All about Lithium Reserves

Why in news?

The Union Ministry of Mines has announced that lithium reserves had been found in Jammu and Kashmir, a first in the country.

Why is lithium so important?

> *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.*

- Lithium is a key element for new technologies and finds its use in ceramics, glass, telecommunication and aerospace industries.
- It is used in Lithium ion batteries, lubricating grease, high energy additive to rocket propellants, and optical modulators for mobile phones.
- Lithium is used in electric car batteries because of its lightness and energy density.
- It is also used as a convertor to tritium used as a raw material for thermonuclear reactions i.e. fusion.
- The thermonuclear application makes Lithium as **"Prescribed substance" under the Atomic Energy Act, 1962**.
- The process of lithium extraction is time-and infrastructure-intensive.

Where are the world's lithium reserves?

- **Sources** - Lithium is currently extracted from two main sources
  - Hard rock mines
  - As brine from salt flats and lake
- **Reserves** - According to the U.S. Geological Survey, at the start of 2022,
  - Identified lithium resources worldwide - 89 million tonnes
  - Mineable parts of the resources - 22 million tonnes
- In terms of reserves, **Chile**, Australia and Argentina top the chart.
- **Production** - In 2021, almost 90% of lithium mining happened in Chile, China, and Australia, with **Australia leading production**.

What is the status of Lithium in India?

- Currently India is **fully import-dependent** when it comes to lithium.
- In 2021-22, **Hong Kong,** China and the US were the top three sources of India's

lithium imports.

- According to the Ministry of Mines, the Geological Survey of India (GSI) has carried out 19 projects in the last five years on lithium and associated elements.
- The GSI has currently inferred that the deposits in Kashmir could hold around 5.9 million tonnes of lithium in the Salal-Haimana area of Reasi District in Jammu and Kashmir.
- This is the G3 level of surveying.
- As per the United Nations Framework Classification (UNFC),
    - **G4** - Basic, reconnaissance survey
    - **G3** - Preliminary exploration
    - **G2** - General exploration
    - **G1** - When quantities associated with a known deposit can be estimated with a high level of confidence



Why is the discovery so significant?

- **Domestic battery manufacturing -** The lithium reserves in J&K could boost the domestic battery-manufacturing industry.
- **Improvement in rank** - If the perceived size of the mineral reserves in J&K is borne out by further exploration, India could jump ahead of China in its Li stockpile.
- **EV penetration** - 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.

*To reduce dependence on China, the Indian government is pushing for a **'Rare Earths Mission'** to exploit the country's critical mineral reserves, which account for 6% of the world's rare-earths' reserves.*

What are the challenges associated with it?

- **Further exploration** - The GSI would have to conduct further exploration to determine if there are mineable reserves in the estimated resources in Jammu and Kashmir.
- Details about the accessibility and purity of the inferred resources would be of material importance.
- **Lack of technology** - At present, India also does not have lithium extraction technologies.
- **Geostrategic location** - J&K has been the site of historical cross-border tensions between India and Pakistan, domestic insurgency, and terrorism.
- **Environmental issues** - Extracting Li from hard rock mines entails open-pit-mining followed by roasting the ore using fossil fuels.
- The water consumption and CO_2 release during this process is enormous.
- These processes depletes and contaminates waterways and groundwater, diminishes

biodiversity, and causes air pollution.
- The Himalaya on the other hand is the youngest mountain range in the world and is much more unstable where incidents of land sinking have been reported from a village in Doda district in Chenab valley.

What can we learn from South America?

- The '**lithium triangle'** of Bolivia, Chile, and Argentina contain roughly half the world's known Lithium.
- In Bolivia and Chile, Li extraction has been either in the hands of the state or requires mining companies to enter into a contract with state-owned companies.
- In 2022, Chilean regulators approved an updated compliance plan, in which Li miner proposed to work with both the regulator and local communities to address environmental infractions.
- In 2022, Mexican lawmakers introduced reforms to create a state-owned entity to extract, process and sell Li and outlaw all direct private investment and production in the Li sector.

What safeguards does India's mining sector have?

- **Involvement of local communities** - State government officials in J&K have said plans for Li exploration will involve local communities, who will be prioritised for jobs in exploration and mine development.
- **DMF** - In 2015, Lok Sabha amended the Mines and Minerals (Development and Regulation) Act 1957 to establish the **'District Mineral Foundation' (DMF).**
- It is a non-profit statutory trust for every Indian district affected by mining-related operations that should work for the interest and benefit of persons, and areas affected by mining-related operations.
- In practice, the DMFs have become sites of centralised bureaucratic control, without meaningful public participation or accountability.

In 2019, the Nobel Prize in Chemistry was given to John B. Goodenough, M. Stanley Whittingham and Akira Yoshino for their contributions to the development of the lithium-ion battery.

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