

THE DEVELOPMENT OF THE NEOMETALS LITHIUM-ION BATTERY RECYCLING PROCESS

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ABSTRACT

The need for sustainable and circular LIB recycling solutions is being driven by burgeoning lithium-ion battery (LIB) production for the electric vehicle (EV) and electronics industries. Landfilling and stockpiling of LIBs is no longer an option given that:

- Spent and scrap LIBs are recognised as hazardous waste and pose a storage and transport fire risk;
- Once liberated, LIB constituent materials are valuable in a direct economic sense but also due to forecast raw material shortages and shoring-up of non-mined, non-conflict national domestic supply chains;
- Hydrometallurgical recycling (like Neometals) supports electrification with a reduced Greenhouse Gas footprint with efficient material recovery rates; and
- Recycling is no longer optional i.e., Governments mandating recycling and industry stewardship to support circular economic principles.

Neometals has developed a proprietary sustainable process for the recovery of valuable constituents from cell production scrap and end-of-life lithium-ion batteries (LIBs). The Neometals processing flowsheet targets the recovery of >90% of all battery materials from LIBs that might otherwise be disposed of in land fill or processed in energy-intensive pyrometallurgical recovery circuits.

Specifically, the Neometals' recycling process targets the recovery of valuable materials from consumer electronic batteries (devices with lithium cobalt oxide (LCO) cathodes), and nickel-rich electric vehicle and stationary storage battery chemistries (lithium-nickel-manganese-cobalt (NMC) cathodes).

Through its recycling joint venture ("Primobius GmbH") with German Company SMS group, Neometals aims to make revenue from provision of recycling services, licensing and sale of recovered cobalt, nickel, lithium, copper, iron, aluminium, manganese along with an ammonium sulphate fertiliser by-product.

This paper will provide an insight into the evolution of Neometals LIB recycling flowsheet over the preceding three years discussing the key metrics that shaped the final flowsheet that is presently being commercialised by Primobius in Germany.

Keywords: Lithium-ion battery (LIB), battery recycling, ethical cobalt, nickel, lithium, manganese, low carbon footprint, circular economy, recycling efficiency.