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Government of India

India's Critical Mineral Mission:

Securing the Minerals of Tomorrow

September 6, 2025

Key Takeaways

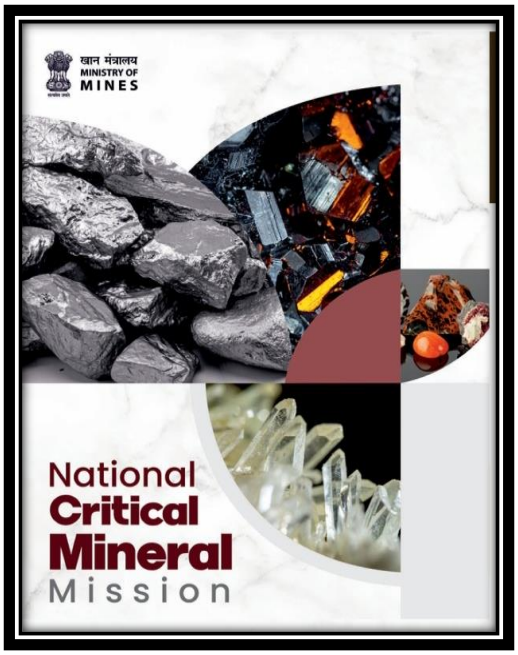
• The **National Critical Mineral Mission** (NCMM), launched in 2025, is India's blueprint to secure domestic and global supply chains of critical minerals.

• NCMM targets **1,000 patents by 2030**, with the creation of **7 Centres of Excellence** to drive breakthroughs in exploration and extraction.

• Under the NCMM, a **₹1,500 crore** incentive scheme has been approved to boost recycling capacity for critical minerals.

Critical Minerals: The New Currency of Progress

As the world pivots to clean energy and advanced technologies, control over critical minerals has become the new frontier of geopolitics. In January 2025, India responded with the **National Critical Mineral Mission (NCMM)**, launched for a period of seven years from **2024-25 to 2030-31**, with a proposed expenditure of **Rs.16,300 crore** and an expected investment of **Rs.18,000 crore** by Public Sector Undertakings (PSUs) and other stakeholders. It is not merely a mining programme, but a strategic blueprint to secure energy security, drive industrial growth, and cement technological independence. From the lithium that powers electric vehicles to the rare earths vital for defense systems, the National Critical Minerals Mission casts its net wide.



What are Critical Minerals

Critical minerals are those minerals that are essential for economic development and national security. They are indispensable for clean energy technologies, high-tech electronics, transport, telecommunications and defence. They are vital to power the global transition to a low carbon emissions economy. These are also minerals fraught with supply chain vulnerabilities, hence the necessity for governments to secure their supply chains for such minerals.

Countries identify minerals critical for them based on their national priorities. In 2023, the Ministry of Mines, released a list of 30 critical minerals for India. These minerals are Antimony, Beryllium, Bismuth, Cobalt, Copper, Gallium, Germanium, Graphite, Hafnium, Indium, Lithium, Molybdenum, Niobium, Nickel, PGE, Phosphorous, Potash, REE, Rhenium, Silicon, Strontium, Tantalum, Tellurium, Tin, Titanium, Tungsten, Vanadium, Zirconium, Selenium and Cadmium.

Why Critical Minerals Matter for India's Clean Energy Future

Critical minerals sit at the heart of India's energy transition, powering technologies from solar panels to electric vehicles. Their role cuts across key sectors. As demand surges, these resources are emerging as the foundation of a stronger strategic future.

- ### Solar Energy

  Photovoltaic cells, the heart of solar panels, depend on elements like silicon, tellurium, indium, and gallium to turn sunlight into electricity. India's solar power capacity, now at **64 GW**, leans heavily on these critical minerals, driving the nation's solar dreams.

- ### Wind Power

  Wind turbines are powered by **neodymium and dysprosium**. These elements drive the high-performance magnets that make turbines spin efficiently. With India aiming to expand its wind power from **42 GW to 140 GW by 2030**, demand for these critical minerals will soar, making them essential for the clean energy revolution.

- ### Electric Vehicles (EVs)

  At the heart of every electric car lies a battery fueled by **lithium, nickel, and cobalt**. These minerals make clean mobility possible, storing energy that powers EVs on the road. With the government pushing for **30% EV penetration by 2030**, the hunger for these resources is set to multiply.

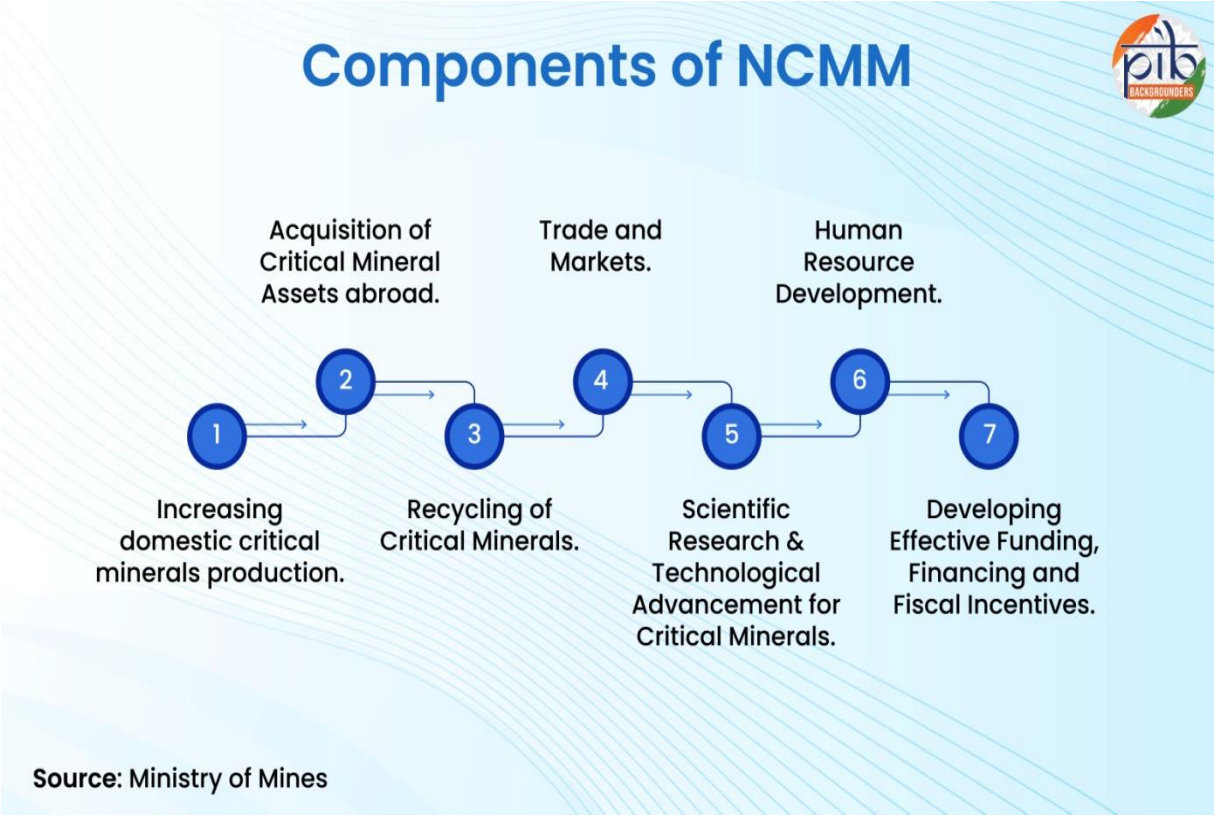
- ### Energy Storage

  Lithium-ion systems are vital for renewable integration, depending once again on **lithium, cobalt, and nickel**. These minerals make it possible to store surplus power and provide backup when demand peaks.

Charting India's Critical Mineral Roadmap

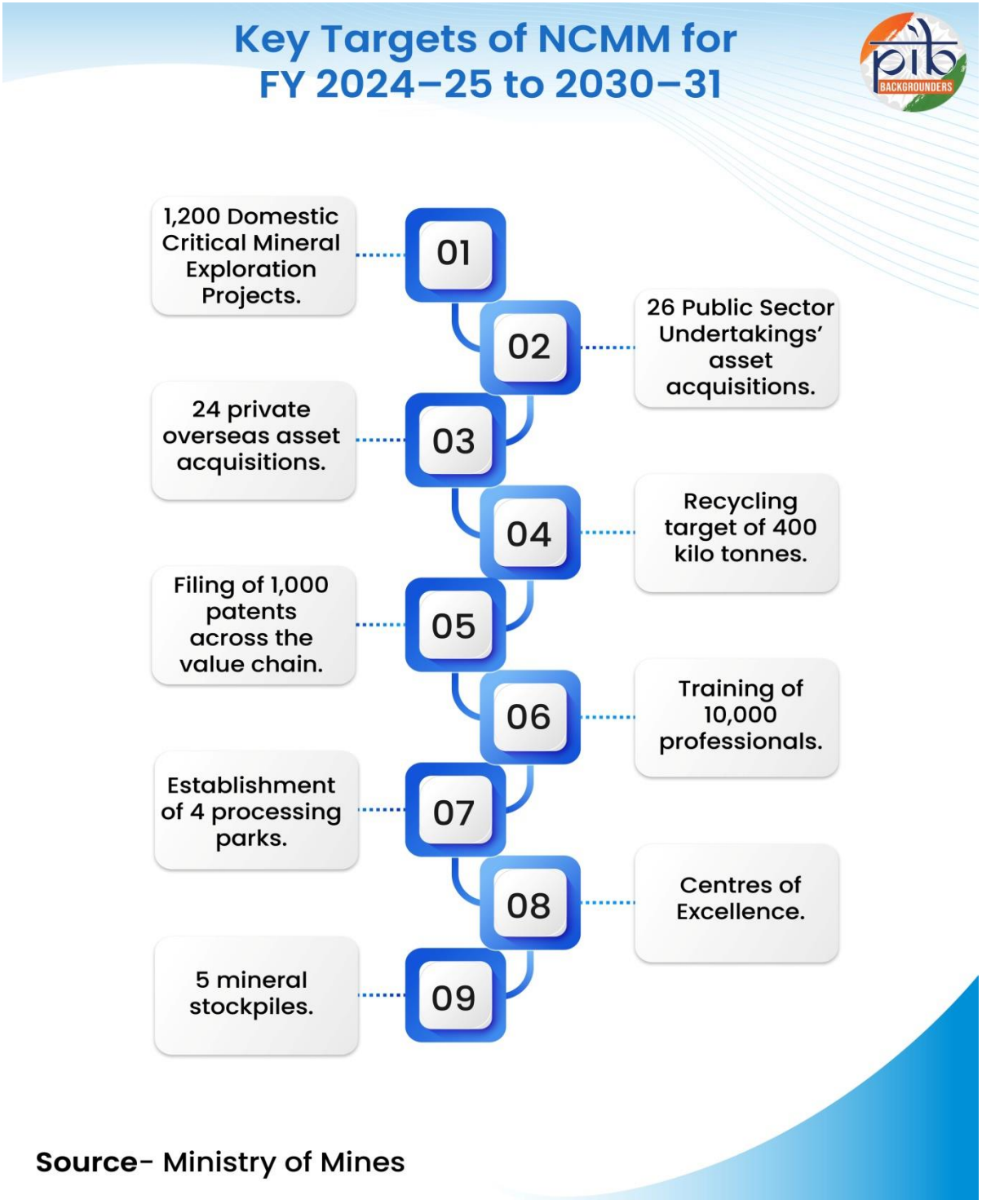
The National Critical Mineral Mission aims to secure a place for India as a global player in the emerging green economy. The legal and policy framework for NCMM is grounded in the amendment of the **Mines and Minerals (Development and Regulation) Act (MMDR Act)**, under which the central government has the exclusive power to auction **24 out of the 30**identified critical minerals.

The NCMM has been designed with the primary objectives of **securing domestic and international supply sources** and **strengthening mineral value chains** covering exploration, mining, processing, recycling, research and development, and human resource development.



As part of the National Critical Minerals Mission, the government has set aside ₹100 crore for pilot projects that look beyond traditional mines. The focus is on tapping unconventional sources like overburden, mine tailings, fly ash, and even red mud to recover valuable minerals that would otherwise go to waste. This push turns industrial byproducts into strategic assets. It's one of the many ambitious steps that tie into NCMM's larger targets, spanning patents, recycling, research, and global partnerships to secure India's mineral future.

The Union Cabinet approved a **₹1,500 crore Incentive Scheme** under the National Critical Mineral Mission (NCMM) to **boost India's recycling capacity** for critical minerals from secondary sources such as e-waste, lithium-ion battery scrap, and end-of-life vehicle parts. By fostering both new and existing recyclers, the initiative aims to build **270 kilo ton annual recycling capacity**, produce **40 kilo ton** of critical minerals, attract around **₹8,000 crore** in investments, and generate nearly **70,000 jobs**—a strategic step to strengthen supply chain resilience and reduce import dependency.



The road to mineral independence is paved with clear targets. Through these targets, the NCMM plans to turn vision into reality. India plans to launch over a thousand projects to uncover new reserves of critical minerals within its own borders. Both public sector enterprises and private players are encouraged to acquire assets by securing stakes in critical mineral projects abroad, strengthening India's global footprint. Development of patents, processing parks for minerals, centres of excellence, incentives for recycling, upskilling workforce and maintaining strategic reserves like mineral stockpiles to ensure uninterrupted supply of critical minerals plan to turn the vision of NCMM to reality.

Mines of Innovation

A central target of the **National Critical Minerals Mission (NCMM)** is to catalyze innovation by supporting and monitoring the filing of **1,000 patents across the critical minerals value chain by FY 2030–31**. The aim is clear: accelerate the development and commercialization of homegrown technologies vital for India's energy transition and strategic industries. That momentum is already visible. In a parallel move, the guidelines for setting up a dedicated **Centre of Excellence (CoE)** under the Mission were cleared on April 6, 2025, marking a key step in advancing India's critical minerals strategy.

Patent Push: How NCMM is Shaping India's Critical Minerals Future

- In **May 2025, 21 patents** were filed in India within the critical mineral's ecosystem, followed by **41 more in June**. Patent grants have also picked up pace — **two in May** and **eight in June**, reflecting the growing push in R&D focused on exploration, extraction, processing, and advanced applications.
- The newly granted patents highlight the diversity of research underway. They range from **ytterbium-doped metal oxide nanoparticles** and **nickel vanadate thin films** to breakthroughs in **tungsten-polymer composite molds**, **tantalum-doped NASICON solid-state electrolytes for sodium-ion batteries**, and advanced **anode materials for secondary batteries**.
- Together, these innovations span critical resources such as **lithium, nickel, titanium, tungsten, vanadium, ytterbium, and tantalum**, minerals at the heart of clean energy technologies, next-gen electronics, and defense applications.

Centre of Excellence in Mining

The Ministry of Mines has designated 7 premier institutions— 4 IITs and 3 research laboratories, as Centres of Excellence (CoEs) under the National Critical Minerals Mission (NCMM). These CoEs will drive cutting-edge research and innovation to bolster India's scientific and technological capabilities in the critical minerals sector. Funding for the centres will come on a project basis through government R&D schemes, industry collaborations, and venture capital support. The institutes recognized as CoEs include **IIT Bombay, IIT Hyderabad, IIT (ISM) Dhanbad, IIT Roorkee, CSIR–IMMT Bhubaneswar, CSIR–NML Jamshedpur, and NFTDC Hyderabad**.

Conclusion

Critical minerals are fast becoming the oil of the 21st century, scarce, strategic, and fiercely contested. They are the building blocks of a modern economy. India has set major climate milestones like cutting the emissions intensity of its **GDP by 45%** by 2030 (from 2005 levels), sourcing **half of its power capacity** from **non-fossil** fuels by the same year, and achieving **net-zero emissions by 2070**. Central to meeting these targets is the National Critical Mineral Mission (NCMM) to secure long-term supplies of lithium, cobalt, nickel, and rare earths. Beyond ensuring clean energy and electric mobility, the mission is designed to attract investments, foster innovation, and place India at the centre of global supply chains for the industries of tomorrow.

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