

“TDB-DST Supports MiniMines Cleantech Solutions Pvt. Ltd. for Sustainable Recycling of Lithium-ion Batteries”

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In line with the Government of India’s vision to promote sustainable technologies and strengthen domestic capabilities in critical minerals, the Technology Development Board (TDB), Department of Science & Technology (DST), has extended financial support to M/s MiniMines Cleantech Solutions Pvt. Ltd. for the project titled “*Sustainable Recycling of the Waste Lithium-ion Batteries.*”

The project aims at the commercialisation of an indigenous, zero-discharge, sustainable battery recycling and critical mineral refining process to extract battery-grade salts of lithium, cobalt, nickel, and manganese from end-of-life lithium-ion batteries. The initiative is expected to strengthen India’s capability in recovering valuable critical minerals through advanced recycling technologies, thereby reducing dependence on imports and supporting the country’s clean energy transition.

MiniMines Cleantech Solutions Pvt. Ltd. is the first R4 category recycler providing end-to-end solutions for end-of-life lithium-ion batteries, including Extended Producer Responsibility (EPR) services. The company has developed a proprietary process known as *Hybrid Hydrometallurgy*TM, which is designed to be agnostic to various lithium-ion battery chemistries and form factors. The company’s black mass recovery and post-processing technology ensures low energy consumption, minimal emissions, and high separation efficiency, enabling recovery rates of up to 99 percent.

The complete process—from pre-assessment, collection, and segregation to mechanical processing and advanced post-processing stages such as extraction, selective separation, and beneficiation—has been indigenously developed and patented. This approach significantly reduces reliance on imported recycling technologies, equipment, and critical raw materials, while also promoting the concept of urban mining within the country.

Under the project, the company proposes to scale up its existing operations into a fully integrated commercial facility capable of processing multiple battery chemistries and producing high-purity critical materials for reuse. The recovered battery-grade compounds, including lithium carbonate and cobalt sulphate, will meet industry specifications and cater to both domestic and export markets.

Speaking on the occasion, **Shri Rajesh Kumar Pathak, Secretary, TDB**, stated, “Development of indigenous technologies for recovery and refining of critical minerals from end-of-life batteries is crucial for strengthening India’s energy security and clean technology ecosystem. Through this project, TDB is supporting the commercialization of a sustainable recycling solution that can reduce import dependence, promote circular economy practices, and contribute to the objectives of the National Critical Minerals Mission.”

A representative of MiniMines Cleantech Solutions Pvt. Ltd. expressed gratitude to TDB for the support and noted that the assistance would enable the company to scale its innovative recycling technology and accelerate the recovery of critical battery materials through environmentally sustainable processes.

The project represents a significant step towards building a self-reliant and technology-driven ecosystem for critical mineral recovery and clean energy materials in India. By enabling efficient extraction of valuable metals from end-of-life batteries, the initiative aligns with national priorities of Aatmanirbhar Bharat, circular economy adoption, and the development of sustainable energy infrastructure.



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