

Rare Earth Realpolitik: China's Grip, India's Gamble, and the Geopolitics of Tomorrow

Introduction: The Power Beneath Our Feet

In the era of clean energy, digital connectivity, and advanced weaponry, Rare Earth Elements (REEs), a group of 17 metals, including the 15 lanthanides, as well as scandium and yttrium, form the invisible backbone of modern technology. Their unique magnetic, electronic, and optical properties make them indispensable for a wide range of applications, from wind turbines and electric vehicles to smartphones and guided missiles. Despite being relatively abundant, their complex extraction and processing make them strategically valuable. But what makes them truly powerful isn't just their utility; it's who controls them.

What makes rare earths truly powerful is not just their utility but the strategic control over their supply chains. Over the last two decades, China has quietly but decisively consolidated a near-monopoly over the global supply of rare earths, controlling the lion's share of mining, refining, and manufacturing capacities. This dominance has transformed what should be a straightforward mineral resource issue into a potent lever of geopolitical influence. As the world races to decarbonize and bolster technological sovereignty, REEs have emerged as a new front in global power struggles. The ongoing tensions surrounding supply chains, export restrictions, and strategic stockpiling reveal that rare earths are no longer just commodities; they are vital instruments of economic strength and national security in an increasingly competitive international arena.

China's Monopoly: A Long Game Playing Out

China's dominance in the rare earth elements (REE) market is the result of a carefully executed strategy spanning decades. Starting in the 1980s and 1990s, China began investing heavily in rare earth mining and processing infrastructure, while offering substantial state subsidies, tax rebates, and relaxed environmental regulations to encourage rapid growth. Today, China accounts for over 60% of global rare earth mining and controls over 85% of the world's rare earth processing and refining capacity. This midstream control is the most critical part of the value chain, as raw REEs have little utility without proper separation, purification, and alloying into usable industrial forms. Even countries with significant REE reserves, such as the United States, Australia, or India, rely heavily on China for processing, which gives Beijing an outsized geopolitical and economic advantage. Notably, China has previously weaponized this dominance; in 2010, it restricted REE exports to Japan during a maritime dispute, disrupting global supply chains. In 2024, China tightened its controls by requiring export permits for certain technologies related to rare earth elements (REEs). By late 2025, it had expanded these measures to require licenses for key elements, such as dysprosium, terbium, and europium, as well as related technologies and magnets. New rules also apply to foreign-made products using Chinese materials or technology, extending Beijing's control beyond its borders. Now targeting 12 of 17 rare earths, China is leveraging its dominance as both an economic and strategic tool in global geopolitics.

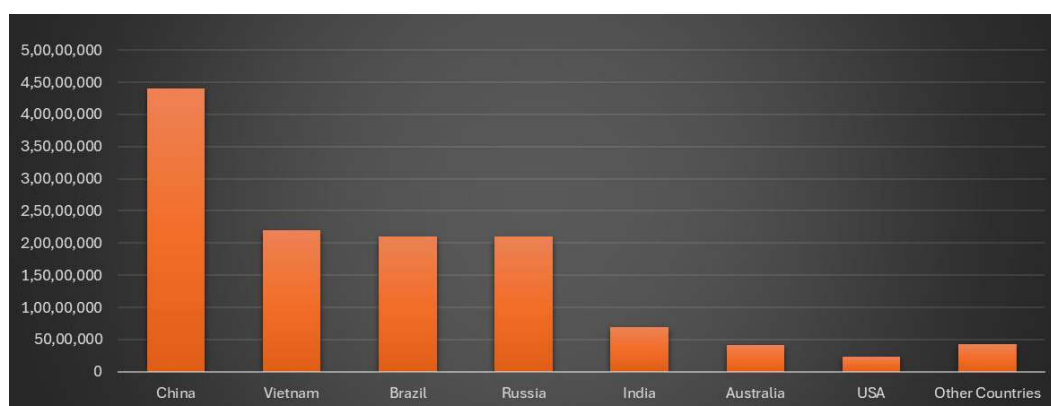
Global Responses: Diversification, Innovation, and Alliances

As dependence on China's rare earth element (REE) supply grows increasingly risky, several countries and

regional blocs are working swiftly to reduce their exposure and build alternative supply chains. The United States has taken significant steps by reviving domestic rare earth mining operations, such as the Mountain Pass mine in California. Alongside this, the U.S. government is funding initiatives in magnet manufacturing, incentivizing domestic processing, and fostering joint ventures with allied nations. Strategic stockpiling of REEs is also underway, recognizing their vital role in defence and high-tech industries.

The European Union has introduced the Critical Raw Materials Act, a comprehensive legislative framework aimed at securing supply autonomy for critical minerals, including rare earth elements. The EU is focusing on localizing parts of the REE value chain, expanding domestic refining capacity, and enforcing mandates to reduce over-reliance on Chinese imports. These efforts are designed not only to secure supply but also to align with the EU's green industrial goals and digital transition. In the Asia-Pacific, Australia has emerged as a key player, largely due to Lynas Rare Earths, one of the few significant non-Chinese REE producers. Australia is increasing its mining output and enhancing downstream processing infrastructure while entering strategic partnerships with the U.S. and the EU. These collaborations aim to build a resilient, non-China-centric supply network for critical minerals. Other emerging producers, such as Canada, Vietnam, Brazil, and African nations like Malawi and Madagascar, are gaining attention for their untapped reserves and strategic potential. However, most face significant challenges, including underdeveloped infrastructure, a lack of refining capacity, regulatory constraints, and environmental concerns related to hazardous waste and radioactive materials.

World Reserves of Rare Earths
Distribution of Rare Earth Element Reserves Across Major Countries
(in tonnes of rare earth equivalent content)



Source: USGS, Mineral Commodity Summaries, 2023 (Compiled by MVIDC WTC Mumbai)

Meanwhile, technological innovation is being aggressively pursued as a longer-term solution. Recycling rare earths from e-waste, discarded electronics, and end-of-life magnets is becoming a crucial strategy. Efforts are underway to develop closed-loop recycling systems and reduce dependency on virgin materials. Simultaneously, research is advancing on substitute materials and alternative device architectures that reduce or eliminate the use of specific REEs. Cutting-edge work in rare earth separation technologies, including ligand-based extraction, ionic liquids, and bioleaching, is opening new possibilities for cleaner, more cost-effective processing.

While these developments represent significant momentum toward a diversified global REE ecosystem, no country or alliance has yet reached the scale, efficiency, and technological depth of China's rare earth dominance. Still, they mark the beginning of a necessary global rebalancing that could, over time, reduce strategic vulnerabilities in critical mineral supply chains.

Indian Scenario: Opportunities, Gaps, and Risks

India's Position and Strategic Strengths

India currently occupies a precarious yet potentially transformative position in the global rare earth ecosystem. It possesses significant reserves of rare earth elements (REEs), particularly in monazite-rich coastal sands located across Kerala, Tamil Nadu, Andhra Pradesh, Odisha, and parts of Karnataka and Goa. Oversight of India's REE exploration and extraction primarily lies with government bodies, such as the Atomic Minerals Directorate for Exploration and Research (AMD) and IREL (India) Ltd, which play a crucial role in tapping into this strategic mineral wealth.

India's rare earth oxide-equivalent reserves are estimated to be around 7 million tonnes, placing it among the top global holders of REE resources. This substantial natural endowment, coupled with India's established infrastructure and experience in mineral sands mining, provides a promising foundation for scaling up REE operations. Another encouraging development is the increasing strategic focus by the Indian government on rare earth elements. This is evident from enhanced policy measures aimed at boosting domestic exploration, extraction, and processing capabilities, alongside efforts to develop a comprehensive value chain that supports advanced applications in electronics, defence, and clean energy sectors.

However, despite these advantages, India's contribution to the global REE value chain remains limited, particularly in refining, separation, and downstream manufacturing. India currently functions more as a supplier of raw materials, without capturing the high-value segments of the REE industry, a structural weakness that requires urgent redressal.

Key Challenges and Gaps

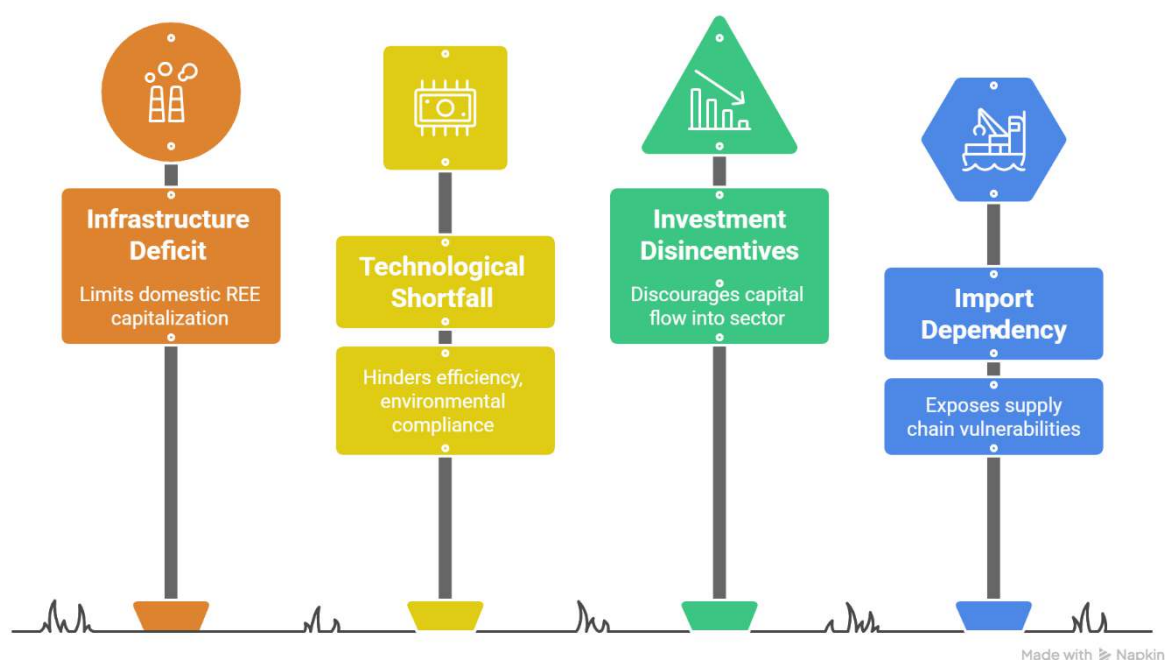
➤ Infrastructure Deficit:

Despite its natural endowments and policy intent, India's rare earth element (REE) sector faces several critical bottlenecks. Chief among these is the absence of large-scale, high-efficiency separation and refining infrastructure. The technologies required to process raw REE ores into high-purity, application-ready materials are both capital-intensive and technically sophisticated. India currently lacks the necessary ecosystem and facilities to support these processes at scale, thereby limiting its ability to transition from raw material extraction to value-added production.

➤ Technological Shortfall:

Another major challenge is India's technological lag in REE processing. Many advanced refinement techniques are proprietary, primarily controlled by Chinese or Western companies, and are not readily accessible to Indian firms. This limited access to cutting-edge technologies hampers progress in efficiency and environmental compliance, particularly given the toxic and radioactive byproducts involved, such as thorium and acid waste that require stringent environmental controls. Establishing environmentally compliant infrastructure is both costly and time-consuming, often facing political and social hurdles.

Bottlenecks in India's Rare Earth Element Sector



➤ Investment Disincentives:

Policy uncertainties and regulatory complexities further discourage private and foreign investments in the REE sector. Limited interest from investors stems from unclear regulatory frameworks, long gestation periods for projects, and apprehensions about environmental liabilities. Without stronger government incentives, clearer policies, and risk mitigation mechanisms, capital inflow into domestic REE processing and refining remains sluggish, slowing the development of a robust indigenous value chain.

➤ Import Dependency:

Most importantly, despite having significant domestic reserves, India remains heavily reliant on imports of finished rare earth products such as permanent magnets, alloys, and other high-purity materials primarily from China. This dependency exposes India to considerable supply chain vulnerabilities and weakens its strategic autonomy, particularly in critical sectors such as clean energy, defence, and advanced manufacturing. Reducing import reliance will require coordinated efforts to develop domestic processing capacity and technological capabilities.

Impact on India and Strategic Imperatives

The shifting global dynamics surrounding REEs have far-reaching implications for India, both economically and geopolitically. At the forefront is the vulnerability of the supply chain. India's reliance on China for crucial REE-derived components such as magnets, specialty alloys, and high-performance materials means that any disruption, whether from geopolitical tensions or trade restrictions, could cripple key sectors like defence, energy, and electronics.

This dependence also poses a threat to India's green energy transition. Critical technologies such as solar panels, wind turbines, electric vehicles, and energy storage systems are highly REE-intensive. If India fails to secure a stable, affordable supply of REEs, it risks delays in meeting its climate goals, higher technology costs, and a reduced role in the emerging global clean-tech market.

In the defence and aerospace domains, REEs are essential components of guided missile systems, radars, sonar, night vision systems, and electronic warfare equipment. Developing a robust domestic defence industrial base, one of India's stated national goals, is contingent upon ensuring secure, indigenous access to high-purity REEs and associated technologies.

From an economic standpoint, a fully developed REE ecosystem could be transformative. If India can scale up refining, chemical separation, magnet production, and REE recycling, it can unlock substantial industrial growth, employment opportunities, and export potential. This could also lead to valuable technology spillovers into adjacent sectors such as metallurgy, electronics, and advanced manufacturing. Moreover, in the context of global geopolitics, India's position becomes highly strategic. As countries like the United States, Japan, and the European Union seek to reduce dependence on Chinese REEs, India can emerge as a trusted alternative partner provided it builds the technical, regulatory, and environmental capacity required to earn that trust.

Conclusion: Forging India's Rare Earth Future

As the world pivots toward clean energy, digital sovereignty, and strategic self-reliance, rare earth elements are no longer just materials; they are instruments of geopolitical leverage, economic power, and technological progress. China's calculated dominance in the rare earth value chain serves as both a warning and a blueprint for others to follow. It has demonstrated how critical minerals, when combined with long-term strategy, industrial depth, and policy consistency, can become formidable tools of influence.

For India, the story of rare earths is still being written. With vast untapped reserves, a strong mining legacy, and growing geopolitical relevance, India is well-positioned to become a major player in the global REE ecosystem. But potential alone is not enough. Bridging the gap between resource availability and industrial capability requires a coordinated national effort that combines public sector leadership, private sector investment, global partnerships, and cutting-edge research and development.

India must focus on developing midstream and downstream capabilities in refining, separation, alloying, and magnet manufacturing areas where it currently lags. Simultaneously, it must craft an enabling environment that balances environmental sustainability, regulatory clarity, and economic viability. Innovation in recycling technologies and sustainable extraction methods can also give India a first-mover advantage in the emerging circular REE economy.

If India succeeds, it won't just reduce its dependence on China. It will unlock a strategic industrial base critical to its energy transition, defence preparedness, and economic ambition. Moreover, it will position itself as a trusted and capable partner in a rapidly evolving global mineral order, a supplier not just of rare earths, but of stability, reliability, and strategic value.

The next decade will determine whether India remains a resource holder or becomes a value-added leader in the rare earth race. The opportunity is real. So is the urgency.