



Lithium reserves found in india

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The story so far: News of the discovery of "5.9 million tonnes inferred resources of lithium" in the Salal-Haimana area of Reasi district, Jammu & Kashmir, by the Geological Survey of India has been received as a game-changer in India's impending transition to a green economy. The term "inferred" refers to the "preliminary exploration stage", the second of a four-step process, according to the Mines and Minerals (Development and Exploration) Act 1957.

A World Bank study suggests that the demand for critical metals such as lithium (Li) and cobalt is expected to rise by nearly 500% by 2050. While "the global electric vehicle market is projected to reach \$823.75 billion by 2030, registering a Compounded Annual Growth Rate (CAGR) of 18.2% from 2021 to 2030," India's market is projected to register a CAGR of 23.76% by 2028. India is seeking to secure its critical mineral supplies and build self-sufficiency in this sector.

As India currently imports all of its Li from Australia and Argentina and 70% of its Li-ion cell requirement from China and Hong Kong, the lithium reserves in J& K could boost the domestic battery-manufacturing industry. If the perceived size of the mineral reserves in J& K is borne out by further exploration, India could jump ahead of China vis-?-vis its Li stockpile.

The J& K reserves will also help advance the Indian government's ambitious plan of "30% EV penetration in private cars, 70% for commercial vehicles, and 80% for two and three-wheelers by 2030 for the automobile industry." They will strengthen India's National Mission on Transformative Mobility and Battery Storage as well.

Critical mineral dependencies constitute a major geostrategic concern in the transition to net-zero carbon energy systems. In the present scenario, as countries seek to avoid dependencies and vulnerabilities related to critical minerals, the latter are likely to be at least as important as oil and gas in the near future. A high level of dependence on China for Li and other crucial metals and their derivatives are also perceived to be sources of energy security risks.

China currently controls 77% of the global lithium-ion battery manufacturing capacity and is home to six of the world's 10 manufacturing companies. As a result, the E.U., the U.S., Canada, India, and other major economies have been trying to leverage alternative supplies that can challenge China's geopolitical dominance in this area. For example, responding to perceived national security concerns, the Canadian government has asked Chinese companies to divest from Canadian lithium-mining companies.

The growing geopolitical rivalry with China makes India's security considerations more immediate as well, especially also in light of the longstanding, and recently escalating, territorial and border disputes. To reduce dependence on China, the Indian government and industry are pushing for a "Rare Earths Mission" to exploit

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the country's critical mineral reserves, which account for 6% of the world's rare-earths" reserves prior to the discovery of Li in J& K.

The new discovery has more geostrategic implications considering the geopolitical sensitivity of its wider location. Although Reasi is in the relatively more stable Jammu region, the Union territory of J& K (previously a state) has been the site of historical cross-border tensions between India and Pakistan, domestic insurgency, and terrorism. If the local populace isn't meaningfully engaged in the impending Li extraction project, the resulting tension could introduce new frontiers of socio-environmental conflict.

The applications of Li in renewable energy infrastructure often obscures its significant environmental consequences, which vary according to the source. Extracting Li from hard rock mines, similar to what has already been proposed in J& K, entails open-pit-mining followed by roasting the ore using fossil fuels. Industry estimates suggest that this process consumes 170 cubic metres of water and releases 15 tonnes of CO₂ for every tonne of Li extracted.

Open-pit-mining, refining, and waste disposal from these processes substantially degrades the environment, including depletes and contaminates waterways and groundwater, diminishes biodiversity, and releases considerable air pollution. This said, the geological context of mining in J& K differs from Australia, which has the largest Li stock in hard rock mines, in one major way.

In Australia, Li-bearing pegmatite deposits are found in the ancient geological regions of Pilbara and Yilgarn cratons, whose continental rocks have been stable for over a billion years. The Himalaya on the other hand is the youngest mountain range in the world and is much more unstable (as evidenced by the ongoing tragedy in Joshimath). Incidents of land sinking have also been reported from a village in Doda district in Chenab valley, which extends to some parts of Reasi.

In the densely populated context of India, the socio-environmental effects of mining are likely to be far worse than they have been in Australia and likely comparable to lithium extraction in South America.

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