preparing a rare earth separating plant, and Vietnam is developing its processing capabilities with western-backed projects while Thailand has signed a MoU with the US for critical mineral cooperation. ASEAN's main objective is to seek economic opportunities and to reduce dependency on China-led supply chain at the same time.[41]

Moreover, in order to bypass China, the US allies also established the Mineral Security Partnership (MSP) in 2022 which includes 23 states such as Australia, EU, France, Germany and India.[42] The European Union has also made securing REEs a strategic priority, and established the European Raw Materials Alliance in 2020. Also, the Quadrilateral Security Dialogue (Quad) made of US, Japan, Australia, and India is becoming a lot more active in the REEs domain to counter China's superiority. The global demand of these elements is expected to reach 315,000

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[40] Mining Technology, "China Continues to Dominate Rare Earths as Diversification Efforts Gain Momentum," March 24, 2026. https://www.mining-technology.com/analyst-comment/china-dominate-rare-earths/.
[41] Chester Cabalza, "Beyond China: Can Southeast Asia Diversify the Global Rare Earth Supply?" *World Geostrategic Insights,* November 13, 2025. https://www.wgi.world/beyond-china-can-southeast-asia-diversify-the-global-rare-earth-supply/.
[42] Umair Ahmad, "Rare Earth Metals: A Strategic Tug of War," *ISSRA*, June 2, 2025. https://www.issra.pk/insight/2025/rare-earth-metals-a-strategic-tug-of-war/insight.html

tons by 2030, up from approximately 62,500 tons in 2002 to 125,000 tons in 2021. REEs are now employed in the manufacturing of electric vehicles and wind turbines, which are the primary cause of this increased demand.[43] These steps reflect broader attempts to restructure and secure the global supply chain of critical minerals along geopolitical lines.

Future Prospects:

The competition for REEs and critical minerals will define industrial competitiveness in the 2030s. The winner will not be the one with the highest reserves but the one that best knows how to integrate policy coherence, technological innovation and cross-border cooperation. By 2030, diversification will have made notable, but not complete progress. China will continue to be the dominant country but its share of refining and magnet production is expected to decrease as projects in North America, Europe, and Australia come online. Recycling and circular economy initiatives will provide an increasing share of inputs, helping to buffer volatility and reduce environmental impacts.[44] But significant challenges persist. REEs are crucial for the green transition, but there is clearly a risk in the scramble to diversify and secure rare earth supplies.

In the race to reduce dependence on China, environmental safeguards may be weakened or ignored, especially in countries where environmental governance is already weak, effectively repeating the past mistakes.[45] The future of REEs is rapidly changing. The current landscape could change with new discoveries, processing technologies, and international agreements. But the underlying reality is this: REEs have transitioned from obscure materials in the periodic table to critical resources within the international order. Their distribution, processing and application will influence the military capabilities, energy transition and technological development in the next decades. The race for these resources could lead to either conflict or cooperation. REEs have certainly made their way firmly into the vocabulary of international relations now. [46]

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[43] Elaheh Sadat Mousavi Nejad, The New Resource Race……

[44] Prof. Dr. Cecilia Van Cauwenberghe, "The Race for Rare Earth and Critical Minerals: From Risk to Results," *Open Access Government,* January 21, 2026. https://www.openaccessgovernment.org/the-race-for-rare-earth-and-critical-minerals-from-risk-to-results/201058/.

[45] Dr Patrick Schröder, The Rare Earths Race…….

[46] Elaheh Sadat Mousavi Nejad, The New Resource Race……

Conclusion:

The race for rare earth illustrates a fundamental configuration of power in the global economy. Geological endowment alone no longer guarantees leverage. What matters now is who can turn raw into magnets, alloys and components that advanced industries require. On that metric, China built an early and durable lead, while the US failed to maintain its traditional leading position and is now racing to reclaim it. China's use of export controls confirms that critical minerals can function as tools of statecraft, shaping global supply networks, and threatening national security. Yet the effectiveness of such measures is not absolute. It has triggered counter-mobilization. The US together with its allies, is investing in mining, refineries, recycling, and alternative sourcing. These efforts will not eliminate dependence overnight because processing capability takes years to build and costs remain high outside China. But they signal the beginning of a fragmented and diversified mineral order, where developing countries will gain new bargaining power as demand for non-Chinese sources has increased. Ultimately, the US-China competition in rare earth is less about a single resource and more about the control of future supply chains.

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