

# Investor Presentation

Nippon Denkai, Ltd.

May, 2023



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# 01. Company Overview

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# About Us

<b>Company Name</b>	<b>Nippon Denkai, Ltd.</b>
<b>Established</b>	<b>October, 1958</b>
<b>President/CEO</b>	<b>Hidemasa Nakajima</b>
<b>Headquarters</b>	<b>1226 Shimoezure, Chikusei city, Ibaraki Pref.</b>
<b>Listing Market</b>	<b>Tokyo Stock Exchange, Growth: 5759</b>
<b>Capital</b>	<b>1,858 Million yen</b> (As of March 31, 2023)
<b>Employees <sup>1</sup></b>	<b>223 employees (Consolidated: 297)</b>
<b>Group Company</b>	<b>Denkai America Inc.</b> (Hereinafter referred to as “DAI”)
<b>Business</b>	<b>Development, manufacturing and sales of electrodeposited copper foil, used for xEV batteries and printed circuit boards for 5G applications.</b>
<b>Consolidated Net Sales</b>	<b>17,047 Million yen (FY2022)</b>

<sup>1</sup> As of March 31, 2023; The figure includes temporary workers, loaned-out employees are not counted. .

# Denkai's Short history

Acquired the only electrodeposited copper foil manufacturer in the US<sup>2</sup>



Listed on TSE Mothers market (Now: Growth)

October 1958

July 2016

June 2018

March 2020

June 2021

Nippon Denkai, Ltd. was founded by three corporations, Hitachi, Ltd., Sumitomo Bakelite Co., Ltd. and Kosoku Denki Chuzo Co., Ltd.

MSD Investment I K.K.<sup>1</sup> acquired shares of Nippon Denkai, Ltd.

Expand EV battery copper foil production line

<sup>1</sup> MSD 1st Investment Limited Partnership is managed by MSD Investments Ltd, a private equity firm, which was jointly established by Mitsui&Co., Principal Investments Ltd., Sumitomo Mitsui Banking Corporation and Development Bank of Japan Inc.

<sup>2</sup> Source: Copper Foil Industries Association

# Management Philosophy and Mission

## Philosophy

As an electrodeposited copper foil manufacturer selected in the global market, we work for continuous growth and prosperity.

## Mission



Sustain high share in Japan for EV battery copper foil market.\*

Securing a Presence in the U.S. Market with copper foil for High-Performance Batteries.\*



Provide world top class quality circuit board copper foil.

Concentrate on high added value field.



Contribute to Carbon free world

Use 100% recycled copper material

\*Previously, we had stated that we would "maintain the top share in the Japanese and U.S. markets," however, U.S. market is growing faster than our increased production and our relative market share is declining. We have decided not to pursue market share and have changed our policy to "secure a presence in the U.S. market for high-performance battery materials".

# Location of Plants

Headquarters: **Nippon Denkai, Ltd.**



US : **Denkai America Inc.**



**Chikusei city, Ibaraki**

**Camden, South Carolina**

**Production capacity**  
**13,200t /Year<sup>3</sup>**



**223<sup>1</sup>**



**750t/M<sup>\*3</sup>**



**74<sup>1</sup>**



**350t/M<sup>\*3</sup>**

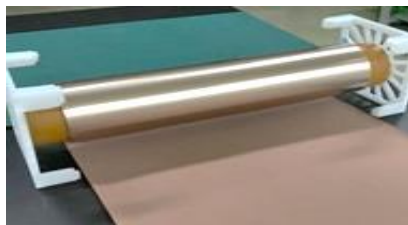
<sup>1</sup> As of March 31, 2022; The figure includes temporary workers

<sup>2</sup> Source: Copper Foil Industries Association

# Sales by Product

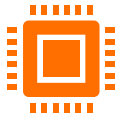
## Circuit Board Copper Foil

### Our Products



### Uses

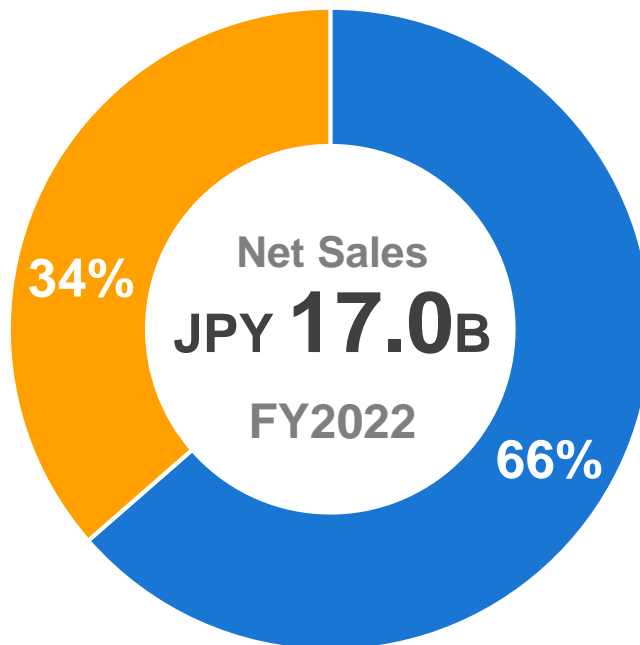
Flexible Printed Circuits  
Board Package Substrate



### Major End Products

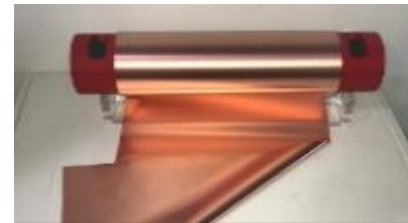


## Sales Composition in FY2022



## EV Battery Copper Foil

### Our Products



### Uses

Lithium Ion Batteries (LIB)



### Major End Products



EV



HV



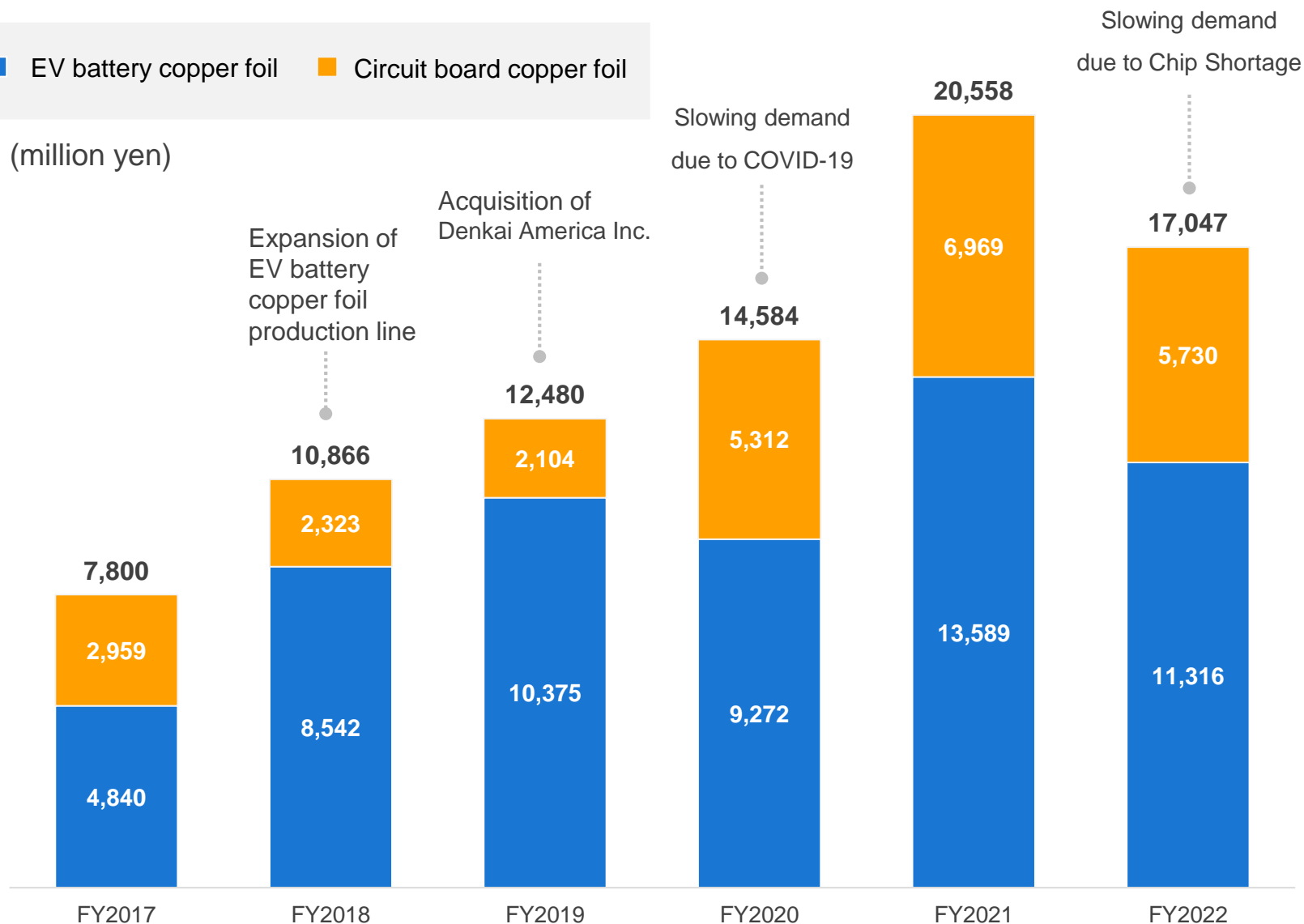
## 02. Business Performance

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# Consolidated Net Sales

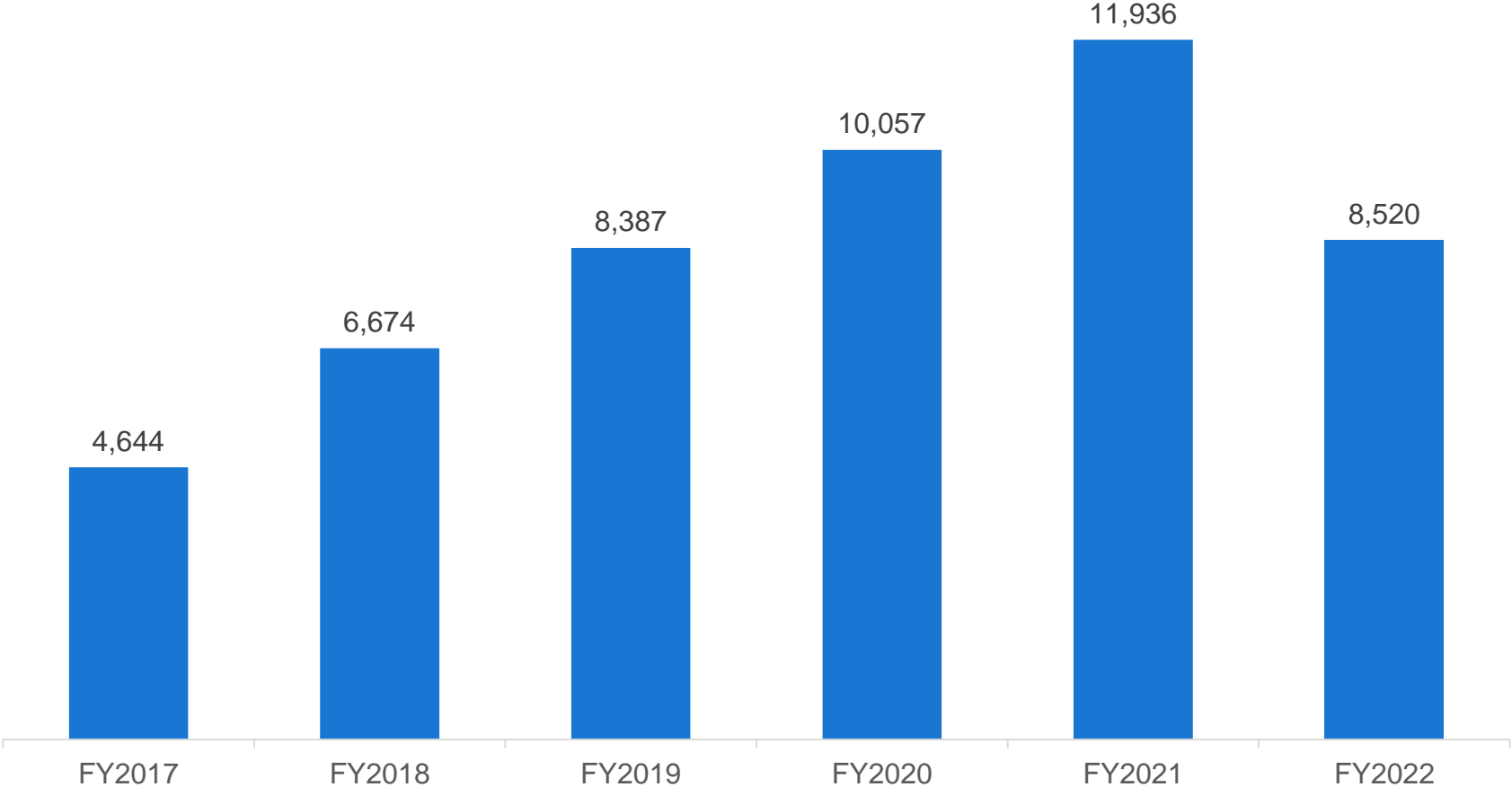
■ EV battery copper foil   ■ Circuit board copper foil

(million yen)

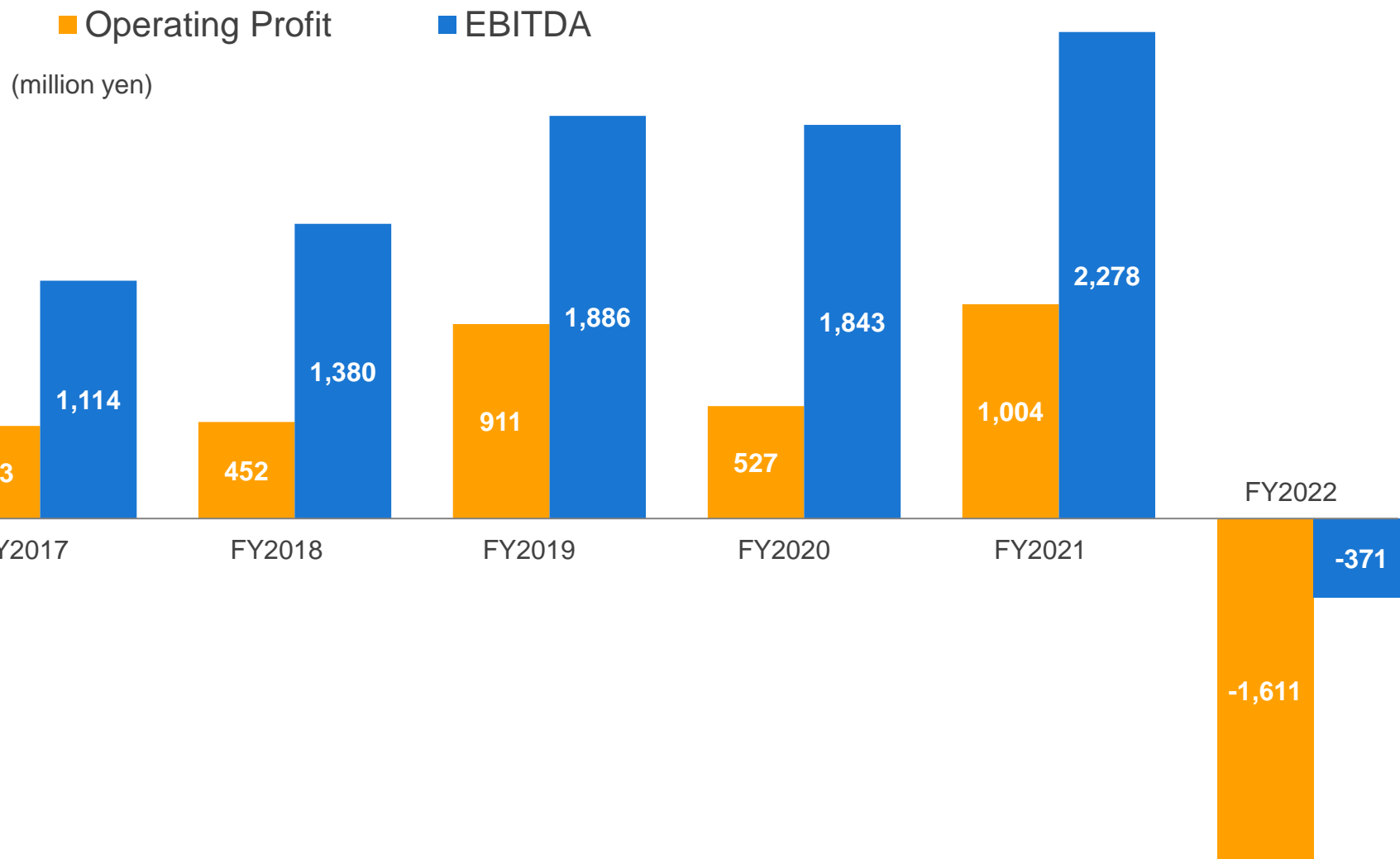


# Production Quantity

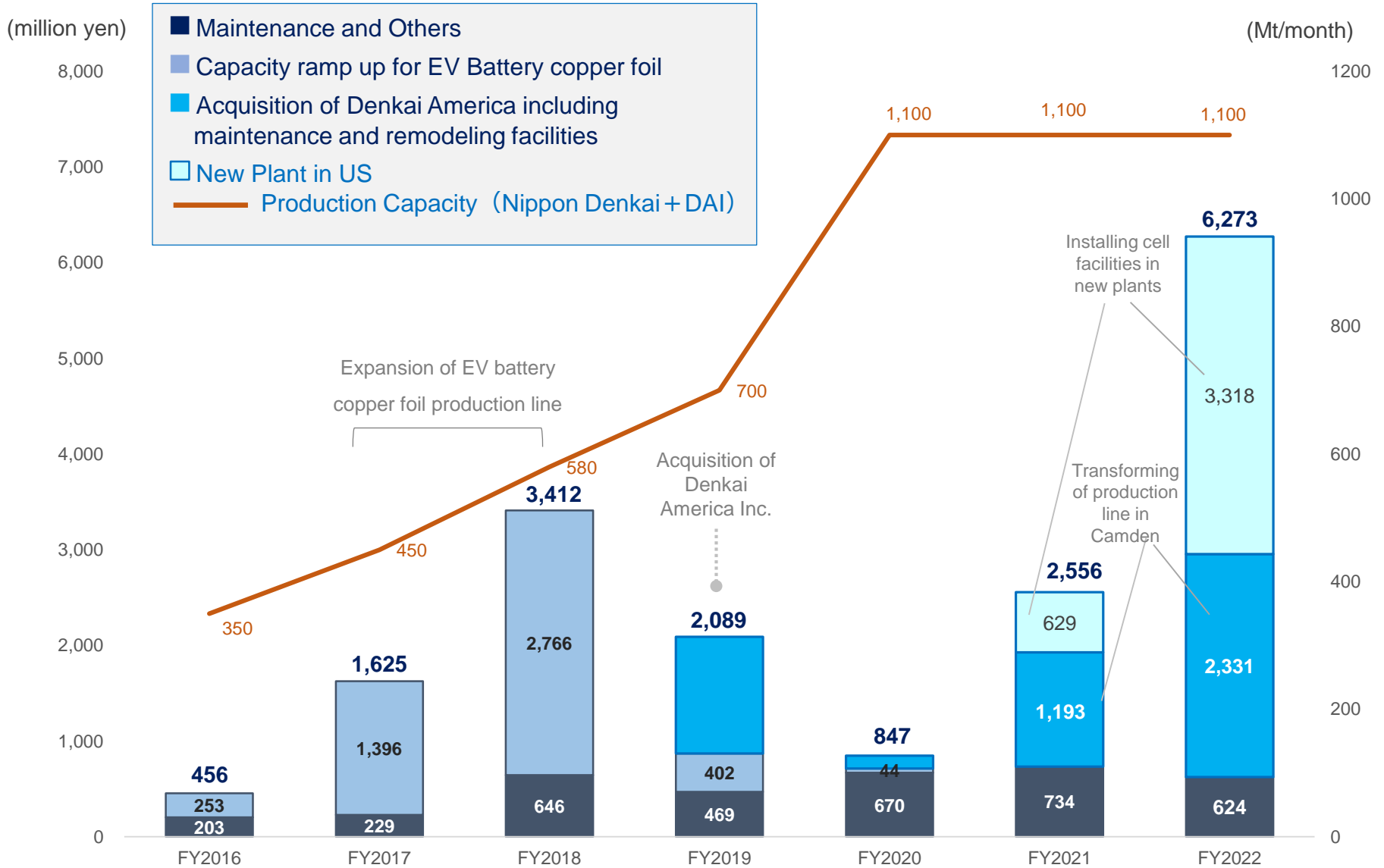
(Unit: Mt)



# Consolidated Operating Profit and EBITDA



# Capital Investment and Production Capacity



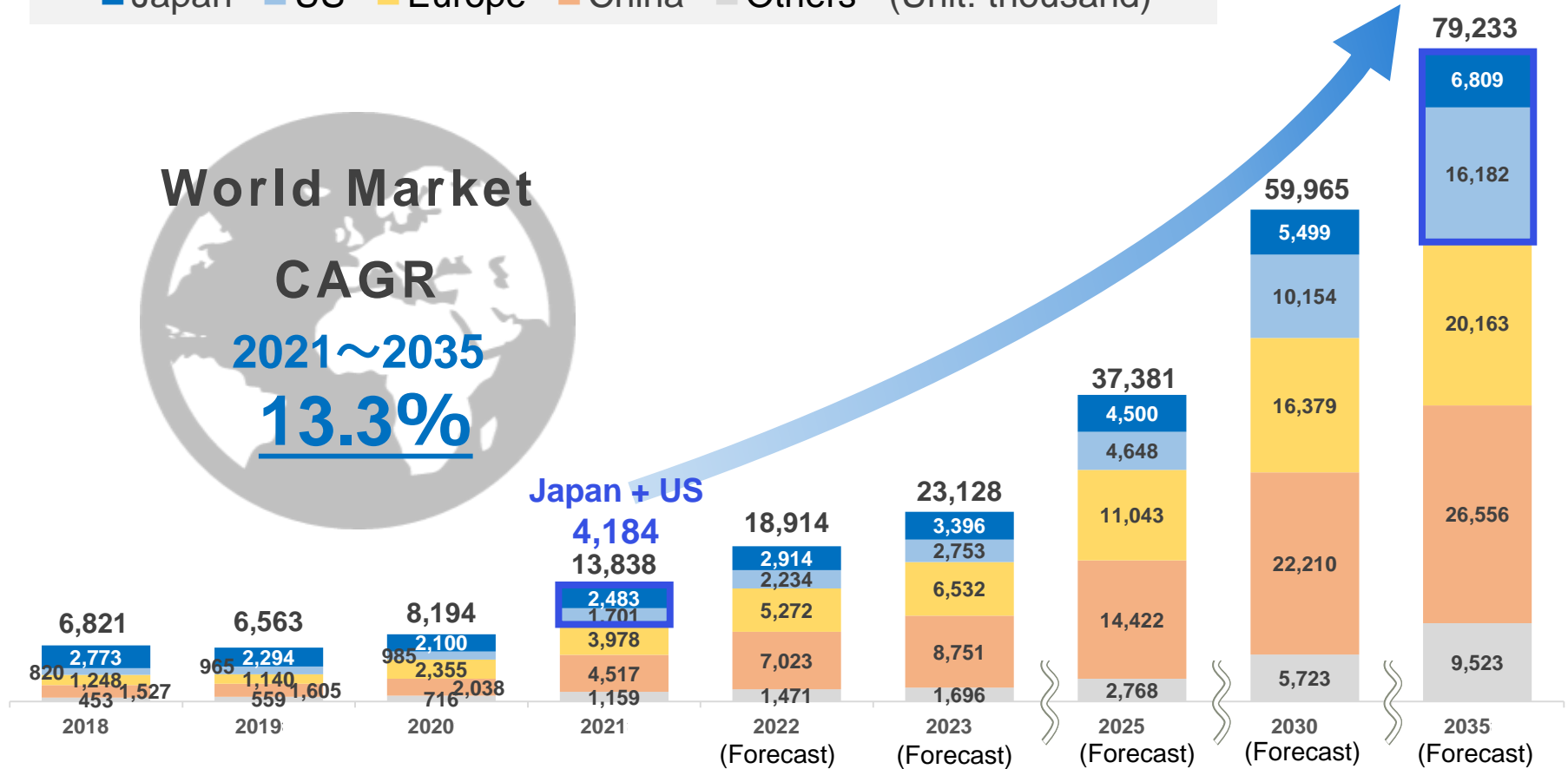
## 03. Business Environment

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# xEV Market Forecast

▶ World xEV market CAGR is expected to grow up to 13.3%, as expansion of environmental policies in various countries.

■ Japan ■ US ■ Europe ■ China ■ Others (Unit: thousand)



Source :Fuji Keizai Management Co., Ltd (as of Dec., 2022)

(Note 1) Above graph shows the result and estimate classified by vehicle production regions, not the demand classified by production regions of EV batteries.

(Note 2) The results and forecast in above graph is calculated and estimated by Fuji Keizai Management Ltd. and information

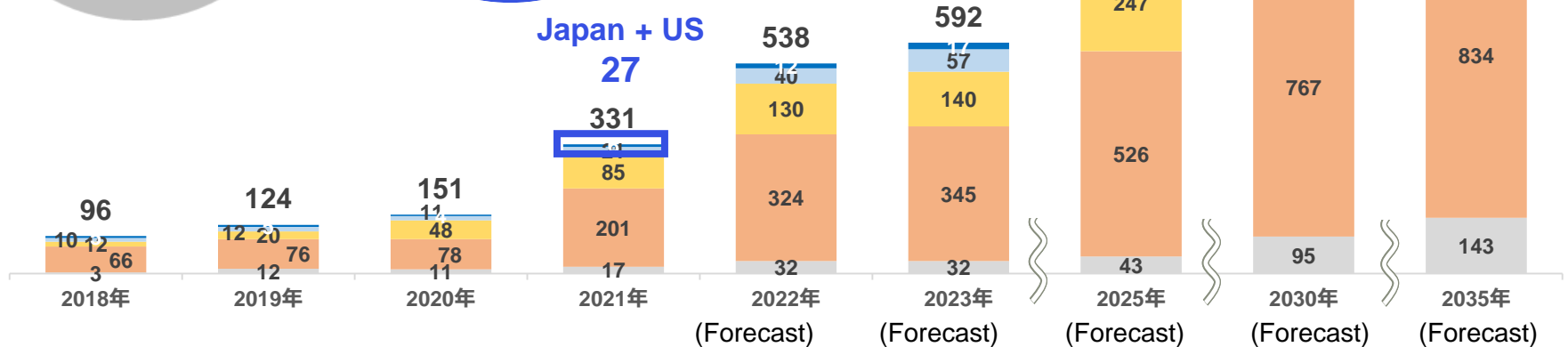
# Negative Current Collector Market Forecast

- ▶ The demand for negative current collectors for EV batteries is predicted to grow rapidly, along with required improvement of LIB's capacities and outputs used in xEV.
- ▶ We focus on the **Japanese and US markets**, where there is little competition.

■ Japan ■ US ■ Europe ■ China ■ Others (Unit : kMt/Year)

World Market  
CAGR  
2021~2035  
**14.9%**

Japan & US  
CAGR  
2021~2035  
**25.0%**



Japan + US  
**624**  
**2,314**

(Note 1) Above graph shows the result and estimate classified by vehicle production regions, not the demand classified by production regions of EV batteries.

(Note 2) The results and forecast in above graph is calculated and estimated by Fuji Keizai Management Ltd. and information.

Source :Fuji Keizai Management Co., Ltd (as of Dec., 2022)



# Major LIB Production Bases in the US

In the U.S., the development and expansion of LIB bases for xEVs is progressing in line with the growing demand for xEVs. However, the development of copper foil bases for EV Batteries has not progressed, and there are still few competitors.

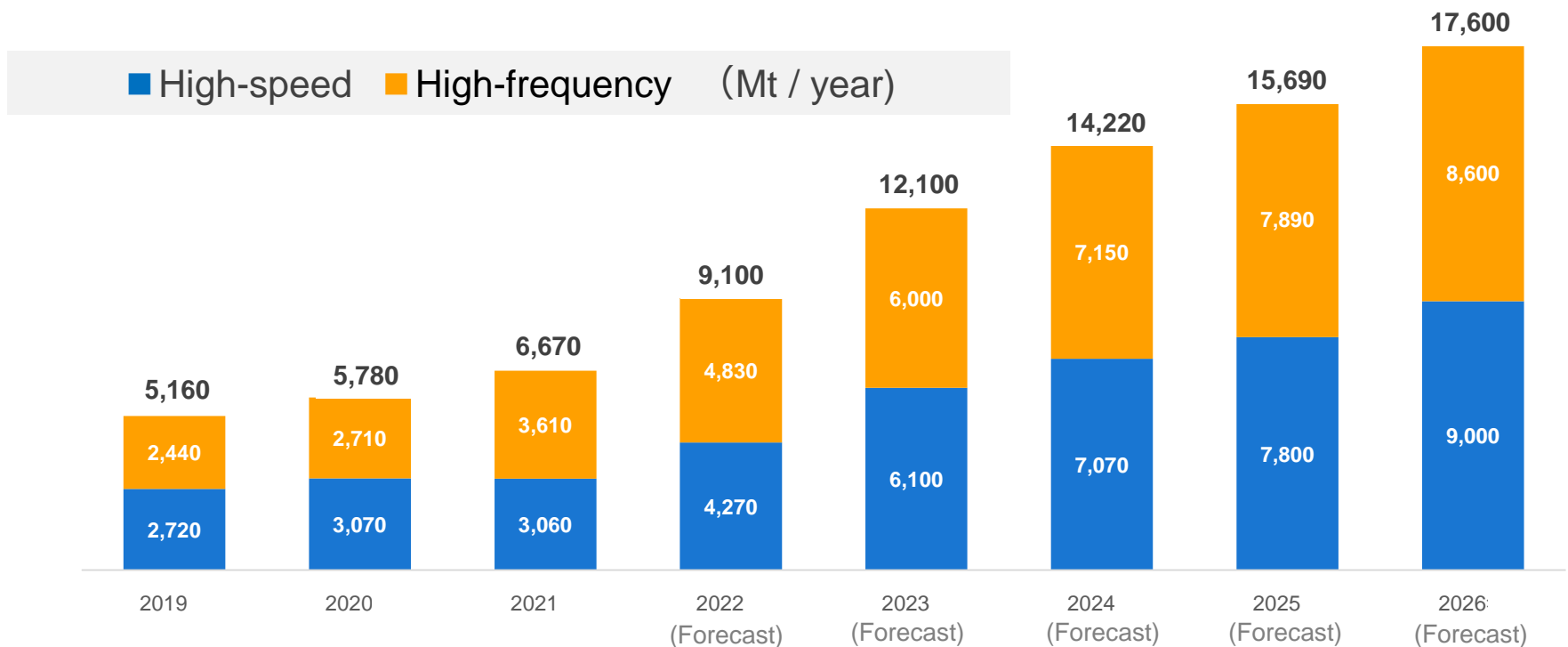


# High End & Super High End Market

The market achieved average annual growth rate of 23.7%.

Demand for high-performance copper foil that minimizes transmission loss is also expected to grow significantly in response to growing demand for 5G and IoT , where high speed communication is advancing.

**Our strategy is to focus on high strength copper foil and copper foil for fine circuit boards, which are high performance foils**



Source :Fuji Keizai Management Co., Ltd (as of Dec., 2022)

# 04. Growth Strategy

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# The Image of Production Expansion



- Accelerate development of high value-added products
- Meet demands of next-generation batteries such as all-solid-state batteries

Start production and sales of copper foil for new batteries

Strengthen sales of circuit board copper foil in overseas high end markets (Overseas shipments started in FY2022)

Further efforts focusing on 5G and HDI markets (Ongoing since FY2020)



Boost supply capacity for circuit boards copper foil by improving manufacturing facilities of the head office plant

- [Optional plans of expanding production capacity]
- Start construction of new US plant
  - Expand production capacity for xEV batteries at head office plant

**2023**  
Start mass production of first EV battery copper foil in the US (FY2023 2H~)

**2024**

**2025**

**2026**

**2030**

# Core Strategies for Business Growth

## Grow sales by focusing on two markets: EV battery and high-frequency circuit board

- **For EV Battery Copper Foil :**

Reinforce product supply system for high-performance LIB, build brand awareness as a “high- performance batteries copper foil” manufacturer, sustain top share in the market in Japan.

- **For Circuit Board Copper Foil :**

Expand production capacity in head office plants, globally promote sales to leading manufacturers of circuit board, lead by developing products meeting new demands while being ahead of the trends.

## Maximize synergy of production sales by two bases structure in Japan and the U.S.

- **In Japan :** Enhance the production and process developments as a mother factory.

Enhance the production system to deal with the rapid expansion of Japan or Asia market.

- **In the US :** Obtain the market share and profitability in the U.S. by constructing new plants which responds to customer demands and establishing the production system.

## Restore business profitability

Restore business profitability by reducing costs through organizational reform with digitization, process improvement, quality enhancement, labor productivity improvement, and yield improvement.

# KPIs and Measures

## 【KPI】

Production Volume : 22,000t /Annual (FY2027)

Grow sales by focusing on two markets:  
EV battery and high-frequency circuit board

Maximize synergy of production sales by two bases  
structure in Japan and the U.S.

### ● To Expand Sales of EV Battery Copper Foil :

- Supply product for high capacity LIBs in response to customer's new production line operation. (FY2023 2Q~)
- Supply products to new customers (after FY2025, at each occasion)
- Providing new materials for high energy density (after FY2023, at each occasion)

### ● To Expand Sales of Circuit Board Copper Foil :

- Expand sales of highly profitable products to substrate manufacturers in Japan and overseas (Ongoing since FY2020, Overseas shipments started in FY2022, to be expanded)

### ● Expand product supply facilities

- Camden Factory : Start Mass production after the Transforming work (FY2023~)
- U.S New Plant (Plan) : Install production capacity for US market by 9,500 Mt/year  
※ Assuming Start construction in FY2023, Completion of construction in FY2025, Start Mass production in FY2026
- Headquarters : Ramp up production line for Circuit Board Copper Foil (FY2024~)

Consider Ramp up for EV Battery Copper Foil (after FY2024, at each occasion)

## 【KPI】

EBITDA Margin  $\geq$  15% (after FY2026)

Restore business profitability

Restore business profitability by reducing costs through organizational reform with digitization, process improvement, quality enhancement, labor productivity improvement, and yield improvement.

# Product Development Staying Ahead of the Curves

EV battery with high capacity and high energy density

**Additive control technology**

High tensile strength and high heat-resistance

Advanced next-generation EV battery

**Microstructure control technology**

Low elastic modulus

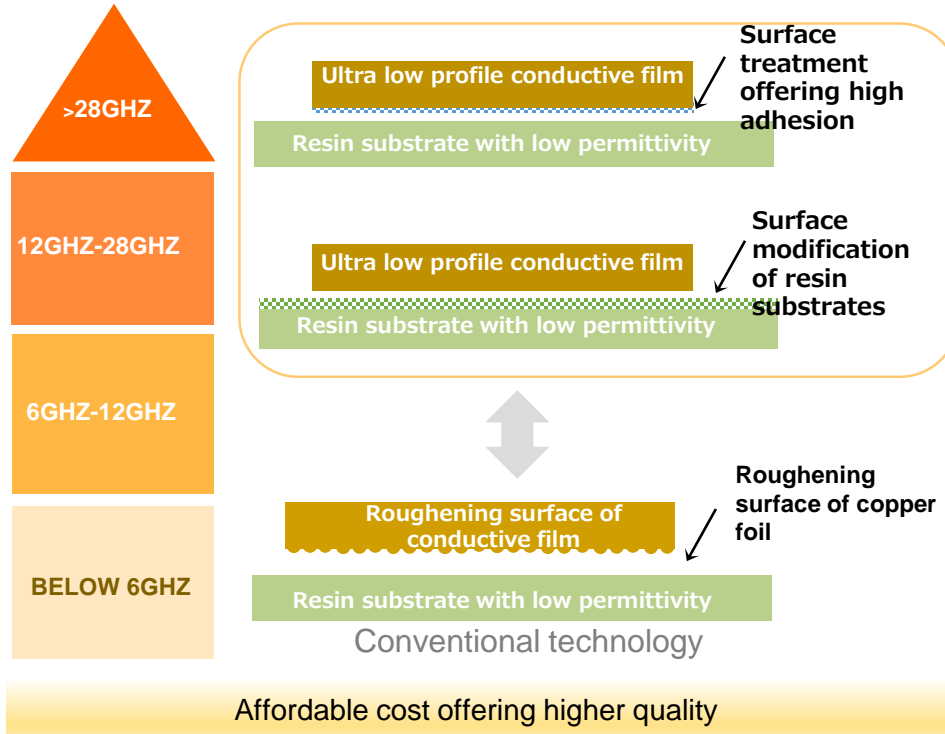
**Surface treatment technology**

High corrosion resistance

Actualize the required property of next-generation battery collectors through three technology platforms; additive control technology, microstructure control technology, and surface treatment technology.

Circuit board copper foil for next-generation communication infrastructure and equipment

Low-latency and reduced energy-loss products

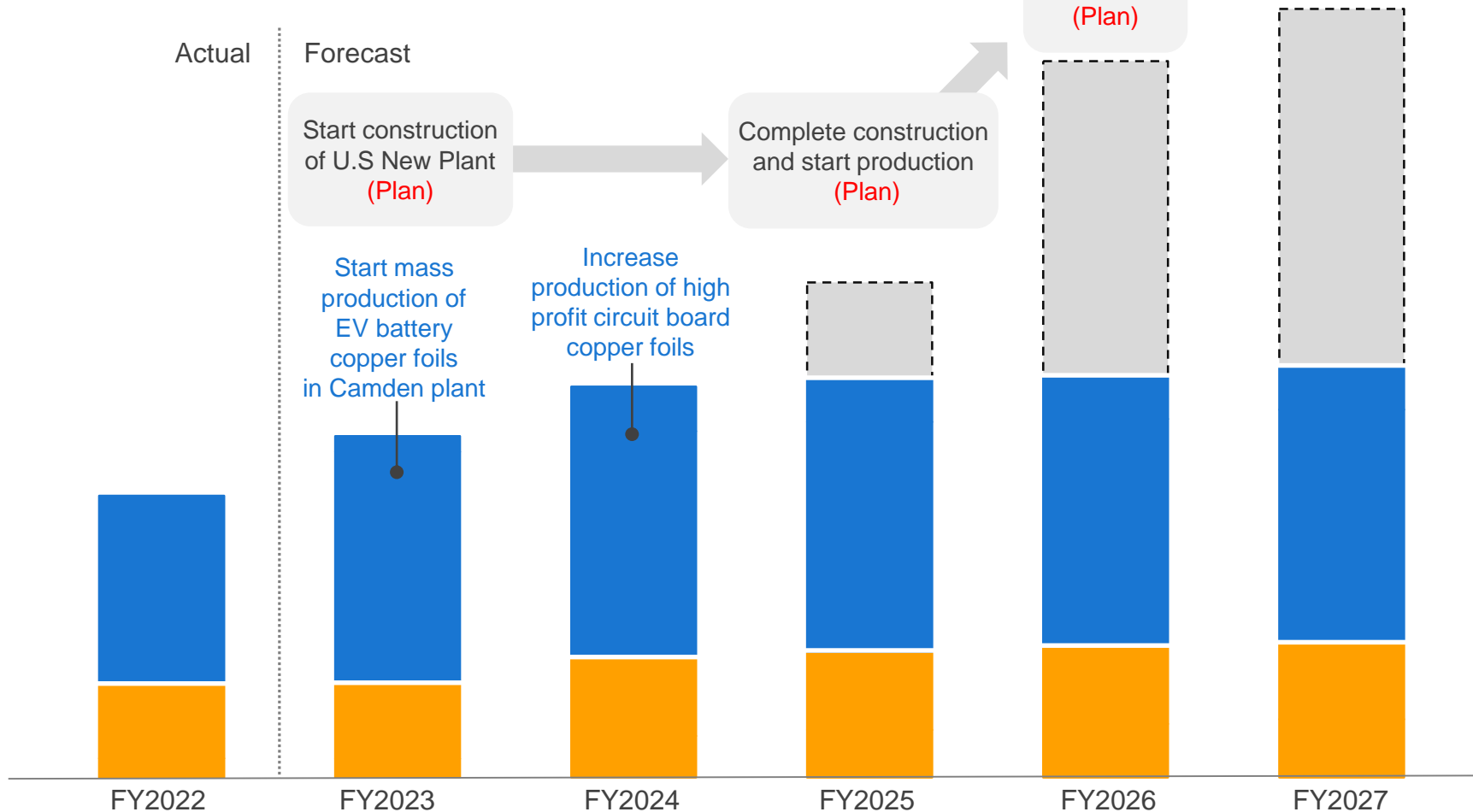


Develop “ultra low profile copper foil” and “surface treatment technology offering high adhesion” for the hotspot frequency market that is highly required for low-latency transmission in 5G or 6G, and apply them to new products.

# Growth Image of Net Sales by Product / Location

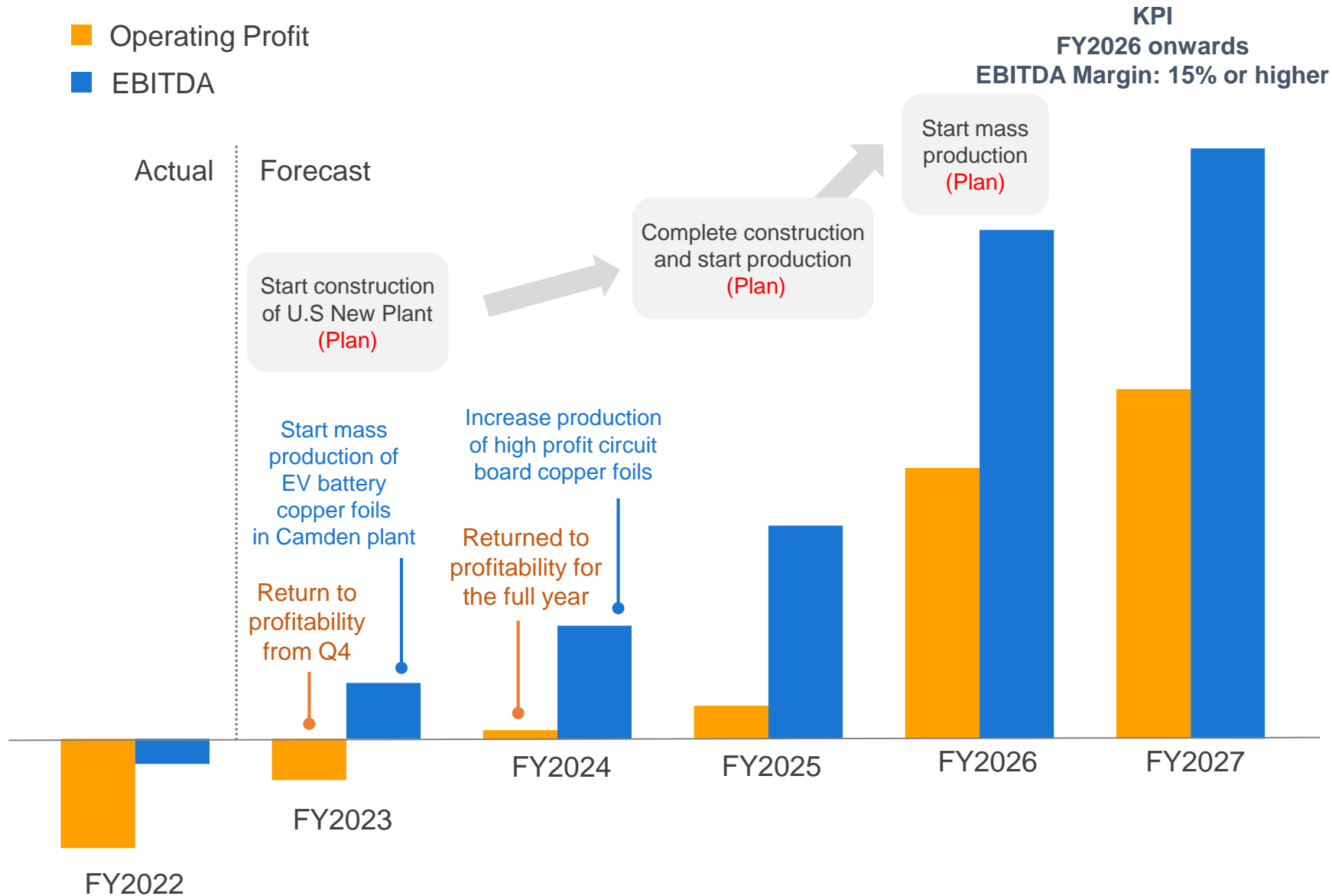
- EV battery foil / U.S. new plant
- EV battery foil / Japan+Camden plant
- Circuit board copper foils / Japan+Camden plant

KPI for FY2027  
Target production volume : 22,000 metric ton / year





# Growth Image of Operating Profit and EBITDA



# Transformation of Production Lines in US plant



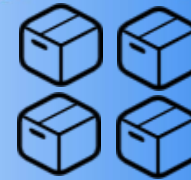
**May, 2023**

Completion of transforming



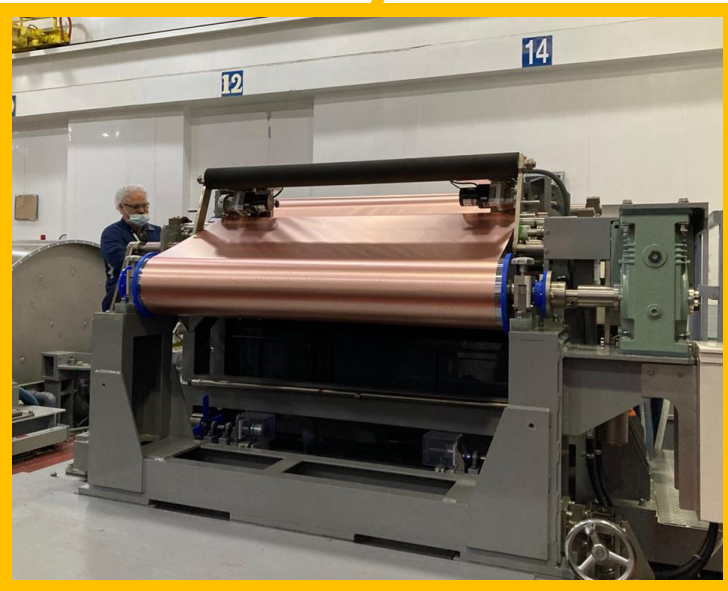
**Summer, 2023**

Start preparing sample



**2H 2023**

Start supplying products



- **Location**

Camden Plant, South Carolina, U.S.

- **Capex**

US\$26 million

- **Product / Capacity**

Copper foil for LIBs / 1,200 metric ton per year

- **Customers**

Major LIB manufacturers in the U.S.

# New Plant Construction Plan in the U.S.

The amount of capital expenditure and the date of start shipping are currently under review.

However, there will be no change in product types, production capacity, or product suppliers.

In this material, construction of a new plant in the U.S. is assumed to start within 2023, with sample shipments to begin in summer 2025.

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Location / Site area

Augusta, GA, U.S. / 115 acre

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Product / Capacity

Copper foils for EV batteries / 9,500 metric tons per year

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Target customers

Major battery manufacturers in the U.S.

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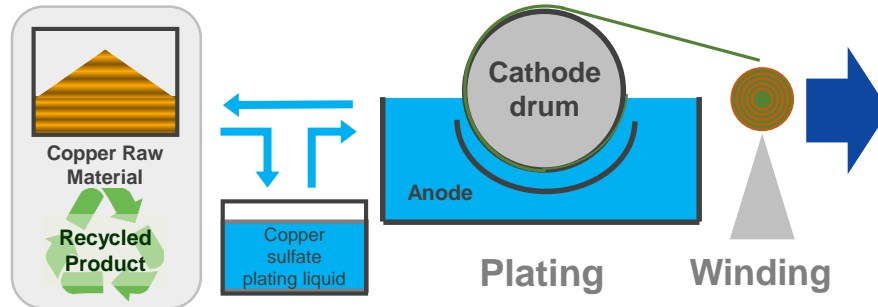
# 05. Appendix

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# Our Manufacturing Process

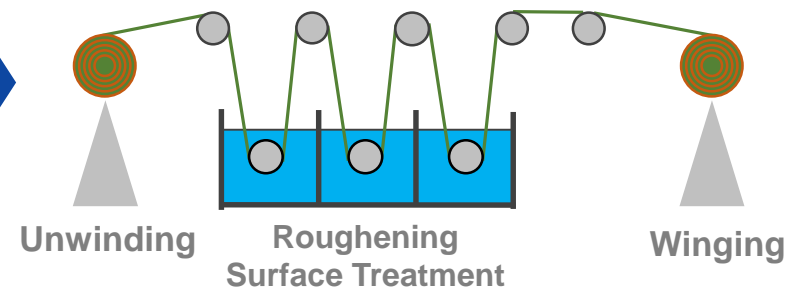
## ① Base foil manufacturing process

Continuous plating on a rotating cathode drum by controlling the surface shape and copper foil properties with additives.

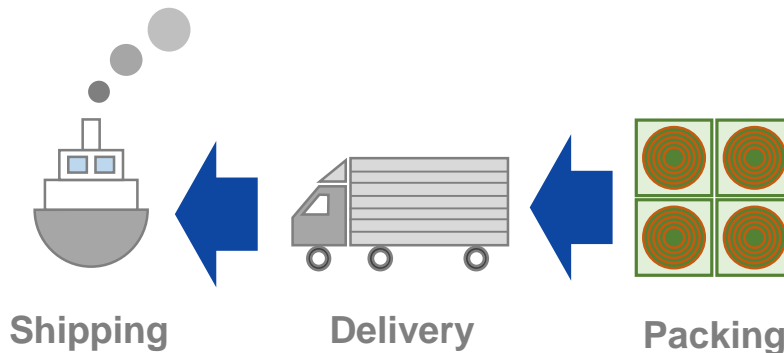


## ② Roughening Surface Treatment Process

Module forming/surface treatment, and rust prevention/organic treatment to suit the application

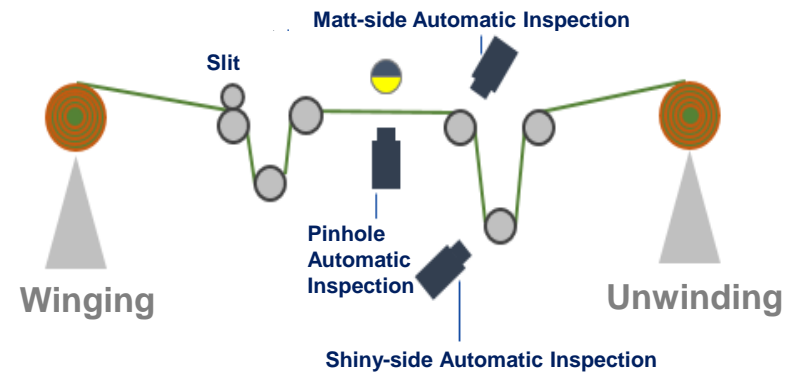


## ④ Delivery



## ③ Slit / Inspection Process

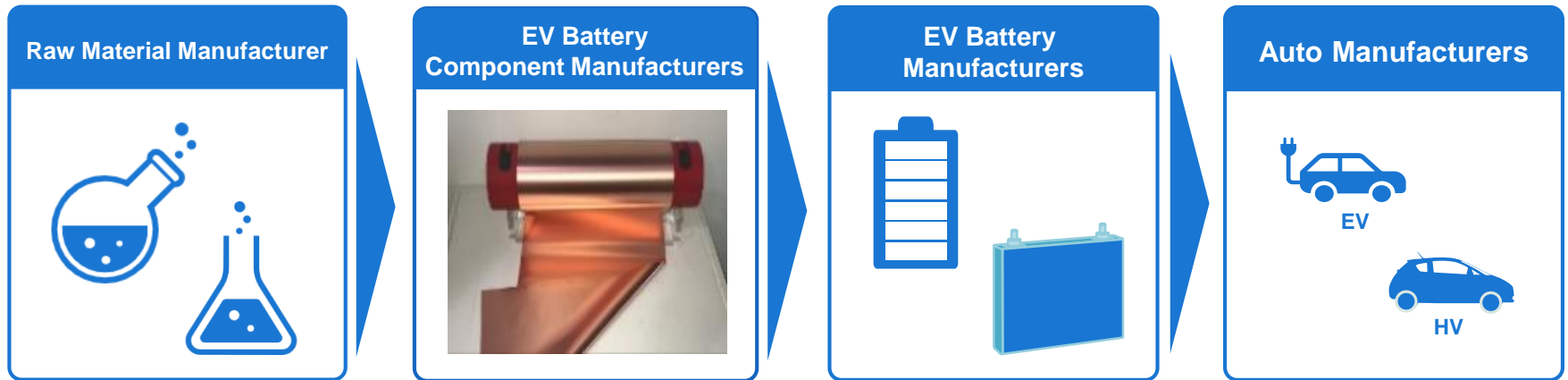
After the automated full inspection, slit processing is conducted



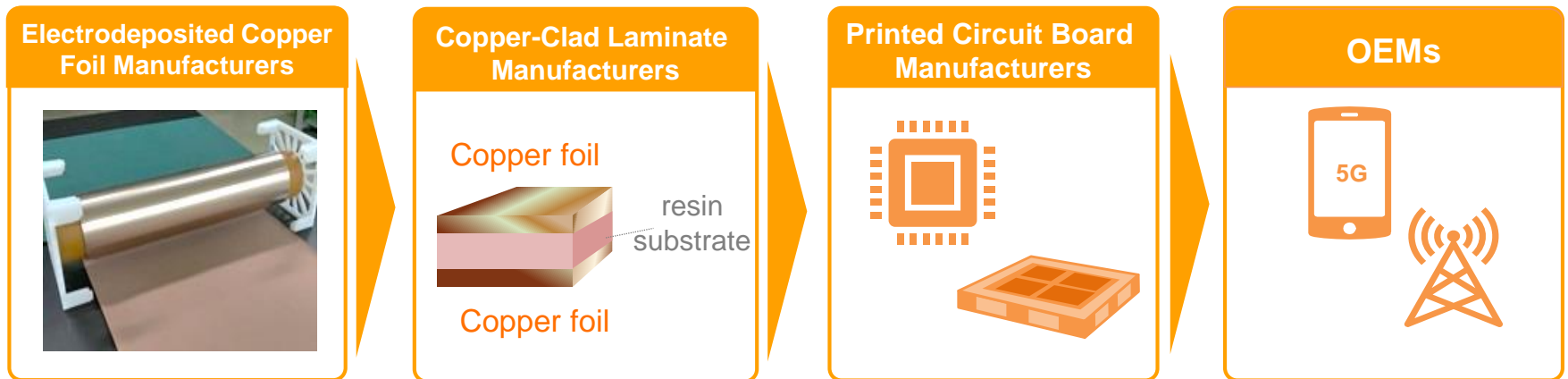
# Our Products' Supply Chain

## EV Battery's Supply Chain

*We have relation to major Japanese and US xEV manufactures through major Japanese EV battery manufacturers*



## 5G Products' Supply Chain



# Automotive LIBs using our copper foil

## Requirements

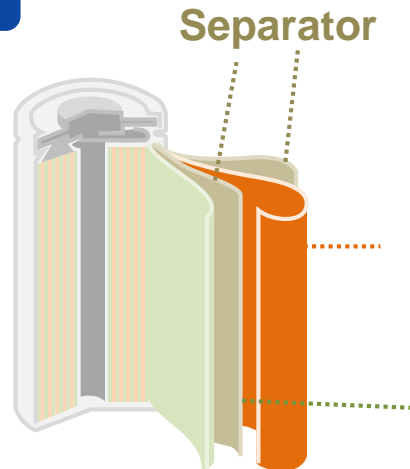
**Long-term reliability**, capable of withstanding internal expansion and contraction of the battery during charging and discharging

## Required Characteristics

- High elasticity: **tear-resistant**
- Even thinness: **Prevention of heat generation** in thin areas
- Smoothness: **Same roughness** on both sides
- High purity: **Prevention of heat generation** by low resistance etc.

## Types of LIB

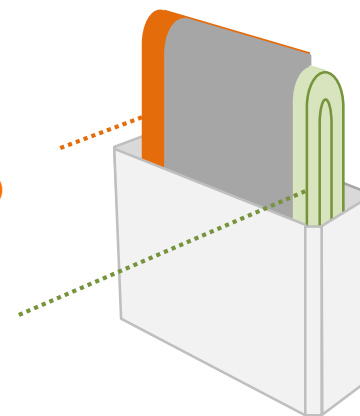
### Cylindrical LIB



**Negative Current Collector (Copper Foil)**

**Positive Current Collector**

### Prismatic LIB



# Our Technology to contribute Medium-to-Long Term Growth

We pursue mid- to Long-term growth through joint research and development of next-generation EV batteries with EV-related companies in Japan and overseas.

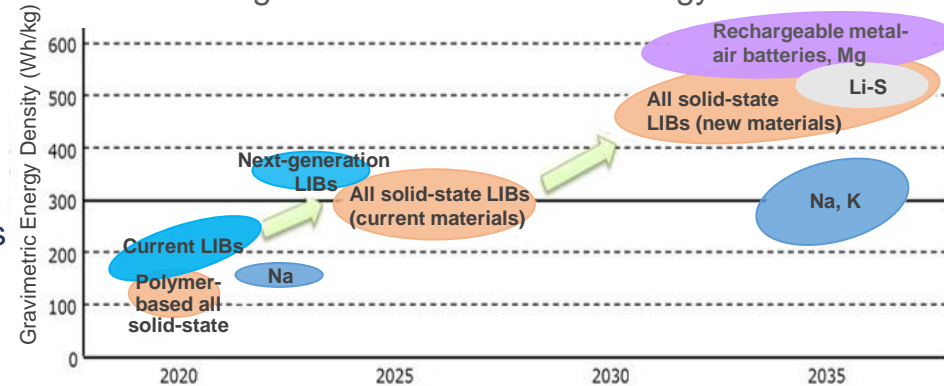
Source: NEDO's website

## Next-generation EV batteries are:

- Advanced LIB with high capacity
- All solid-state LIB with high energy density
- Innovative secondary battery with greatly improved performance through technology based on new principles

The development of copper foil that maximizes the characteristics above is required.

Image of EV batteries' technology shift



Next-generation LIB	Joint Development Partners	Our R&D achievement	Status
Advanced LIB (Liquid Type)	<ul style="list-style-type: none"> <li>• Japanese battery manufacturers</li> <li>• Negative electrode manufacturer</li> </ul>	Developed copper foil with surface treatment offering high tensile strength and high adhesion, which contributes to the <b>improvement of cruising distance and acceleration performance</b>	Under evaluation by the manufacturers
All solid-state LIB	<ul style="list-style-type: none"> <li>• Automobile manufacturers in Japan and overseas</li> </ul>	Developed surface treatment offering the ability to prevent copper sulfide from producing, contributing to the <b>exponential increase of safety and reliability and the ensuring of high energy density</b>	Under evaluation by the manufacturers
Innovative secondary batteries (Post-LIB)	-	Commenced the development of copper foil necessary for innovative secondary batteries, such as fluoride-ion batteries and zinc negative electrode batteries	-



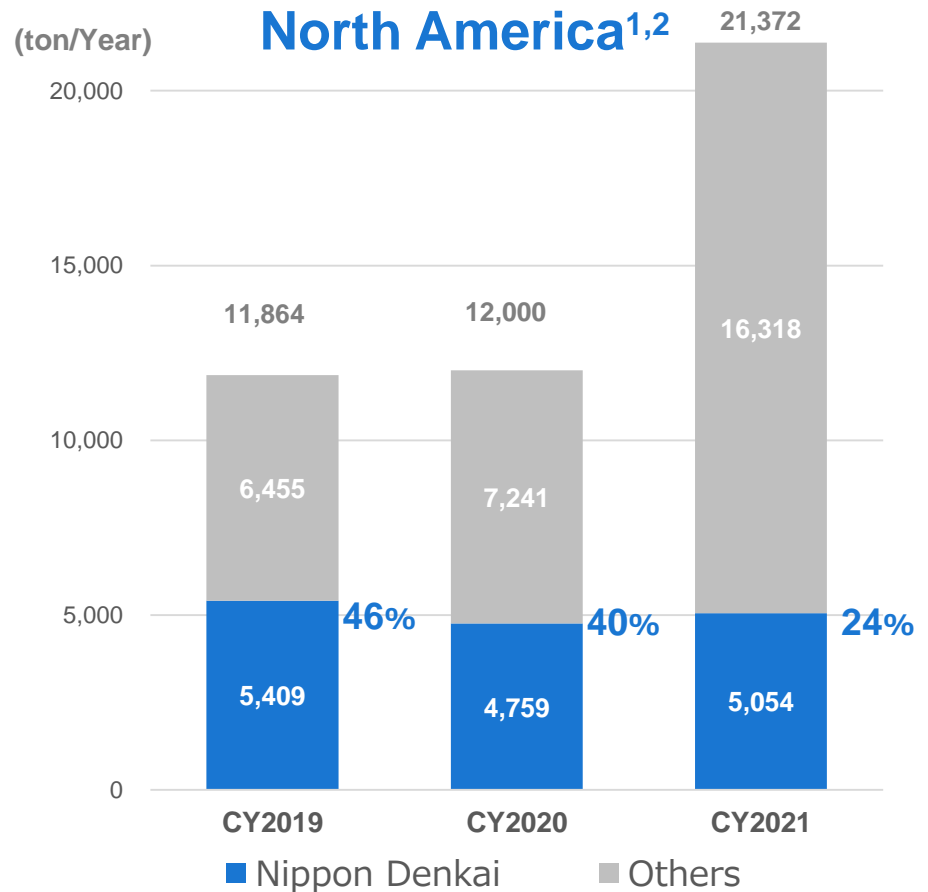
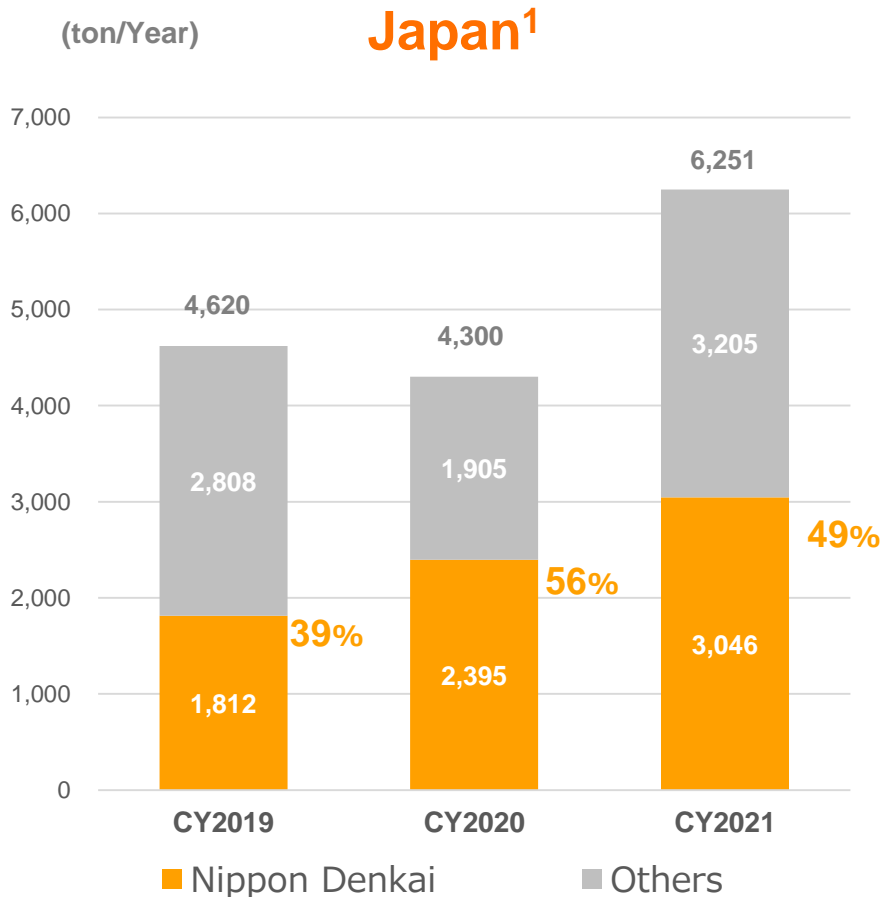
# Major Customers (FY2022 Actuals)

We have stable connections and revenue bases with major Japanese EV battery manufacturers and major Japanese and US electrical parts manufacturers, through actual sales performance.

Customer	Products	Sales (JPY million)	Ratio (%)
Panasonic Corporation	For EV batteries / PCB	9,094	53.3%
Primearth EV Energy Co., Ltd.	For EV batteries	2,465	14.5%
Isola	For PCB	1,845	10.8%
KCE	For PCB	404	2.4%
CAC Corporate	For PCB	489	2.9%
AGC Multi Material America	For PCB	335	2.0%
Total Sales		17,047	

# Our Market Share in the EV Battery Copper Foil Market

Our products have been highly evaluated by the market for their long-term reliability and good handling performance, and have gained nearly half of the market share in Japan, demonstrating our global presence.



<sup>1</sup> These above pie charts compare copper foil demand by region (Source: Fuji Keizai) with our sales volume in the Japanese and North American markets.

<sup>2</sup> The market share 40% in North America does not include DAI products.

# Our focusing Business Indicators

## Business Indicators / Reasons to focus on

### **Production Volume** (by metric tons)

We place importance on production volume (by metric tons) as an indicator to grasp the progress of our production and sales activities, excluding the impact of the rise and fall of copper price.

### **Operating Income**

We place importance on Operating Income as a basic indicator for measuring the status of our profit.

### **EBITDA**

As we own a large number of fixed assets properties, we place importance on EBITDA, which is adjusted to the impact of Depreciation and Interest Expenses.

# Financial Highlights

(unit: million yen)	FY2018	FY2019	FY2020	FY2021	FY2022
<b>Net sales</b>	<b>10,866</b>	<b>12,480</b>	<b>14,584</b>	<b>20,558</b>	<b>17,047</b>
EV battery copper foil	8,542	10,375	9,272	13,589	11,316
Circuit Board copper foil	2,323	2,104	5,312	6,969	5,730
<b>Operating profit</b>	<b>452</b>	<b>911</b>	<b>527</b>	<b>1,004</b>	<b>-1,611</b>
(Operating profit margin)	4.2%	7.3%	3.6%	4.9%	-9.5%
<b>Net income</b>	<b>22</b>	<b>1,988<sup>3</sup></b>	<b>193<sup>3</sup></b>	<b>848</b>	<b>-1,933</b>
(Net income margin)	0.2%	15.9%	1.3%	4.1%	-11.3%
<b>Depreciation and Amortization, etc</b>	<b>928</b>	<b>974</b>	<b>1,316</b>	<b>1,274</b>	<b>1,240</b>
<b>EBITDA<sup>2</sup></b>	<b>1,380</b>	<b>1,886</b>	<b>1,843</b>	<b>2,278</b>	<b>-371</b>
<b>EBITDA margin (%)</b>	<b>12.7%</b>	<b>15.1%</b>	<b>12.6%</b>	<b>11.1%</b>	<b>-2.2%</b>
<b>Interest bearing debt</b>	<b>5,589</b>	<b>6,459</b>	<b>6,010</b>	<b>8,866</b>	<b>12,377</b>
<b>Net interest bearing debt</b>	<b>4,991</b>	<b>5,205</b>	<b>4,348</b>	<b>6,366</b>	<b>8,797</b>
<b>Total assets</b>	<b>10,227</b>	<b>13,747</b>	<b>13,643</b>	<b>18,034</b>	<b>22,678</b>
<b>Net assets</b>	<b>2,461</b>	<b>4,434</b>	<b>4,946</b>	<b>5,755</b>	<b>7,447</b>
<b>Net interest bearing debt / EBITDA</b>	3.6x	2.8x	2.4x	2.8x	— *
<b>Equity ratio (%)</b>	24.1%	32.3%	36.3%	31.9%	32.8%
<b>ROE (%)</b>	0.9%	57.7%	4.1%	15.9%	-29.3%
<b>Financial leverage</b>	4.2x	3.1x	2.8x	3.1x	3.0x
<b>Total assets turnover rate</b>	1.2	1.0	1.1	1.3	0.8

\* Percentage change is omitted since this is a comparison of increase and decrease.

# Methods of earning Revenue and Cash Flow

Our company operates the development, manufacturing and sales of electrodeposited copper foil. We generate Revenue and Cash Flow by the sales of our products to the customers.



# Risk factor Analysis

Risk factor / Possibility of occurrence	Impact level	How to cope with the factor
<p><b>Energy and resource price hikes / High</b></p> <p>In our group's manufacturing activities, soaring energy and resource prices will result in higher manufacturing costs.</p>	<p><b>High</b></p>	<p>We will improve production efficiency at manufacturing sites. In addition, we are negotiating with customers to reflect energy and resource price increases in selling prices.</p>
<p><b>Copper Price Fluctuations / High</b></p> <p>Our products are made mainly from High-purity copper materials, so market fluctuations in Copper prices have an impact on manufacturing costs.</p>	<p><b>Low</b></p>	<p>In order to minimize the impact, we are working “Copper price Indexing System” with customers, in which product prices are decided based on Copper prices in the Market.</p>
<p><b>Exchange Rate Fluctuations / Medium</b></p> <p>Translation of foreign currency-denominated assets, liabilities, revenues, and expenses into Japanese Yen will increase or decrease depending on Exchange rate fluctuations.</p>	<p><b>Low</b></p>	<p>In the cases of Account Receivables and Payables in foreign currencies are incurred or when investments are made in overseas subsidiaries, they are hedged by executing Forward exchange contracts.</p>
<p><b>Limited Number of Customers / Medium</b></p> <p>A significant portion of our Consolidated Net Sales is derived from sales to a limited number of clients. The performance and purchasing policies of the customers have a significant impact on our top line.</p>	<p><b>High</b></p>	<p>We will increase the number of clients by working to expand sales channels to the High-value-added fields where future growth is expected and to overseas customers.</p>

Our group has other business risk factors in addition to those mentioned above. For details, please refer to “Business and Other Risk Factors(「事業等のリスク」)” in the Annual Securities Report(「有価証券報告書」).

# Our Commitment to Sustainability

Our group is implementing various activities to be a company that can grow together with the communities in local and the global. Here are some examples.

## Carbon-free world with xEV.

We aim at creating a **carbon-free world and a sustainable society** by providing high-quality copper foils for LIB and xEV.



## Our products are made from 100% recycled materials.

We recycle scrap copper foils from the manufacturing process.

100%  
Recycled  
Raw copper  
Materials



Scrap copper foils from  
the manufacturing  
process are  
Recycled



SDGs Targets



## Human Capital Management Efforts

We strive to create a workplace environment where each and every employee is motivated and can demonstrate their abilities. In fiscal 2021, we received the "Silver Certification," a certification as an excellent health company, as we continue to develop a workplace environment where all employees can maintain their health and maximize their abilities.



## Corporate Governance Enhancement

The Nominating and Compensation Committee, established in FY2021, is now in operation. Internal audit activities continue to report to the Board of Directors, and Internal Controls are used to ensure proper business operation systems, including those of subsidiaries.

SDGs Targets



## Scheduled Date of Next Update

The next update is scheduled to be May, 2024 with the announcement of the year-end financial results for FY2023.

However, if there are any important changes in this document, we will update as necessary.

Contact us : Nippon Denkai, Ltd. / Investor Relations  
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# Disclaimer

These documents have been prepared solely for the purpose of disclosing relevant information regarding Nippon Denkai, Ltd. (referred to herein as the "Company", "we" or "us") and, depending on the context, its consolidated subsidiary. These documents do not constitute an offer to sell or the solicitation of an offer to buy any security in the United States, Japan or any other jurisdiction.

These documents include forward-looking statements including current plans, outlook, estimates and forecasts. Forward-looking statements are based on the intentions of our management based on the information available as of May 10, 2022.

These forward-looking statements are dependent on various risks and uncertainties and actual results may differ materially from the information provided in this documents.



**日本電解株式会社**

**Nippon Denkai, LTD.**