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EDITORIAL ANALYSIS

Breaking the Rare Earth Dependency — India's Long Road to Magnet Self-Reliance

 **BUSINESS STANDARD**

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SUBJECTS COVERED**ECONOMY****SCIENCE & TECH****GS PAPERS****GS3****CURATED & WRITTEN BY****Bharat Choudhary**

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 Business Standard

22 March 2026

GS3

 Business Standard

 MAINS RELEVANCE: **GS Paper 3**


INTERVIEW ANGLE

"India has 6% of global rare earth reserves but imports nearly all its magnets from China — what explains this paradox and how can India bridge the gap?"

WHY IN NEWS

The inauguration of India's first NdFeB rare earth magnet pilot plant at ARCI, Hyderabad, and the government's Rs 7,280 crore scheme for domestic magnet manufacturing, signal a strategic push to reduce dependence on China for these critical materials.

The Strategic Vulnerability

Rare earth permanent magnets — particularly Neodymium-Iron-Boron (NdFeB) — are the **unsung enablers of the 21st century**. Every electric vehicle, every wind turbine, every smartphone, and every advanced weapons system depends on them. And **China controls over 90%** of global production.

This is not a natural monopoly born of geology. China has **60% of global rare earth reserves** — significant, but not dominant. The monopoly was built through **decades of deliberate industrial policy**: subsidised mining, integrated processing, export controls, and strategic pricing that drove competitors out of business.

Why India Lags Despite Resources

India holds **~6% of global rare earth reserves** (fifth-largest after China, Vietnam, Brazil, Russia) but produces a negligible fraction of its magnet needs. The gap exists because:

- ❶ **Mining exists, processing does not:** IREL mines monazite sand but India lacks large-scale separation, refining, and alloy-making facilities
- ❷ **The “missing middle”:** The value chain from ore to finished magnet has 8-10 processing steps; India has capability in mining and end-use but nothing in between
- ❸ **Environmental concerns:** Rare earth processing generates **radioactive thorium waste** — India's nuclear establishment controls thorium, creating inter-ministry coordination challenges

- ④ **Capital intensity:** A commercial-scale NdFeB plant requires Rs 2,000-3,000 crore investment with 5-7 year payback
- ⑤ **Skilled workforce deficit:** Sintered magnet manufacturing requires specialised metallurgical expertise that India’s education system does not produce at scale

The ARCI Pilot: A Start, Not a Solution

The ARCI pilot plant is an important **proof of concept** — demonstrating that India can produce sintered NdFeB magnets using the New Pressless Process. But the pilot produces **kilograms** per month. India needs **thousands of tonnes** per year to meet domestic EV and wind energy targets.

The Rs 7,280 crore scheme targeting 6,000 MTPA capacity is the right scale. But execution will determine success:

- Can India attract private sector investment when Chinese magnets are 30-40% cheaper?
- Will environmental clearances for rare earth processing be expedited or delayed?
- Can India secure reliable raw material supply — domestically or through strategic partnerships?

Lessons from Global Peers

COUNTRY	APPROACH
Japan	Invested in recycling + material substitution; Hitachi recycles magnets from old motors
Australia	Lynas Corp: Only non-Chinese rare earth processor at scale; refinery in Malaysia
USA	Defence Production Act funding for MP Materials; DOD stockpiling critical minerals
EU	Critical Raw Materials Act 2024: mandates 10% domestic mining, 40% processing by 2030

India can learn from all four: **build processing capacity, invest in recycling, stockpile strategically, and mandate domestic content** for defence and public procurement.

Policy Recommendations

- ① **Designated rare earth processing zones** with fast-tracked environmental clearances
- ② **Compulsory domestic sourcing** for defence magnets (phased — 30% in 3 years, 50% in 5 years)
- ③ **KABIL (Khanij Bidesh India Ltd.) must accelerate** overseas acquisition of rare earth assets — in Africa, Australia, and Latin America
- ④ **R&D investment in substitution:** Ferrite magnets and alternative motor designs that reduce rare earth requirements
- ⑤ **NdFeB magnet recycling policy:** Urban mining from end-of-life EVs and wind turbines

UPSC RELEVANCE

NdFeB magnets, ARCI, IREL, KABIL, rare earth elements.

MAINS GS-3:

India's critical mineral strategy, supply chain diversification, S&T for industrial self-reliance, clean energy transition dependencies.

MAINS GS-2:

India-Japan technology cooperation, industrial policy.

ESSAY:

“In the 21st century, control of critical minerals is the new oil politics.”

★ FACTS CORNER — KNOWLEDGEPEDIA

RARE EARTH SUPPLY CHAIN:

China: 60% mining, 90% processing, 90%+ magnet manufacturing

India: ~6% reserves (5th globally), ~2,900 tonnes/year mining

Government scheme: Rs 7,280 crore for 6,000 MTPA capacity

ARCI pilot: First end-to-end NdFeB facility in India

KEY INDIAN ENTITIES:

IREL (Indian Rare Earths Ltd.): Under Dept. of Atomic Energy; mines monazite

ARCI: Under DST; research and pilot production

KABIL (Khanij Bidesh India Ltd.): JV of NALCO, HCL, MECL for overseas mining

CSIR-NIIST: Research on rare earth extraction

GLOBAL APPROACHES:

Japan: Recycling + substitution (Hitachi)

Australia: Lynas Corp (non-Chinese processor)

USA: MP Materials + DOD stockpiling

EU: Critical Raw Materials Act 2024

OTHER RELEVANT FACTS:

Rare earth elements: 17 elements (15 lanthanides + Sc + Y)

Critical Minerals Mission (India): Budget 2024-25, Rs 600 crore

2010 China-Japan dispute: Rare earth export restriction; prices rose 10x

India's EV target: 30% EV penetration by 2030

Each EV needs ~1-2 kg of NdFeB magnets; each 3 MW wind turbine needs ~600 kg

Sources: [Business Standard](#), [Chatham House](#), [PIB](#)

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