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Minerals from Waste: TDB's RDI Fund Backs E-Waste Recycling Technology



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Why in News

The Technology Development Board (TDB) of the Department of Science and Technology (DST) signed an agreement on 16 November 2026 with M/s Neo Seekermetals Pvt. Ltd. (Hyderabad, Telangana) under the RDI Fund. The agreement supports the development and commercialisation of an indigenous technology to extract critical metals by recycling e-waste and lithium-ion battery waste. The total project cost is Rs 20 crore, of which Rs 10 crore will come from the RDI Fund through Optionally Convertible Debt (OCD).

Introduction: TDB and the RDI Fund

Technology Development Board (TDB): A statutory body under the Department of Science and Technology (DST) that finances the commercialisation of technologies developed for the first time in the country - turning laboratory research into market-ready products.

RDI Fund (Research, Development and Innovation Fund): A scheme to finance high-risk, high-impact R&D projects; support comes in several forms, including OCD (debt that can convert into equity under set conditions).

Critical minerals: Minerals such as lithium, cobalt, nickel and rare-earth elements that are essential for electric vehicles, batteries, electronics and clean-energy technologies, and whose supply security has become a strategic issue.

Main Body: project details

- **Title:** 'Extraction of Critical Metals by Recycling of E-Waste and Lithium-Ion Battery Waste'.
- **Finance:** Total cost Rs 20 crore; Rs 10 crore from the RDI Fund through OCD.
- **Technology:** The company's integrated and patented recycling process will recover valuable metals and battery materials from both e-waste and battery waste, bringing discarded material back into the productive economy.
- **Goal:** To advance the technology from TRL-5 to TRL-9 - from validation to commercial-scale deployment.
- **Intent:** As TDB Secretary Shri Rajesh Kumar Pathak said, an India moving towards clean energy and advanced technologies needs secure, sustainable access to critical minerals; recovery from e-waste is a foundation of the circular economy.

What are TRL levels

Technology Readiness Level (TRL): A 1-to-9 scale measuring a technology's maturity. TRL 1-3 cover concept and laboratory research, TRL 4-6 cover prototypes and validation in a relevant environment (TRL-5 = component validation in a relevant environment), and TRL 7-9 run from demonstration to proven operation in a real system (TRL-9 = technology proven in actual operations).

Exam relevance

For Prelims: TDB's status (under DST), the RDI Fund, OCD, the TRL scale and recovery of critical metals from e-waste are direct question areas.

For Mains: Self-reliance in critical minerals, urban mining and the circular economy - for multi-dimensional GS-III answers.

Way Forward

If the project succeeds, India will gain a stronger domestic supply chain of critical minerals from e-waste and battery waste, import dependence will fall, and waste management will bring environmental gains. Once the technology reaches TRL-9, it can be scaled to other recycling units.

Prelims Practice Questions

Q1. With reference to the TDB-Neo Seekermetals agreement, consider the following statements:
Statement 1: The total project cost is about Rs 20 crore, with about Rs 10 crore supported from the RDI Fund
Statement 2: The project aims to develop the technology from TRL-5 to TRL-9
Statement 3: The TDB is an autonomous component of the Indian Space Research Organisation (ISRO)

Which of the statements given above is/are correct?

(a) 1 and 2 only

(b) 2 and 3 only

(c) 1 and 3 only

(d) 1, 2 and 3

Answer and Explanation

Correct answer: (a) 1 and 2 only

Explanation: Statement 1 is correct: the total cost is Rs 20 crore, with Rs 10 crore from the RDI Fund through OCD. Statement 2 is correct: the goal is to move from TRL-5 to TRL-9 (commercialisation). Statement 3 is incorrect: the TDB is a statutory body under the Department of Science and Technology (DST); it is not an autonomous component of ISRO.

Q2. Which stage does TRL-9 represent?

(a) Theoretical proof of concept

(b) A laboratory prototype

(c) Component validation in a relevant environment

(d) A technology proven in actual operations in a real system

Answer and Explanation

Correct answer: (d) A technology proven in actual operations in a real system

Explanation: TRL-9 is the highest maturity - proven in actual operations; TRL-5 is component validation in a relevant environment.

Mains Practice Question

How is e-waste recycling (urban mining) a strategic option for the supply security of critical minerals? Analyse with reference to the TDB's recent project financing. (GS-III; 250 words)

Answer Outline:

Introduction: Introduce the TDB-Neo Seekermetals agreement (RDI Fund, 16 November 2026); define critical minerals.

Main Body: Recovery of metals like lithium, cobalt and nickel from e-waste/batteries cuts import dependence; the TRL-5 to TRL-9 leap as the commercialisation path; instruments like OCD supporting high-risk innovation; circular economy and waste-management gains; challenges - collection systems, safety standards and scale.

Conclusion: Conclude that urban mining is a shared solution for supply security and environmental safety; public finance accelerates private innovation.

Frequently Asked Questions (FAQ)

Short answer: TDB (DST) signed an agreement with Neo Seekermetals (Hyderabad) under the RDI Fund - Rs 10 crore through OCD within a Rs 20 crore project - to take e-waste and lithium-ion battery critical-metal recovery technology from TRL-5 to TRL-9.

Q: What is the TDB?

The Technology Development Board - a statutory body under the Department of Science and Technology (DST) that finances the commercialisation of indigenous new technologies.

Q: What is OCD?

Optionally Convertible Debt - a loan that can be converted into equity under set conditions.

Q: What does TRL-5 to TRL-9 mean?

The journey on the technology-maturity scale from a component validated in a relevant environment (TRL-5) to a technology proven in actual operations (TRL-9).

Sources

- PIB - TDB-DST Signs Agreement with NeoSeeker Metals under RDI Fund to Advance Indigenous Critical Minerals Recovery Technology (16 November 2026): https://www.pib.gov.in/PressReleasePage.aspx?PRID=2336782&lang=1&reg=3

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