



Business ■ Collecting and recycling of minor metals from rechargeable batteries
 ■ Recycling of used casings (other than batteries)

For more detailed company information

Value & Vision

Becoming an Indispensable Industry Player through LIB-to-LIB Recycling

EVs are growing in popularity, and global production is expected to quadruple between 2022 and 2030. Demand for lithium-ion batteries (LIBs) is likely to surge accordingly. However, the industry faces concerns about shortages of raw materials such as lithium, cobalt, and nickel. Against this backdrop, LIB-to-LIB recycling has emerged as a global challenge.

RE100
 °CLIMATE GROUP |



Recycling LIBs to Produce Black Mass and Collect Valuables

LIB cathode materials contain minor metals, such as cobalt, nickel, and lithium. After LIBs are heated, they are crushed and sorted to collect black mass*1, a mixture of minor metals. The company also collects copper contained in the anode material. We sell high-quality metals to smelters, utilizing the expertise we have cultivated since our establishment. In 2022, the company changed the crusher used on the electrode material recycling line to increase production capacity. In 2025, we plan to start operating a hydrometallurgical plant and expand our business by taking the lead in producing battery materials using black mass as raw material.



Black mass

Production Using a Decarbonization Process at RE100 Plants

To achieve carbon neutrality by 2050, decarbonization processes will be required in battery recycling, as well. With the exception of the trucks we use

for haulage, we have achieved 100% renewable energy in all of our processes. We will help to build a low-carbon society by working toward RE100 at new sites we will establish in the future.

Expanding Battery Collection

In March 2022, we became the fourth company to be certified as a wide-area industrial waste recycling processor by JBRC, a general incorporated association. Our advanced sorting technology allows us to handle a wide variety of rechargeable batteries, enabling us to collect a range of batteries across a wide area. In addition, the acquisition of an industrial waste disposal license has made it possible for us to accept and recycle waste batteries that are classified as industrial waste. As we can now process LIBs from various items such as discarded cordless appliances, electric toys, and heated cigarettes, we expect our LIB handling volume to increase.



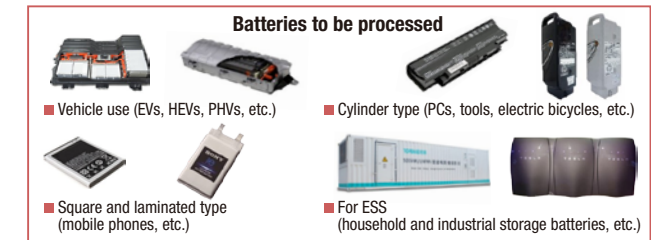
Keeping an Eye Focused on Advanced Battery Recycling

Kenta Imai, Representative Director VOLTA Inc.

VOLTA recycles rechargeable batteries, such as lithium-ion and nickel-metal hydride batteries, using its own knowledge and the Group's recycling expertise. While keeping an eye on competition from Chinese and other companies that have already established a lead in this field, we plan to leverage the Group's comprehensive strengths to establish a recycling scheme and develop sorting technology. As a result, we will take up the challenge of becoming a cutting-edge recycling company capable of capturing new markets. In addition to the Group's strengths in thorough crushing and sorting technology, we will help to realize a sustainable society by taking advantage of the trading function that enables us to purchase and sell products overseas.



The Lithium-Ion Battery Recycling Process



The Recycling Process in the Plant

Battery recycling process

Heating treatment

Electrolyte is volatilized through heat treatment.



Shredding/Sorting*2

Sorting with sieves after shredding



LIB material recycling supply chain

Black mass: Hydrometallurgy manufacturers
Iron: Steel manufacturers
Copper: Copper smelters and manufacturers

Electrode plate recycling process

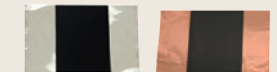
Shredding/Sorting

Continuous shredding by multiple shredders and sorting with sieves



Anode sheet/Cathode sheet

Active materials*1 applied to copper foil or aluminum foil are efficiently stripped off by a special shredder



LIB material recycling supply chain

Active materials: Hydrometallurgy manufacturers
Carbon: Steel manufacturers
Copper: Copper smelters and manufacturers
Aluminum: Reducing agent applications

*1 Black mass/active materials: A concentrated sludge of cobalt, nickel, and lithium

*2 By evaporating electrolytic solution through heating treatment, shredding and sorting are handled in a continuous line