Lithium-ion Battery **Recycling Business** 

# **VOLTA** Establishment of a resource recycling flow for minor metals



### Main business activities of VOLTA Inc.

01

Collecting and recycling of minor metals from rechargeable batteries

02

Recycling of used casings (other than batteries)



# **Value & Vision**

Demand for minor metals will grow as electric vehicles (EVs) become widespread. We are working toward recycling these at our RE100 plant to promote recycling of resources in Japan.

We will become an indispensable presence in the battery industry and future society.

# Strategic securing of minor metals

As demand for rechargeable batteries in electric vehicles grows, the demand for and the value of cobalt, nickel, and other mineral resources are expected to increase. VOLTA Inc. seeks to establish a domestic resource recycling flow and to strategically secure mineral resources.

#### Decarbonization process at RE100 plant **N**2

As we aim to achieve carbon neutrality by 2050, decarbonized processes are also needed in battery recycling and reproduction of resources. In April 2021. VOLTA achieved the use of 100% renewable energy sources in all processes except for transport vehicles.

#### Acquisition of certifications and permits **N3** to broaden business domains

In July 2020, VOLTA obtained a permit to "engage in the industrial waste disposal business", enabling the collection of more types of batteries. In February 2021, the company acquired certification under the "R2 Standard", a U.S. regulation that aims for responsible recycling processes. The company seeks to expand business opportunities by gaining an advantage in transactions with foreign-affiliated companies.

## ▼ The lithium-ion battery recycling process





Cylinder type (PCs, tools, electric bicycles,



Square and laminated type (mobile phones, etc.)



(household and industrial storage batteries, etc.)



Batteries to be processed

#### The recycling process in the plant

## Battery recycling process

### **Heating treatment**

Electrolyte is volatilized through heat treatment



## Shredding/sorting

Sorting with sieves after shredding \* By evaporating electrolytic solution through

heating treatment, shredding and sorting are handled in a continuous line



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 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

<sup>\*</sup> Black mass/active materials: Cobalt/nickel concentrate sludge