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HOW INDIA-AUSTRALIA PARTNERSHIP CAN BE A GAMECHANGER IN CRITICAL MINERAL SUPPLY CHAINS?

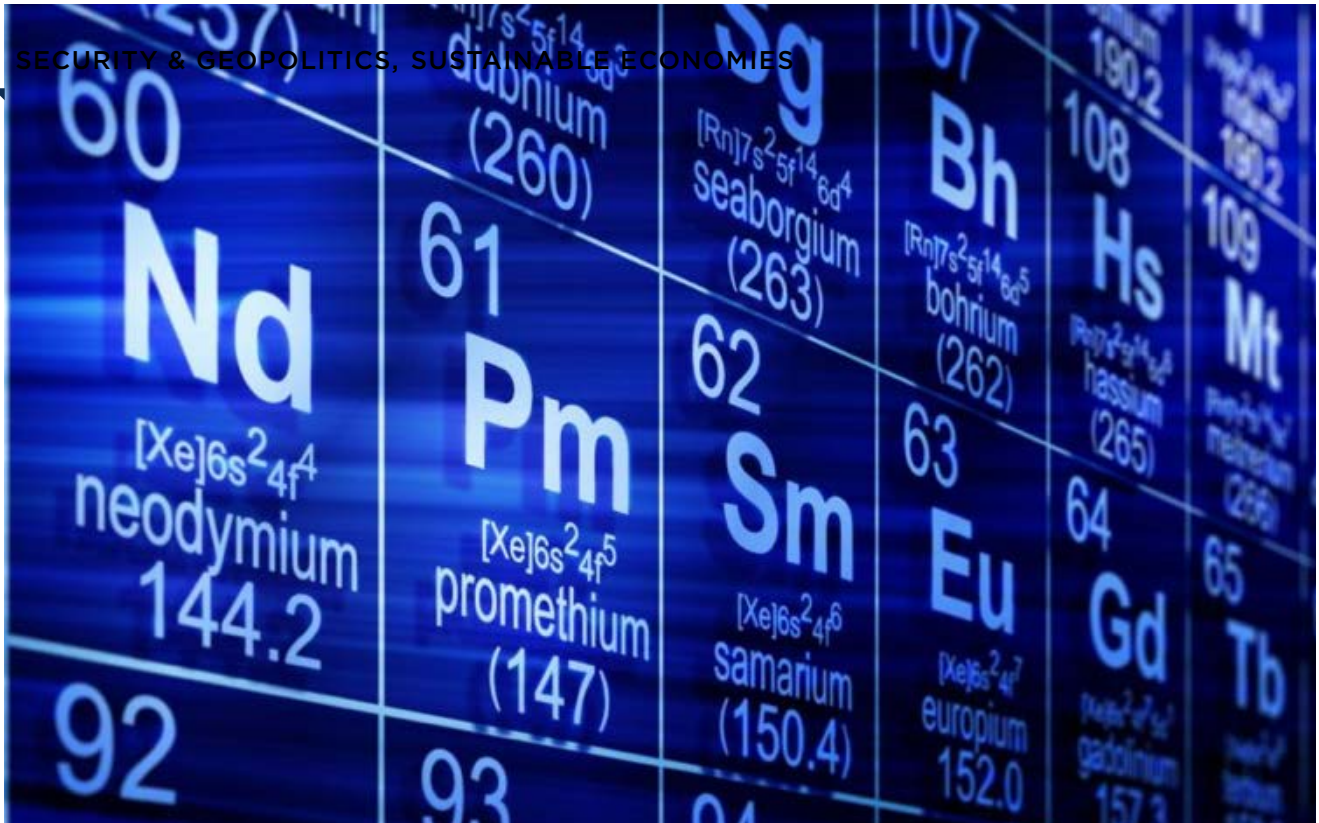
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Read Professor Mohan Yellishetty, Prof Ajay Kumar and Prof Robin Batterham AO's insights on how the Australia-India partnership can be a gamechanger in critical mineral supply chains

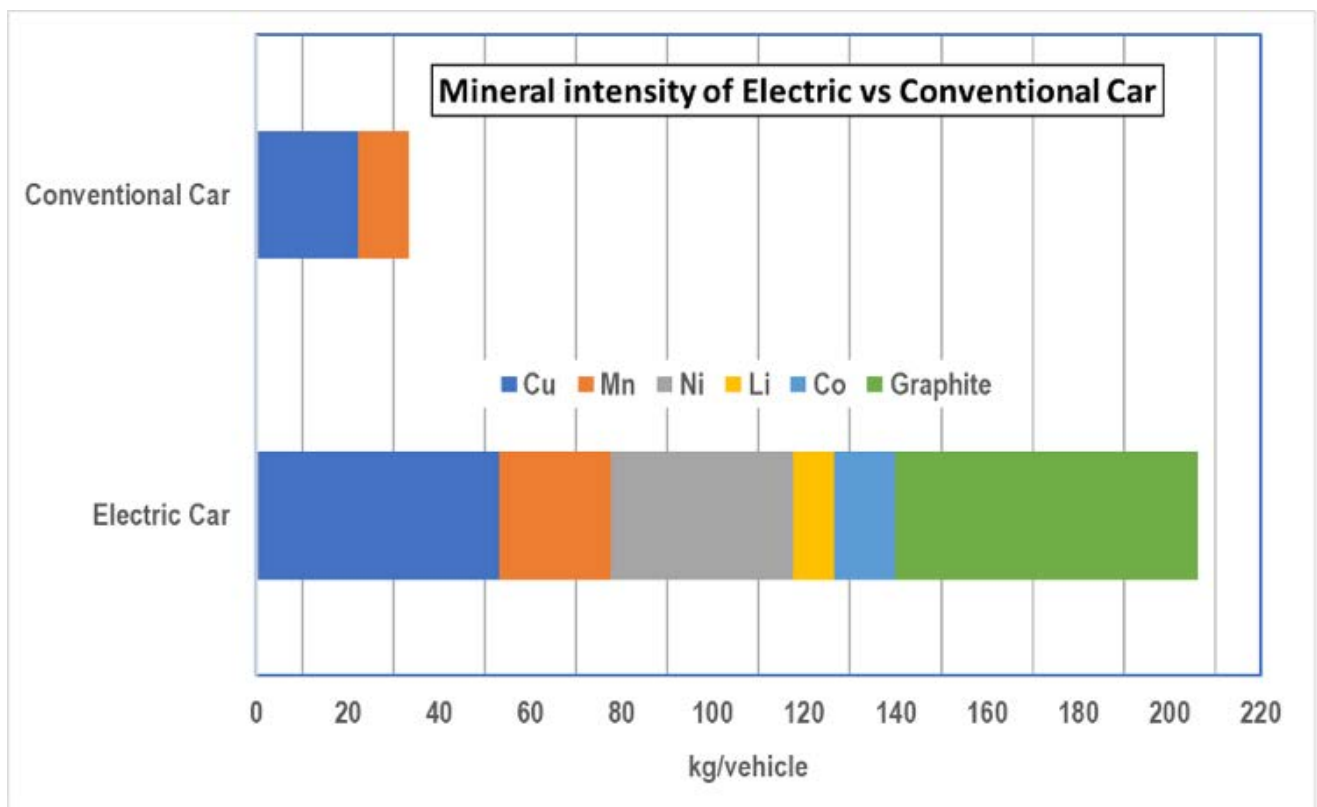
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By **Professor Mohan Yellishetty**, Honorary Academic Fellow, Australia India Institute, Co-Founder, Critical Minerals Consortium, Monash University, Australia, Co-Founder, Australia-India Critical Minerals Research Hub, **Prof Ajay Kumar**, Distinguished Professor, IIT Kanpur, India and Former Defence Secretary of India, and **Prof Robin Batterham AO**, Emeritus Kernot Professor

of Engineering, Distinguished Fellow, Australia India Institute and Faculty of Engineering and Information Technology at The University of Melbourne, Australia.

Why and what minerals are Critical minerals?

Critical minerals, essential for batteries, electric vehicles, and electrification needs, are at high risk of supply disruptions, crucial for combating climate change. An electric car needs six times more minerals than a gas car, like lithium (6 kg), nickel (29 kg), manganese (10 kg), and copper (20 kg) per 60 kWh battery. Wind turbines use 120 kg of neodymium and 12 kg of praseodymium per megawatt, and electric vehicle motors rely on 0.45 kg of neodymium and 0.075 kg of dysprosium.



Critical minerals for India

India, on its path to becoming a global economic force, is gearing up for significant demand for critical minerals. While the country has substantial production of various minerals, including minerals like coal, bauxite, iron ore,

chromite, and zinc, the domestic availability of critical minerals remains limited.

This dependency is as high as 100% for vital elements like cobalt, lithium, nickel, niobium, vanadium, germanium, beryllium, rhenium, tantalum, strontium, and REEs. The situation is challenging due to limited reserves and a historical lack of organised mineral exploration processes within the country. In many cases this exposes Indian manufacturing to greater risks.

Recognising this challenge, India has initiated efforts to identify, explore, extract domestically, and source them from international partners when they are not readily available within the country.

Geopolitics and Supply Concentration

Geopolitics greatly affect critical minerals trade, leading to global supply chain disruptions.

China's export bans on key metals like Gallium, Germanium, and REEs have created scarcity and price spikes. Despite Australia's significant mineral resources, China's dominance in processing, driven by low costs and competitive labor, positions it as a key global player, influencing prices globally. Diversified supply chains, emphasised in the Australian Critical Minerals Strategy 2023–2030, are crucial to prevent disruptions.

But such attempts run the risk of strategic responses in the form of export bans on processed commodities from China and moves to create oversupplies.

The market characteristics of critical minerals

The critical minerals markets face challenges due to their opaque nature, entry barriers, small and differentiated markets, and the absence of essential market mechanisms. These factors make it difficult for miners to ensure fair prices for their products and attract necessary financing.

Many critical minerals markets are too small to be of interest to major mining companies. That leaves it up to mid-tier and small miners to bridge the gap between rapidly growing demand and supply. Although new supply will likely

come from mid-tier and small market players, the incumbent suppliers are usually geographically concentrated, leading to the potential for sovereign interference.

Until we can find a way to break free of the market stranglehold of the biggest player China, the investments into alternative critical mineral supply chains will remain at risk.

Manufacturing Growth and Renewable Energy Ambitions in India:

India's rapidly growing economy has become a focal point for both domestic and international investments in manufacturing industries. Recognising the pivotal role of manufacturing in industrial development, the Government of India launched the 'Make in India' initiative, with the goal of increasing the sector's contribution to GDP from the current 20% to a potential 25-30% by 2030.

India has set ambitious targets in its renewable energy transition. The plan aims to have 30% of vehicles powered by electricity by 2030 and to develop 50 GW of cell manufacturing capacity by the same year. Transition to renewable energy reduces exposure to global energy markets because the vast majority of renewable energy will be produced and consumed in-country, and another country can't stop the sun shining and the wind blowing.

India's path to becoming a manufacturing powerhouse and increase in green power and energy-saving technologies hinges on securing sustainable and reliable raw material supply chains.

Atmanirbhar (Self-reliant) Nation and International Partnerships

The India-Australia partnership is poised to reshape the critical minerals supply chain, challenging China's dominance. India's "Demand, Demography, and Democracy" (3Ds) coupled with scale of economies could propel its emergence as a global manufacturing hub. With a growing middle class and expanding industry, India's domestic demand makes it a key player. Its skilled labor market and commitment to democratic rule align with global de-risking efforts in the US-led Mineral Security Partnership (MSP).

India's strategic initiatives, like 'Critical Minerals for India' publication and critical minerals block auctions, show intent to fortify its position. Initiatives such as securing leases overseas via KABIL reflect efforts to reshape the critical minerals landscape. Collaborations with Australia (CECA) and trilateral initiatives with Australia and Japan (Supply Chain Resilience Initiative) enhance India's position. Joining the MSP demonstrates India and Australia's commitment to securing critical mineral resources globally, promoting best practices and supply chain resilience in the Indo-Pacific.

Is bilateral Public-Private Partnership for CM processing and refining a solution?

Australia possesses substantial deposits of critical commodities essential for the global energy transition, coupled with superior environmental, social, and governance standards, making it an appealing investment destination. However, refining capacity limitations and insufficient local demand lead to the disposal of many extracted critical minerals in tailings storage facilities, posing challenges. Leveraging Australia's Mining Equipment, Technology, and Services capabilities could enhance India's critical mineral industry's efficiency, fostering healthy competition with China.

In contrast, India boasts mining and refining expertise, infrastructure, and a growing demand for critical minerals. Its favourable labor market, coupled with low energy and water costs, positions India as a compelling alternative to China for downstream processing.

To mitigate market uncertainties marked by market volatility, fostering a public-private partnerships (PPPs) is imperative. Government intervention becomes essential to absorb and mitigate risks arising from price fluctuations and shocks, averting potential bankruptcies for commercial entities.

Tesla's new factory in India, announced by CEO Elon Musk with a projected investment of \$2-3 billion, strategically complements its existing supply agreement with Australian mining company Magnis Energy Technologies. This move will enhance Tesla's production capabilities in a key market and ensure a steady supply of critical battery materials, supporting the company's global expansion and sustainability goals.

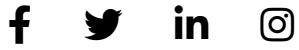
Several Indian mining companies have already established a presence in Australia, such as Legacy Iron Ore, a subsidiary of the Indian government's National Mineral Development Corporation. This exemplifies the potential for joint ventures to accelerate the development of critical mineral projects, promoting mutual growth and cooperation. Australia's Critical Minerals Facility, backed by a \$4 billion investment, can provide essential capital to navigate the challenges in critical mineral projects, fostering collaboration between Australian mining companies and their Indian counterparts.

The Australia-India partnership, underscored by the Comprehensive Strategic Partnership, commits Australia to assist India in establishing a domestic critical minerals processing industry. This collaboration not only promises to enhance capabilities but also to create numerous job opportunities in both nations, boosting employment for semi-skilled and unskilled workers in rural and regional areas and contributing to economic growth through both blue- and white-collar roles.

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