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Breaking the minerals monopoly

India can draw inspiration from Indonesia's success in nickel to lead globally in critical minerals

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Representative Picture

In the 21st century, critical minerals and rare earths have taken centre stage, becoming crucial for electronics, renewable energy, electric vehicles, defence, aerospace, and medical devices. For instance, the International Renewable Energy Agency's pathway to restrict global temperature rise to 1.5°C posits that renewables will constitute 91 per cent of the energy mix by 2050, requiring massive quantities of minerals like silicon, silver, lithium, and rare earths such as neodymium and dysprosium. The surging demand and deepening reliance have classified these and other minerals like graphite, manganese, cobalt and nickel as "critical", highlighting their pivotal role in shaping future technologies and industries.

The global surge in demand has elevated critical minerals to the status of strategic assets and geopolitical tools. These minerals are concentrated in a few nations, with China being the dominant one possessing substantial reserves of dysprosium (50 per cent), neodymium (50 per cent), and graphite (65 per cent). China's mineral dominance is fortified by securing advantageous agreements across Africa, Latin America, Central Asia, and Australia, often through initiatives like the Belt and Road Initiative (BRI). For instance, China's \$1.3 billion BRI investment in mineral exploration and processing in Ghana, Guinea, Niger, Sierra

Leone, and Mali ensured privileged access to bauxite and lithium. In Ghana, the involvement of SinoHydro, a Chinese firm in aluminium processing from Ghanaian bauxite, grants China concessional terms over 20 years, while the Ghanaian entity repays the Chinese loan.

Additionally, China's monopoly is reinforced by being the mineral processing capital of the world. China controls substantial global shares — graphite (80 per cent), dysprosium (100 per cent), manganese (93 per cent), and neodymium (88 per cent). This industrial prowess of China, driven by economies of scale, has reduced their processing costs and erected significant barriers to entry for other nations, solidifying China's control over mineral supply-chains.

The monopolistic weaponisation of critical mineral supply is raising concern. In 2010, China restricted rare earth exports to Japan amidst a territorial dispute. Recently, when the US restricted semiconductor technology sales to China in October 2022, China imposed export controls on germanium and gallium from August 2023, commodities crucial for semiconductor manufacturing where China holds 60 per cent and 80 per cent of global production, respectively. Amid ongoing tensions between China and the US over the South China Sea, China also restricted exports of synthetic graphite grades crucial for defence and aerospace, where it maintains almost complete market dominance.

Other geopolitical initiatives include the possibility of creating an Opec-like cartel by resource-rich nations, a "Buyers Club" to avoid a bidding war among G7 countries or strategic stockpiling by others. The US and the EU are promoting localisation and friendshoring of critical minerals even though it means higher costs. During Narendra Modi's US visit in 2023, the critical minerals partnership was high on the agenda. The Mineral Security Partnership, a US initiative with 13 countries and the EU, began in mid-2022, and India joined in 2023.

India's ambitions for net-zero emissions by 2070, semiconductor foundries, and expanding defence, nuclear, and space industries underscore the critical importance of minerals like lithium, nickel, copper, and cobalt. With India heavily reliant on imports for these minerals — 100 per cent for cobalt, nickel and lithium, and 93 per cent for copper and its concentrates — securing supply chains is crucial amid potential geopolitical pressures and vulnerabilities in strategic sectors.

India has abundant heavy minerals, found in the sands of Kerala, Tamil Nadu, Andhra Pradesh, and Odisha, and significant deposits of polymetallic ferromanganese nodules and crusts in the Andaman Sea and Lakshadweep Sea, along with deep-seated deposits inland. Despite possessing over 210 million tonnes of graphite and 665 million tonnes of ilmenite and rutile, production remains minimal, with most exported as raw material. Many critical minerals have remained undiscovered due to the focus on bulk minerals, neglecting deep-seated critical minerals. Exploration was restricted to government entities, hindering investment and adoption of advanced prospecting technologies.

Recent government initiatives are promising. Recognising 30 minerals as critical, the government has taken over their prospecting to streamline efforts of the states. In 2019, 100 per cent foreign direct investment was

allowed. The Geological Survey of India has launched over 250 projects to explore deep-seated critical minerals. Amendments in 2023 to the Mines and Minerals (Development and Regulation) Act, 1957, and the Offshore Areas Minerals (Development and Regulation) Act, 2002, have permitted the entry of the private sector through auctions. Certain minerals previously classified as atomic, have been reclassified, facilitating private-sector mining. Three rounds of auctions for blocks of lithium and rare earths started in November 2023 have been completed. Offshore blocks are also set for auction, opening new opportunities, and startup challenges aiming to develop advanced processing technologies have been launched. Stockpiling key minerals for renewable energy, automotive, space, defence, and semiconductor sectors is also under examination.

At the same time, India is starting to collaborate with other countries. Khanij Bidesh India is assisting Argentina in lithium exploration across five blocks and discussing lithium and cobalt blocks in Australia. India, as a trusted friend of Africa, should be investing in beneficiation and processing facilities, promoting local economies and sustainable relationships. To expedite international initiatives, the government should involve both the private sector and public-sector undertaking.

India must enhance its mineral processing capabilities to meet its low-concentration core and specific end-use requirements. Current capacities are insufficient and below international productivity norms. India can draw inspiration from Indonesia's success in nickel to lead globally in critical minerals, where it has access to domestic and international raw materials. Like oil-refining, India has the potential to become a global leader in lithium refining and to address global bottlenecks in critical minerals. To achieve this, the production-linked incentive scheme for minerals should be tailored to meet global aspirations, generating significant employment opportunities in the process. While policy initiatives have been implemented, there is now a pressing need for investments and technological advancements.

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