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2. India-US Critical Minerals Agreement – Economy

India and the United States have signed a bilateral agreement to reinforce critical minerals and rare-earth element supply chains, establishing reliable alternative pathways for strategic resources. Concurrently, the Quad partners (India, United States, Japan, and Australia) have launched a unified Critical Minerals Initiative, mobilizing up to \$20 billion to expand global mining and processing capacities. This dual-track approach reflects growing recognition that secure access to critical minerals is essential for technological superiority, clean energy transition, and strategic autonomy in an increasingly multipolar world.

1. Critical Minerals and Rare Earth Elements – Definitions and Scope

Critical Minerals Designation

1. Critical minerals are materials such as lithium, cobalt, graphite, and gallium that are essential for high-tech industries but face severe vulnerabilities regarding supply disruptions.
2. These materials lack adequate substitutes and concentrate heavily in geographically limited sources, creating strategic bottlenecks for advanced economies.
3. Supply disruptions from single-source dominance can paralyze entire technology sectors including semiconductors, renewable energy, and defence manufacturing.

Rare Earth Elements Characteristics

1. Rare Earth Elements comprise a specific group of 17 metals including scandium, yttrium, and the 15 lanthanides, known for unique magnetic and luminescent properties.
2. These metals are vital for defence equipment, advanced electronics, green technologies, and high-performance industrial applications.
3. REE scarcity and processing complexity make them particularly strategically significant in contemporary geopolitical competition.

2. Key Highlights of the India-US Agreement

Dual-Track Diplomatic Framework

1. The partnership functions through a bilateral India-US framework alongside the multilateral Quad initiative, combining bilateral depth with multilateral resilience.
2. The agreement was signed by India's External Affairs Minister and the US Secretary of State, signifying high-level political commitment.
3. This dual approach allows customized bilateral cooperation while leveraging multilateral partnerships for broader supply chain diversification.

Financial Mobilization and Investment

1. The G4 grouping aims to catalyse up to \$20 billion in public and private financing to support mining, refining, and recycling infrastructure globally.
2. This substantial financial commitment targets infrastructure development away from China-centric manufacturing and processing hubs.
3. Investment covers exploration technologies, processing facilities, refining capacity, and advanced recycling operations across partner countries.

Comprehensive Lifecycle Coverage

1. The agreement covers the entire lifecycle of strategic materials, spanning exploration, processing, recycling, and joint commercial investments.
2. Comprehensive coverage ensures no critical gap in supply chains from raw ore extraction to finished component manufacturing.
3. Joint commercial investments create shared economic interests aligned with strategic objectives.

Strategic Sector Focus

1. The mineral pipelines sustain highly sensitive and high-tech sectors including semiconductors, electric vehicles, clean and renewable energy grids, and advanced defence systems.
2. These sectors represent competitive frontiers where critical mineral security directly translates into technological leadership.
3. Défense applications demand highest purity and reliability standards, necessitating partnership with trusted allies.

Institutional Integration

1. The framework expands on prior diplomatic commitments, integrating with international clean energy supply chains, the US-led Forum on Resource Geostategic Engagement (FORGE), and high-tech infrastructure partnerships.
2. Integration creates coherent policy frameworks aligning critical minerals strategy with broader technology and energy policies.

3.Quad Critical Minerals Initiative – Strategic Architecture

ESG and Sustainability Standards

1. The initiative emphasizes high environmental, social, and governance standards in mining, advanced mineral recovery, and recycling technologies across partner countries.
2. ESG emphasis ensures mining operations maintain environmental integrity, respect community rights, and follow transparent governance principles.
3. High standards differentiate Quad supply chains from alternative sources relying on lower environmental and labour protections.

Geopolitical Objective

1. The pact aims to reduce dependence on heavily concentrated manufacturing hubs, mitigating risks associated with export curbs or political manipulation of mineral markets.
2. Historical precedents demonstrate how single-source dominance creates vulnerability to strategic coercion.
3. Diversification reduces leverage of authoritarian states over democratic economies' critical technology sectors.

4.Significance for India

Clean Energy Transition Support

1. Critical minerals including lithium, cobalt, nickel, graphite, and rare earth elements are indispensable for electric vehicles, battery storage, solar panels, wind turbines, and renewable energy infrastructure.
2. Secure mineral access directly enables India's ambitious clean energy transition and renewable energy capacity expansion targets.

Semiconductor and Manufacturing Ambitions

1. Reliable mineral access supports India's ambitions in semiconductor fabrication, electronics manufacturing, battery production, and high-technology industrial supply chains.

2. Make in India and Atmanirbhar Bharat initiatives require stable supply of critical inputs for domestic manufacturing ecosystems.

Supply Chain Diversification

1. The framework enables India to diversify away from highly concentrated supply chains, particularly in rare earth processing and mineral refining.
2. Reduced vulnerability to export restrictions, geopolitical coercion, and supply disruptions strengthens economic resilience.
3. Access to Australian lithium, rare earths from multiple sources, and Japanese recycling technologies creates polyvalent supply architecture.

Strategic Resource Diplomacy

1. Critical minerals emerge as a key pillar of India's strategic partnerships with the United States, Australia, Japan, Argentina, Chile, African nations, and Russia.
2. Resource diplomacy strengthens India's economic and geopolitical engagement with critical allies and emerging partners.
3. Mineral partnerships create mutual dependencies supporting broader strategic cooperation.

Strategic Autonomy Enhancement

1. Secure mineral access strengthens India's capabilities in defence technologies, clean energy systems, electric mobility, aerospace, space technologies, and advanced manufacturing.
2. Strategic autonomy reinforces India's ability to pursue independent foreign policy without external coercion over critical inputs.

5.Challenges and Vulnerabilities

Domestic Processing Limitations

1. Although India possesses mineral reserves, it lacks sufficient capacity in mineral refining, separation technologies, and processing infrastructure.
2. Limited value-addition capabilities reduce India's integration into global supply chains and competitiveness in downstream manufacturing.

Environmental and Social Concerns

1. Critical mineral extraction leads to ecological degradation, water stress, and displacement of local communities if not regulated sustainably.
2. Tribal rights protection and community participation require careful balancing against strategic imperatives.

Global Competition Intensification

1. Rapid clean energy and high-tech expansion intensifies global competition for critical minerals, increasing supply security challenges.
2. Rising demand from multiple economies creates bidding competition for limited mineral supplies.

Overseas Investment Risks

1. Indian investments in foreign mining assets face political instability, resource nationalism, regulatory uncertainty, and logistical vulnerabilities.
2. Geopolitical shifts can threaten asset security and operational continuity.

6.Way Forward

1. **Strengthen Domestic Exploration Infrastructure** – India should expand geological surveys, mineral mapping, exploration incentives, and transparent auction mechanisms to accelerate discovery and extraction of domestic critical mineral reserves, reducing long-term import dependence.

2. **Develop Processing and Refining Ecosystems** – Policy focus must shift from mere mineral acquisition to building indigenous capabilities in processing, refining, separation technologies, and downstream value-added manufacturing, creating higher-value supply chains.
3. **Establish Circular Economy Frameworks** – India should strengthen battery recycling, e-waste recovery, urban mining, and circular economy initiatives to reduce import dependence, improve resource efficiency, and create new economic opportunities.

Source – [https://www.mea.gov.in/press-](https://www.mea.gov.in/press-releases.htm?dtl/41236/IndiaUS_Framework_on_Securing_of_Supply_in_the_Mining_and_Processing_of_Critical_Minerals_and_Rare_Earths#~~~text=The%20Framework%20was%20signed%20in,processing%2C%20recycling%20and%20related%20investments)

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