

XProEM and ZIPTRAX CLEANTECH Enter Strategic Partnership to Recycle India's Growing Lithium-Ion Battery Waste

Companies to deploy closed loop, environmentally friendly, and economically viable process for LIB recycling of locally generated waste from EVs, mobiles, gadgets, and other applications



Ontario, Toronto, May 4, 2021 ([Issuewire.com](https://www.issuewire.com)) - The ever-increasing use of rechargeable lithium-ion batteries (LIBs) in a host of portable electronics, energy storage and electric vehicle (EV) applications has led to a rapid rise in their manufacturing globally, with a cumulative market size estimated to reach 130 GWh in India itself by 2030. Further, owing to the environmental impacts associated with use of fossil fuels, i.e. greenhouse emissions and associated climate change, the lion's share of LIBs in transportation-related applications will grow rapidly, driven by strong momentum built in the EV industry. With EVs globally expected to exceed 145 million vehicles on the road by 2030, use of LIBs in EV applications is expected to be the primary driver of growth. Such a sudden increase in LIB manufacturing would result in large volumes of spent batteries in our ecosystem, which are fast becoming an environmental hazard. Furthermore, as lithium is a strategically critical metal with costs forecasted around \$15,000 per tonne, recycling of lithium and other metals in spent batteries has immense commercial value. According to recent estimates, post-2020, the recycling of spent LIBs in India will become increasingly important, as the batteries used thus far in EVs will incrementally reach the end of their lives. More than 2 million tonnes of spent LIB EV packs need to be recycled by 2025 globally, representing a market value of over \$10 billion. According to these projections, in India alone, recycling spent LIBs could open up a market worth up to \$1.5 billion by 2030.

Ziprax Cleantech is a New Delhi based advanced technology start-up with a unique technology that

provides lifecycle management of lithium-ion batteries. The ideation for Ziptrax originated through the concept of urban mining e-waste and batteries to extract critical minerals such as PGM, Gold, Silver, REEs as well as Lithium, Cobalt, Nickel and Copper. Our Cradle-to-Cradle approach to LIBs reduces the battery costs significantly for applications such as EVs and battery energy storage systems (BESS), benefitting not just manufacturers and distributors through buyback of depleted battery packs but also end-users and customers. Ziptrax has been able to establish a wide sourcing and logistics network and spent battery collection mechanism in PAN India and this has been powered by its robust zero-emission physical separation process.

According to industry data, India generates over 15,000 tonnes of LIB waste every year, however, it has a very limited capacity to recycle this waste volume. Ziptrax Cleantech is currently able to recycle more than 300 tonnes of end of life LIB packs per year through its proprietary mechano-hydromet technology producing a variety of materials including Cathode Active Materials, (LFP, NMC and LCO grade), graphite as well as base metals like aluminium and copper.

The objective for Ziptrax ultimately is to put in place closed-loop recycling for India's indigenous LIB Manufacturing plants and the company is working closely with a few of the large cell makers who have laid out plans to start Li-ion cell production by 2022. Hence, there is a need to expand Ziptrax's capacity to about 1,500 tonnes per annum in 2021 and the company is raising investment for its first scaled-up facility in the Delhi NCR region. The company will continue to further develop processes for Cathode-precursor manufacturing, which will help in its direct integration into the Li-ion cell manufacturing supply chain.

XProEM is a technology company based out of Toronto (Canada) and has developed its proprietary Solid State Subtractive Metallurgy (S3M) chemical separation and Diffusion Driven Doping Restoration (D3R) process, which can process the black mass of a wide range of batteries and produce precursor battery materials or even restore the electrodes directly. XProEM's integrated technology system provides a uniquely sustainable solution to tackle the imminent problem of recycling a large amount of spent LIBs by directly recovering battery materials into their reusable forms via a solid-state chemical reduction process. As much of the XProEM process is operated in solid-state, it is designed to consume much less energy than current recycling processes and eliminates the requirement for toxic solvents and treatment of hazardous wastewater post-processing of feedstock. The integrated process is compatible with various LIB types and allows for efficient recovery of waste battery materials into high-value products. The XProEM process effectively lowers the energy and consumable cost by 55%, lifting the gross operating margin to over 45% (compared to 20-25% for pyrometallurgical and hydrometallurgical processes).

XProEM truly stands to lead the development of regional & global industry standards for LIB recycling, and build an independent and complete technical framework for LIB recycling. Additionally, XProEM will also focus on the future of LIB recycling by converting innovative R&D work into an IP portfolio to safeguard its competitive advantages over its peers. Key pipeline projects to enable this include expanding R&D activities to improve and develop recycling technologies compatible with future LIB types (SS, Li-Air, Li-S etc.) and continue to improve cathode restoration techniques. With the rapid demand for cheaper electrode materials, the key question lies, can we restore cathodes and anodes back to their original states rather than recovery of individual components through segregation of each key element? The answer is a firm **YES** as XProEM has also developed the D3R restoration process for directly replenishing lithium in lithium-depleted cathode from spent LIBs to restore the stoichiometric amount of lithium in the spent cathode. The re-lithiation is accomplished by mixing with lithium-bearing compounds to provide the source of lithium, and diffusion of lithium from the mixed material into spent LIB cathode, with both material morphology and composition, restored. Based on the current work

program underway, XProEM expects to carry out the pilot operation on D3R in the next year.

XProEM has also won several international entrepreneurship competitions and awards, including Hangzhou International entrepreneurship and innovation competition, finalist in the Hi5 Competition, and was featured as an Impact Startup at Collision Conference 2021, recognized for striving to make UN Sustainable Development Goals achievable and make a positive impact on their communities. In addition, XProEM has been successful in fundraising from both public funding sources and private investors in North America and Asia. To date, XProEM has been currently implementing its global expansion program, focusing on countries and regions with a large volume of spent LIBs now or in the near future.

XProEM and Ziptrax have identified each other's strengths and potential areas of partnership. With a solid logistics network and physical separation process of Ziptrax combined with a disruptive chemical recycling technology from XProEM, this partnership will ensure that spent LIBs are recycled locally in an economical and sustainable manner in which the critical battery materials are fed back to the battery supply chain. This partnership is fully committed to supporting India's growth as an EV powerhouse in the next decade. The companies will be looking to raise strategic investment of USD 2 million in 2021-22 and the target is to capture a significant market share with a processing capacity of over 1,500 tonnes per annum (TPA) by next year and over 5,000 TPA by 2025. We have the target to recycle 5,000 tonnes of batteries by 2025 and generate revenues of close to Rs 250 odd crores (at current prices) along with a significant market share in terms of both second-life battery repurposing as well as cathode production.

About Ziptrax Cleantech

Incorporated in New Delhi, India with the circular economy based approach for repurposing and recycling Lithium-ion batteries, Ziptrax Cleantech has taken up the challenge to perform Li-ion battery recycling for recovering metals like Cobalt, Lithium, Nickel, etc, as well as potentially extend the life of lithium-ion batteries in Electric Mobility and Energy Storage Applications with re-manufacturing of 2nd Life Battery packs. Since 2016, the DPIIT recognized startup has been awarded and recognized at multiple occasions such as Winner of Tata Social Alpha 2018 Energy Challenge, Winner of AIC-EMPI Mobility 2019, Incubatee at Shell E4 2019 cohort, Winner of Villgro iPitch 2020 and Winner at I-ACE Hackathon 2021.

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About XProEM Ltd.

Founded in 2018 and established in Toronto, XProEM is a Canadian company developing a disruptive clean technology and business solution to sustainably tackle the imminent problems associated with recycling spent lithium-ion batteries (LIBs) through their proprietary processes. This is achieved by employing a closed-loop recycling process that transforms LIB waste into high-value materials in an

environmentally friendly and economically feasible fashion.

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