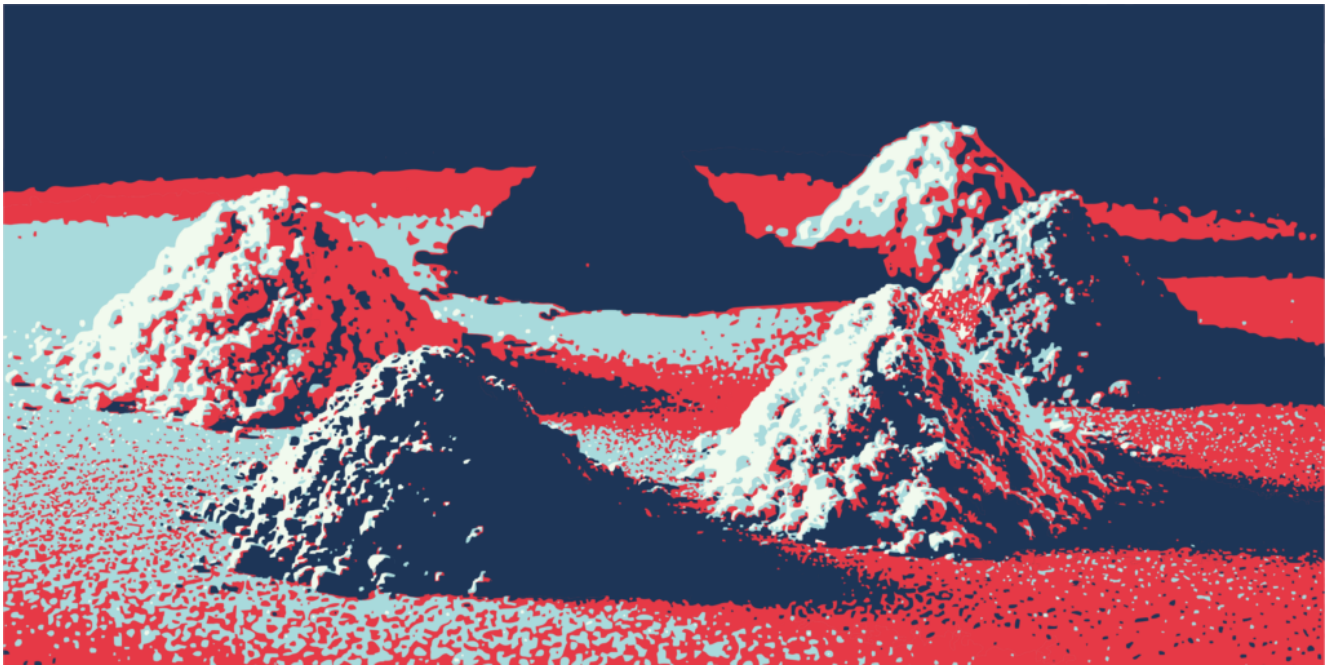
India-Japan Engagement on Rare Earths: Strategic Convergence meets Complementarity

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Several reports at the beginning of March, including those from Reuters, indicate that Japan is in discussions with India to explore rare earth deposits in Rajasthan jointly. The talks follow Tokyo's expressed interest in the deposits and plans to send experts to examine the region's hard-rock deposits, including individuals involved in the decision-making process. Japan's interest emerged over a month after India's Ministry of Mines (MOM) Minister G. Kishan Reddy stated that three hard-rock rare earth deposits containing an estimated 1.29 million metric tons of rare earth oxides (REO) had been identified in Rajasthan and Gujarat.

Reports suggest that Tokyo would provide extraction technology and financial support in exchange for a stable offtake arrangement under which rare earth supplies would be exported

to Japan. A Japanese entity is expected to bid in auctions for land parcels in Rajasthan's Barmer and Jalore. Meanwhile, Naoki Kobayashi, Deputy Director at the Ministry of Economy, Trade and Industry (METI), stated that discussions remain at an exploratory stage, with no corporate partnerships, technology agreements, or timelines yet finalised.

Amid Japan's pursuit of diversified mineral supplies, its interest in Rajasthan's rare earth comes at a critical time. On February 24, China, in its latest mineral export control measure, restricted exports of dual-use items to 20 Japanese entities that Beijing claims supply Japan's military. This ban, according to Beijing's Commerce Ministry, is meant to curb Japan's re-militarisation and nuclearization. The move, amid strained China–Japan relations under new PM Sanae Takaichi, effectively cuts Japanese firms off from seven rare earth elements and associated materials, as well as several other controlled critical minerals.

Notably, the India–Japan talks also follow India's suspension of its 2012 rare earth export pact with Japan in June 2025 after China's April curbs on rare earth exports, which hit India's automobile industry and accelerated policy measures, mostly stopgap measures aimed at achieving domestic self-sufficiency in critical minerals.

China factor and sectoral complementarities

Even as China continues to maintain export controls on critical minerals, the ongoing discussions reflect efforts by India and Japan to effectuate their shared objective of giving critical minerals a "heightened priority." The talks also align with the Memorandum of Cooperation on critical minerals agreed during Prime Minister Narendra Modi's visit to Tokyo in August 2025. The MoC intends to promote business opportunities, information exchange on regulations, exploration of joint projects, participation in auctions,

extraction practices, and stockpiling initiatives, and to encourage joint investments across supply chains. These objectives correspond closely with the sectoral complementarities between the two countries that the recent discussions appear to reflect. For Japan, India offers access to essential mineral resources and the prospect of a stable, reliable supply. For India, Japan provides advanced technology, capital investment, and technical expertise required to harness these deposits.

Similar to Japan, India seeks to reduce its dependence on China for critical minerals. In this context, Japan emerges as a promising partner, particularly as India aims to develop sustainable industrial-scale extraction and processing capabilities. Japanese technological expertise could be an important enabler in unlocking India's mineral reserves, including the recently identified hard-rock deposits in Rajasthan. Globally, Japan is among the leading states in critical minerals and rare earth element (REE) mining projects, research and development initiatives, and supply chain investments, and is advancing next-generation rare earth extraction and processing technologies.

For instance, Shin-Etsu Chemical has long operated world-class rare earth separation facilities, employing advanced solvent-extraction techniques since the 1960s. Japan also hosts the Center for Rare Earths Research at Muroran Institute of Technology. In addition, Tokyo has collaborated with Vietnam to improve rare earth extraction and processing through the Rare Earth Research and Technology Transfer Centre in Hanoi. Japan is further involved in deep-sea mining initiatives targeting rare earth elements from seabed deposits, extracting from depths exceeding 6,000 metres. Such initiatives are critical to developing the next-generation extraction and processing technology.

By contrast, India, partly owing to the absence of advanced, scalable extraction, refining, and processing technologies,

contributes less than 1% of global rare earth output, despite possessing the world's third-largest reserves. India's in-situ REO are largely found in monazite sands along coastal beaches, teri or red sands, and inland alluvium in coastal states, as well as in Rajasthan.

The promise of Rajasthan's identified reserves

Vis-à-vis the state in question, the Geological Survey of India (GSI) has intensified exploration activities for critical and strategic minerals in recent years, particularly under the National Critical Mineral Mission (NCMM), with the aim of identifying potential mineralised locales across the country, including Rajasthan. During the fiscal year 2024–25, of 195 exploration projects undertaken by GSI, 35 projects were in Rajasthan. These included assessments of hard rock deposits in districts such as Barmer, Jalore, Sirohi, and Sikar to assess mineral potential. Barmer has been identified as a key site for rare earth deposits, with 1,11,845 tonnes of in situ REOs in hard rock terrains.

Although GSI or the MOM have yet to make public details on the concentration, kind, and purity of the identified 1.29 million metric tons of REOs, preliminary surveys conducted in 2024 by the Rajasthan state mines and geology department are somewhat suggestive of the potential of the state's reserves, including those found in hard rock deposits. Several districts, including mining blocks in Barmer, Jalore, Sirohi, and Bhilwara, had confirmed deposits of minerals such as bastnäsite, britholite, synchysite, and xenotime within carbonatite and microgranite rocks. Bastnasite, britholite, and xenotime are source minerals from which several rare earth elements, such as cerium, neodymium, praseodymium, gadolinium, yttrium, and dysprosium, are extracted. Notably, REEs such as dysprosium, yttrium, and gadolinium are amongst the rare earths wherein Tokyo faces import restrictions from China—indicative of Japan's interest in Rajasthan's

reserves. These discoveries were mainly in the Aravalli Range and the Malani Igneous Suite (igneous rock feature) located in the Thar Desert.

In the Barmer district, particularly in the Kamtai area, around 5.41 million tonnes of rare earth deposits have been estimated. These deposits contain light rare earth elements at concentrations ranging from 17.31% to an average of 2.97%. Such concentration levels are considerable, and cannot be discounted as the concentration degree for any typical economically viable REE mining block usually ranges between 0.5% and 6%. The potential of Rajasthan's reserves becomes particularly critical given the fact that, since 2015, only two REE-specific mining blocks have been successfully auctioned by the centre across India.

Utilising identified reserves, being located in the Aravalli Range and the Malani Igneous Suite, has certain silver linings. It means that potential REE extraction would be less complex and pose fewer environmental risks than extraction from monazite-bearing beach sands, which contain the radioactive element thorium. Nor would it entail an investor burden from the forest-clearance-related compliance regime that is typical of critical minerals projects.

However, the optimism surrounding identified REOs in Rajasthan would eventually have to confront midstream capability-related challenges. The geological potential of Rajasthan's reserves could only help reduce import dependence when processing and refining capabilities for these hard rock-based REEs are developed, currently missing.

While India has taken steps to establish processing facilities based on indigenous technology, the annual production capacity of operational and soon-to-be-operational plants represents only a fraction of India's annual REO demand of 17,000 tonnes. Moreover, India lacks the processing infrastructure to handle hard-rock rare earth

deposits, which require different, more complex, and energy-intensive processing technology than the beach-sand minerals currently processed by established plants. The rare Earth Permanent Magnet plant in Visakhapatnam that makes samarium cobalt magnets would also be insufficient for processing hard-rock rare earth deposits found in Rajasthan, since the plant produces magnets sourced only from monazite and bastnäsite ore deposits.

Future of bilateral cooperation

Whether a formal bilateral agreement with a Japanese entity emerges from the current discussions remains to be seen, even as IREL expresses confidence regarding the high concentration of deposits within Rajasthan's hard-rock reserves. The success of bilateral collaboration or the successful auctioning of mining blocks, apart from the purity of the deposits, will depend on the effectiveness of the enabling environment and incentives created for foreign firms through recent measures under the NCMM and amendments to the Mines and Minerals (Development and Regulation) Act, including the procedural easing for exploration licences.

More broadly, attracting foreign investment while avoiding domestic opposition and litigation will require a coherent industrial strategy, along with environmental safeguards to manage toxic and radioactive by-products generated during mining and processing. Even as India seeks to establish industrial-scale processing capacity under the REPM incentive scheme, bilateral complementarities, MOC, and China's continued REE export controls mean that India will likely continue to rely primarily on rare earth imports while exploring domestic and overseas mines, with Japan a critical partner in this effort.