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China Tightens Grip on Rare Earth Elements—What It Means for India and the World

China's Export Regulation on Rare Earth Elements

Story outline

On April 4, 2025, China's Ministry of Commerce imposed export restrictions on seven rare earth elements (REEs) and magnets majo rly used in the defence, energy, and automotive sectors in response to U.S. President Donald Trump's tariff increases on Chinese products. The new restrictions apply to 7 of 17 REEs—**samarium, gadolinium, terbium, dysprosium, lutetium, scandium, and yttrium**—and requires companies to secure special export licenses to export the minerals and magnets.

China which leads global export of rare earth magnet, implemented export controls and the new regulation from China is that they require comprehensive information about end use and customer statements, including verification, that products will not be utilised for defence purposes or re - exported to USA.

What are Rare Earth Elements

As per the International Union of Pure and Applied Chemistry (IUPAC) in 2005, these are a **group of 17 elements.** These elements share similar properties such as **high density and high conductivity** includes cerium(Ce), dysprosium(Dy), erbium(Er), europium(Eu), gadolinium Gd), holmium(Ho), lanthanum(La), lutetium(Lu), neodymium (Nd), praseodymium(Pr), promethium(Pm), samarium(Sm), scandium(Sc), terbium(Tb), thulium(Tm), ytterbium (Yb), and yttrium(Y).

Even though they are called "rare," these elements are quite common in the ground. The challenge is that they are usually spread out in very small amounts, so mining and separating them is difficult and expensive.

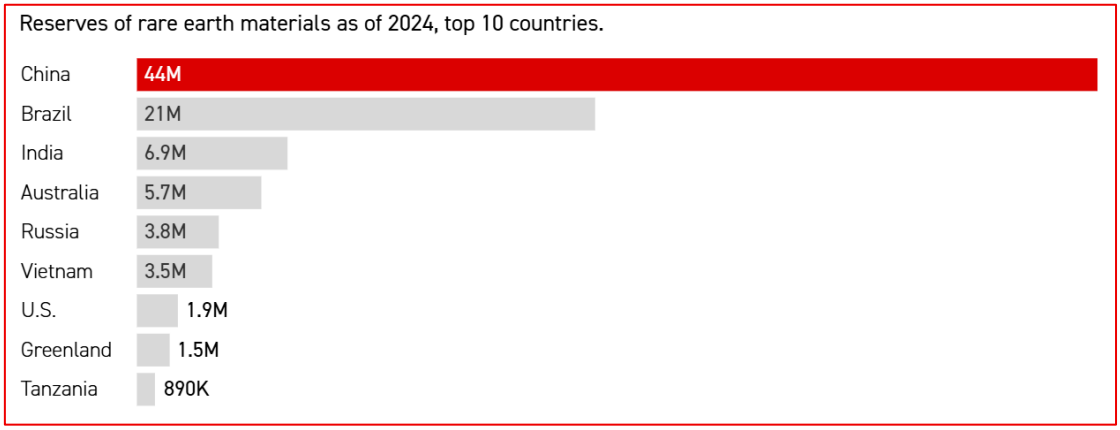
Rare-earth elements differ from other elements, in that when looked at analytically, they are virtually inseparable, having almost the same chemical properties. However, in terms of their electronic and magnetic properties, each one occupies a unique technological niche that nothing else can.

Sectors in which REE is Used the most

- **Defence** - including advanced military systems, precision-guided munitions, and communication systems.
- **Energy** - renewable energy and electric vehicles.
- **Automotive** – Electric and hybrid vehicles (Permanent Magnet motors, Batteries, Catalytic Convertors), Internal Combustion Engines (Fuel refinement, Spark plugs, Polishing, sensors etc.)

How is China controlling rare earth mineral exports?

The restrictions come under China's rights as a signatory to the international Non-Proliferation of Nuclear Weapons Treaty, which allows it to regulate exports of "dual use" items. This applies to products that can be used for both civilian and military applications.



Source: U.S. Geological Survey

After acquiring number of processing technologies from France during the **1980s**, China also began to work on becoming a processing superpower. Almost **90%** of global rare earths processing is now done in China, with the country producing **70 kilotons** of refined rare earths in 2023.

Technologically, especially for rare earths processing, China also far outperforms the competition. Between 1950 and 2019, China applied for almost **26,000 rare earth-related patents**, compared to Japan's 13,920 and 9,810 in the US. And while the technologies themselves are incredibly advanced, regulations in China are also less strict in terms of environmental impacts.

Geostrategic significance of recent export control of REE

- **To gain upper hand in the tariff war:** Retaliation against the USA's reciprocal tariffs, which may hurt the Chinese industry due to a fall in exports.
- **Implications on Critical technologies: Yttrium and Dysprosium,** which are widely used in the manufacturing **of jet engine components,** defence equipment, and advanced electronics.
- For importing nations, supply disruptions can cripple industries, inflate costs, and delay technological advancements.
- **Global supply Chain disruption:** Disruption in supply chain may affect major REE-consuming countries like the **US, Japan, Vietnam, and Germany.**
- **Weaponisation of REE:** China first weaponized rare earths in 2010 when it banned exports to Japan over a fishing trawler dispute.

China Dominates Rare Earth Supply Chain

Source: U.S. Geological Survey

Although, the extraction of REE in rest of the world is 40%, but having a refined machinery and skilled manpower makes the China, a dominant in processing by 87%.

Even Australia, despite possessing significant rare earth reserves, sends **90%** of its heavy REEs to China for processing, as reported by the Australian Financial Review.

India has resources, but not capacity

India is not without options. The country holds an estimated 6.9 million metric tonnes of rare earth reserves—roughly one-sixth of China's. Yet, domestic production remains negligible due to technological constraints, environmental concerns, and institutional bottlenecks. **Indian Rare Earth Limited (IREL)**, the state-owned enterprise with exclusive rights to monazite mining, lacks the capacity for commercial-scale magnet manufacturing.

While Japan has begun reviving its rare earth industry, the US and other nations, including India, remain deeply dependent on Chinese exports.

Direct Impact of China's rare earth minerals export in India

The pressure is being felt in India, where EV manufacturers are facing potential shortages of rare earth magnets used in electric motors, power steering systems, and braking units. In ICE vehicles rare earth magnets are primarily used in electric steering and auxiliary motorised system. Also crucial for hybrid vehicle propulsion.

Maruti Suzuki, the country's premier automobile manufacturer, is adjusting production schedules for its forth coming E-Vitara model, which earlier aimed at 26,000 units in September 2025 and has now reduced the number to 8,000 units.

Despite low cost of rare earth magnet, its crucial functionality could be a major challenge for India's automotive industry.

Alternatives to REE in magnets

While rare earth elements (REEs) offer unique properties crucial for many technologies, several alternatives are being explored and developed to reduce reliance on them. These alternatives include different magnetic materials, efficient use of REEs, substitution with other elements, recycling, and exploring accessible alternatives.
Alternatives including:

- Iron nitride (FeN)
- Manganese Aluminium Carbon (MnAlC)
- Tetrataenite
- SmFeN (Samarium Iron Nitride)

While alternatives are emerging, no single material can perfectly replicate the performance of REE magnets in all applications and the abundance and cost of alternative materials are important factors in their adoption.

Seeking support from parent companies.

Carmakers like Maruti Suzuki India, Hyundai Motor India and Kia India are seeking assistance from their respective Japanese and Korean parent companies as the

automobile industry tries to navigate through supply-side challenges related to rare earth magnets.

Korean auto giant has assured its two arms in India (**Hyundai motor group and Kia)** of no rare earth magnet-related disruptions for their respective EV and ICE models in the near term, even if China does not resume exports.

While both **EV** and **ICE** vehicles utilize rare earth elements, EVs require significantly larger amounts, primarily for high-performance motors and battery technology.

- A typical EV with a permanent magnet motor contain around **2 - 5 kg of REEs**, with neodymium-based magnets being a significant component.
- An ICE vehicle uses only **0.1 - 0.5 kg of REEs**, with the majority likely in the catalytic converter.