

Carbon Nanotube Dispersions Business for Lithium ion Battery Business Briefing

Toyo Ink SC Holdings Co., Ltd.
Toyocolor Co., Ltd.

Date of Business Briefing : August 22, 2023

Release date of Presentation data of Business Briefing : August 21, 2023

In this presentation material, the following are synonymous with each other unless otherwise noted.

- Carbon Nanotube (CNT) dispersions for cathode materials of lithium ion batteries
- CNT dispersions for LiB positive-electrode materials
- CNT dispersions for LiB

The forecast or projections in this presentation are based on the assumptions and beliefs of our management in light of the information available as of August 21, 2023. Changes in global, economic and business conditions could cause actual results to differ materially from these forecasts. All amounts are rounded to the nearest 100 million yen.

1) It will grow as our core business and contribute to the establishment of a sustainable society by ubiquitizing EVs globally.

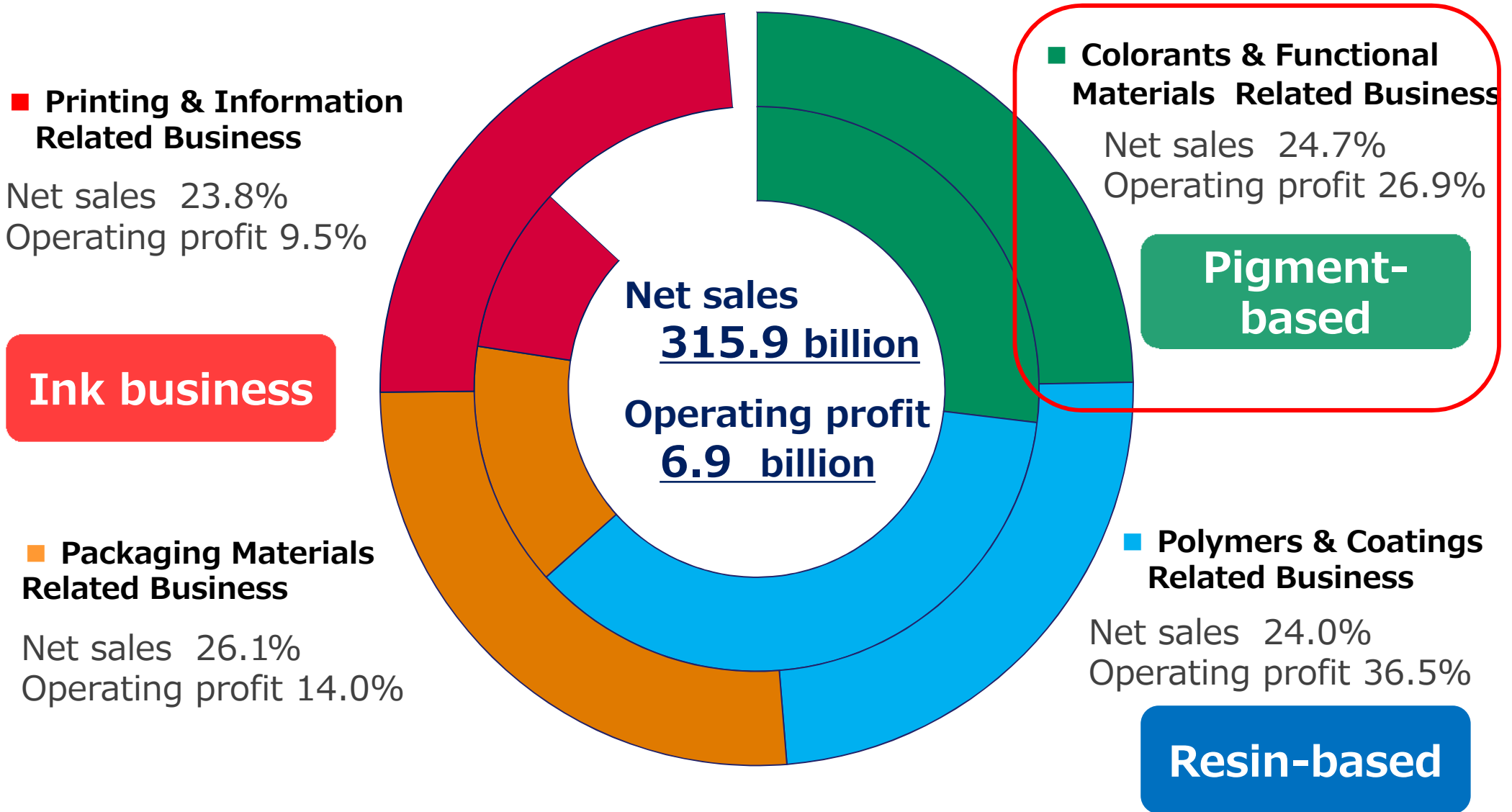
2) We position it as a growth business, have set the sales target for FY2026 at over 40.0 billion yen and aim to enable it to contribute to profit in the medium to long term.

3) We plan to invest 25.0 billion yen by FY2026 to reinforce the local production system at 5 production bases in 4 regions of the world: Europe, the U.S., China and Japan.

Composition of Business Segments

FY2022 (Fiscal Year Ended December 31, 2022)

Net sales: outer circle / Operating profit : inner circle



■ **Printing & Information Related Business**

Net sales 23.8%
Operating profit 9.5%

Ink business

■ **Packaging Materials Related Business**

Net sales 26.1%
Operating profit 14.0%

■ **Colorants & Functional Materials Related Business**

Net sales 24.7%
Operating profit 26.9%

Pigment-based

■ **Polymers & Coatings Related Business**

Net sales 24.0%
Operating profit 36.5%

Resin-based

Major products and applications

① Pigment-based

Colorants & Functional Materials Related Business

Plastic colorants for Automobiles Containers



Pigments for Printing inks Paints for automobiles



Resist inks for Display panels



Materials for Lithium ion battery



② Resin-based

Resins for paints for buildings



Can coatings



Adhesives for Packaging, Electronics



Functional films For smartphones



③ Ink Business

Books, Newspaper



Buildings



Labels Paper containers



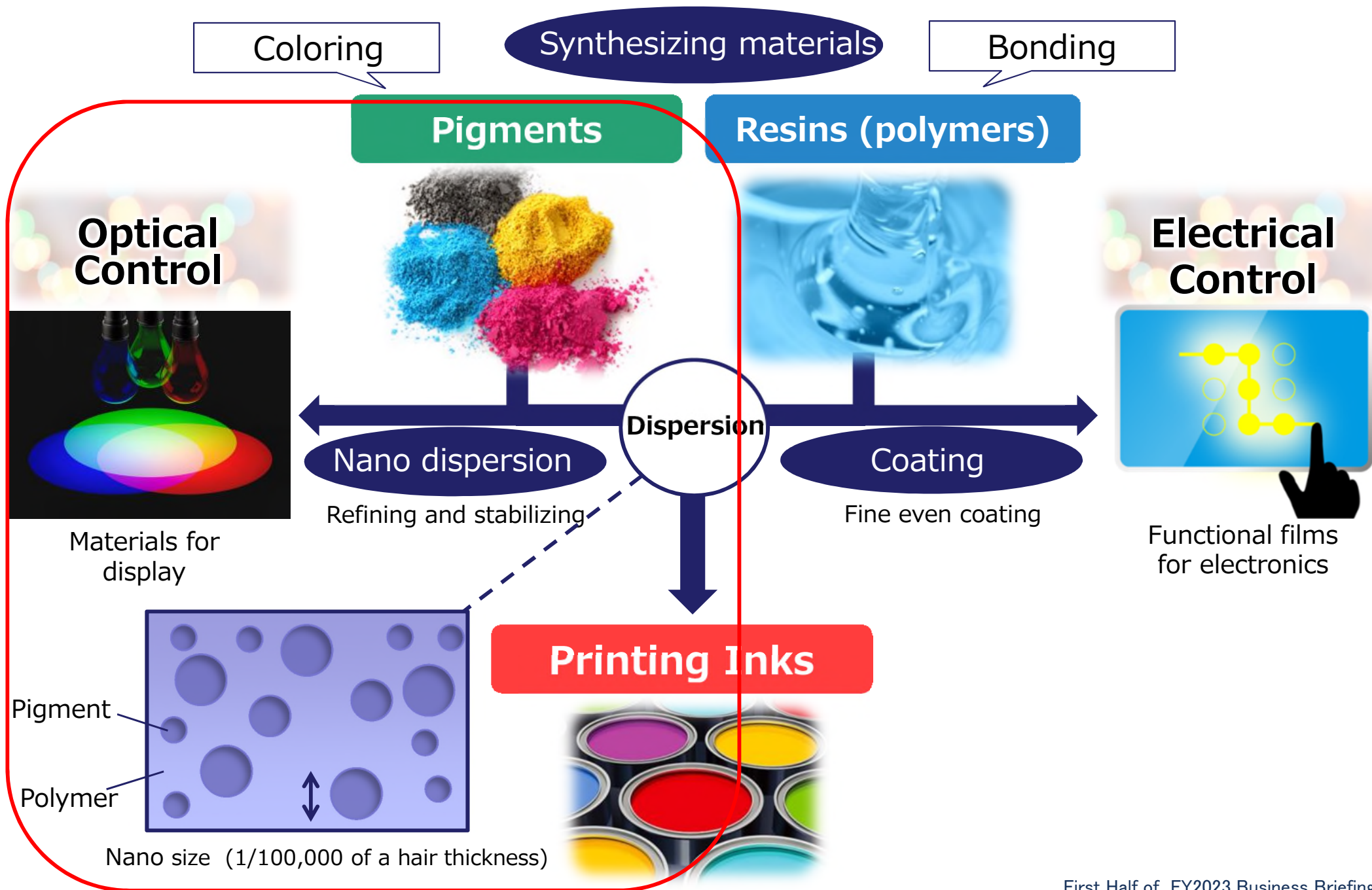
Flexible packaging



Established Business

High Growth Potential Business

Unique Core Technologies and Expansion of Business Areas



History of evolution with dispersion as the core technology

Applying Dispersion Technologies Which Have Been
Accumulated for Many Years in Materials for LiB

Lengthy track record in
automotive LiB

~1990



Pigment dispersions for
automotive coatings

1990~



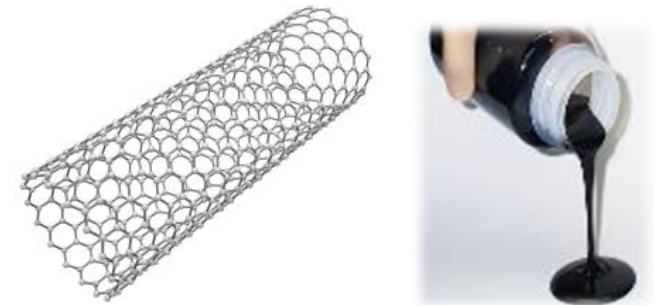
CB Dispersions for
Data storage tape

2015~



CB Dispersions
For LiB cathode

2019~



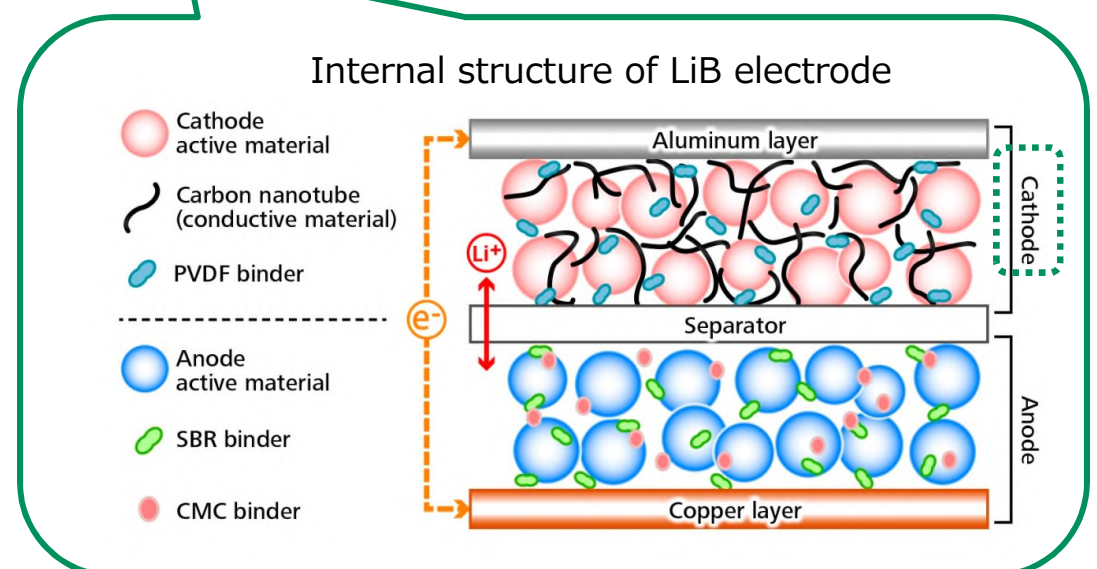
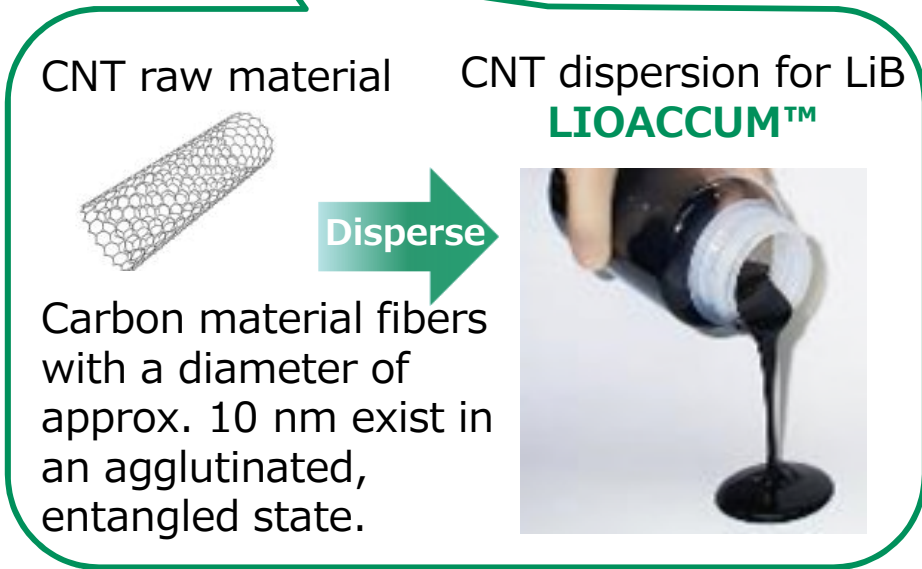
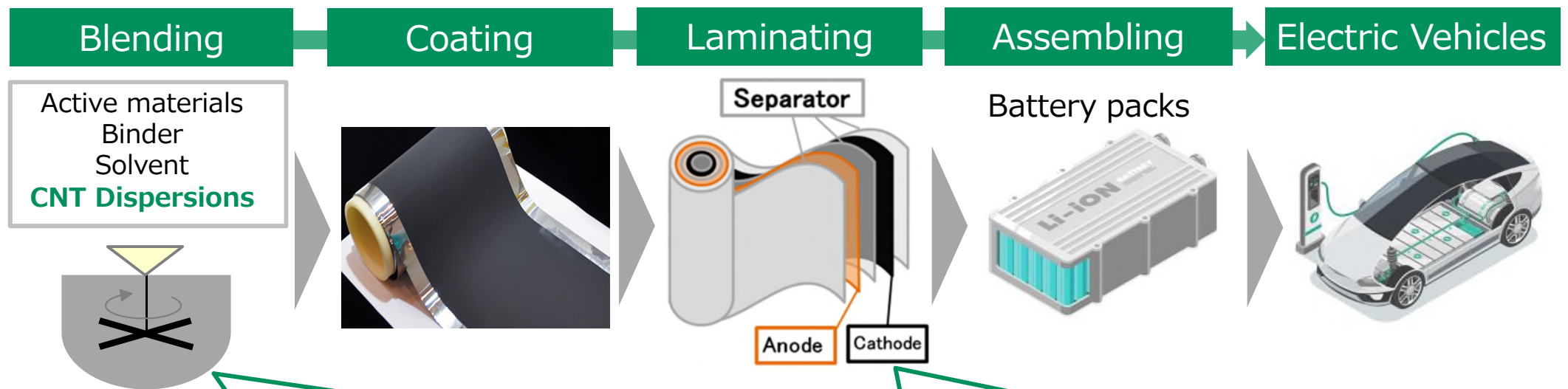
CNT Dispersions
For LiB cathode

✓ Development of fine dispersion
technology for conductive carbon black.
-Adopted for use in Data storage tapes

✓ Adopted for LiB of HEV
✓ Birth of **LIOACCUM™**
as battery use

✓ **LIOACCUM™**: Adopted for LiB of EVs
✓ It was created by dispersing CNT,
a next-generation conductive material,
by using our proprietary technology.

LiB production process and CNT dispersions LIOACCUM™



- **LIOACCUM™** excels in CNT dispersion properties and distributivity in the electrode. It forms an even, efficient conductive network on the surface of the active material.
- It helps increase the capacity, output, and service life of LiB.

Types of batteries and developed products using LIOACCUM™

- LIOACCUM™ is used as a cathode conductive agent for high-capacity automotive LiB using NCA or a ternary active material.
- Developing a CNT dispersion for silicon anodes, aimed at further boosting the capacity of LiB, and having it evaluated by customers.
- We are also developing CB/CNT dispersions for all-solid-state battery, working together with Tokyo Institute of Technology and our customers.

Use	Features	Electrolyte	Cathode materials		Anode materials	
			Active materials	Conductive agent	Active materials	Conductive agent
Stationary Solar battery etc.		Liquid	LFP*1	CB	Graphite	-
Consumer Mobile/PC etc.		Liquid	NCA/Ternary*2	CB	Graphite	-
Automotive	Low cost/ Low capacity	Liquid	LFP	CB	Graphite	-
	High capacity		NCA/Ternary	CNT	Graphite	-
	Super high capacity		NCA/Ternary	CNT	Graphite·SiOx*3	CNT
	All-solid state battery	Solid Sulfide-based	NCA/Ternary	CB/CNT	Graphite	-

*1 : LFP [LiFePO4] A cathode active material with low energy density and low cost

*2 : NCA [Li (Ni Co Al) O2] / Ternary [Li (Ni Co Mn) O2] A cathode active material with high energy density

*3 : SiO xAn anode active material with capacity more than four times greater than that of graphite. Its problem is that it expands and contracts significantly during charge and discharge.

Effect of Using CNTs in LiB as a Conductive Agent

- ✓ CNTs are more conductive and elongated than conventional conductive agent (CB: carbon black).

Benefit to LiB

- **High capacity:**

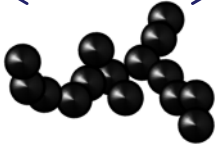
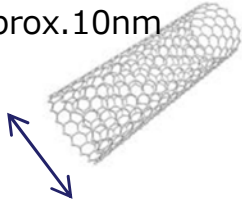
The capacity of LiB is increased by increasing the active materials inside the battery.

- **High output:** Increasing the output of LiB with high conductivity

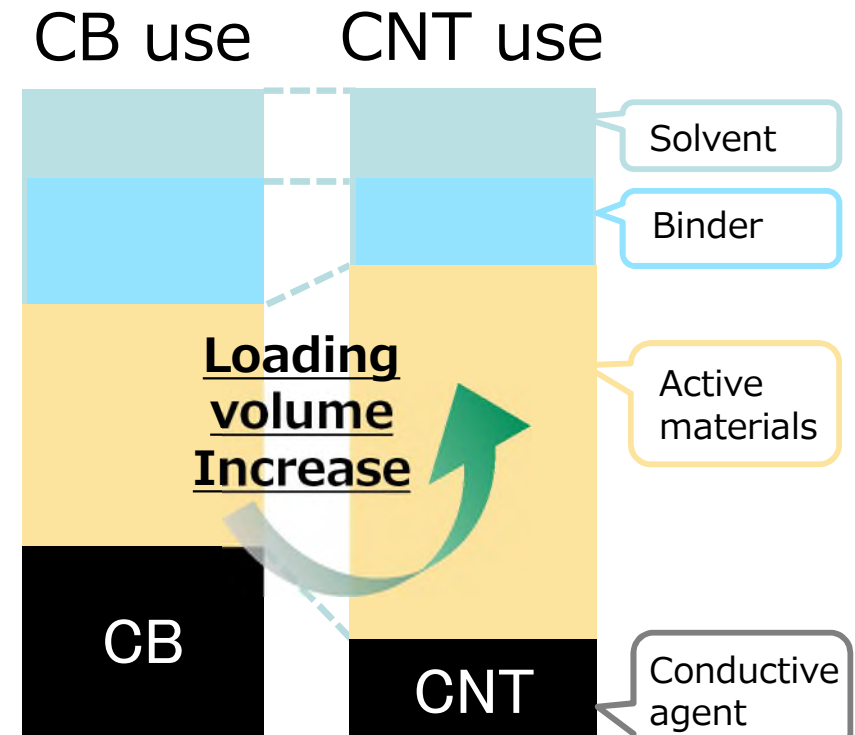
- **Long life:**

The service life of LiB is increased through the uniform use of the active material.

Conductive agent's features

	CB	CNT
Shape, size	<p>Approx. 500nm</p>  <p>A structured form with connected particles</p>	<p>Approx. 10nm</p>  <p>Fine and long fibers</p>
Conductivity	Low	High
Additive amount	More	Less
Dispersion difficulty	Easy	Difficult

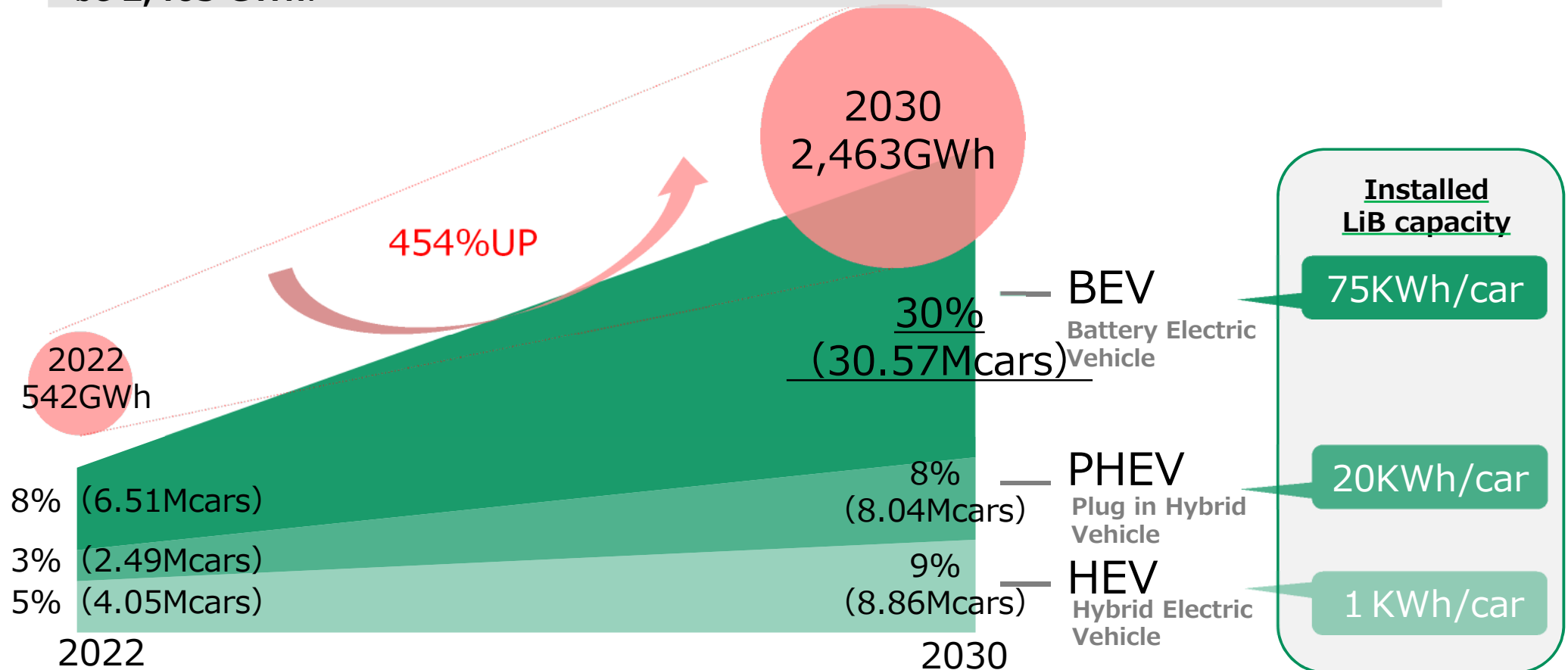
Cathode material's components



EV Sales Forecast and Battery Demand Growth

▼ Share of global new vehicle sales (%) and total battery demand (GWh)

The percent of new vehicle sales globally that are BEVs will increase to **30%** by 2030. The total battery demand combining the data for BEVs, PHEVs and HEVs is expected to be **2,463 GWh**.



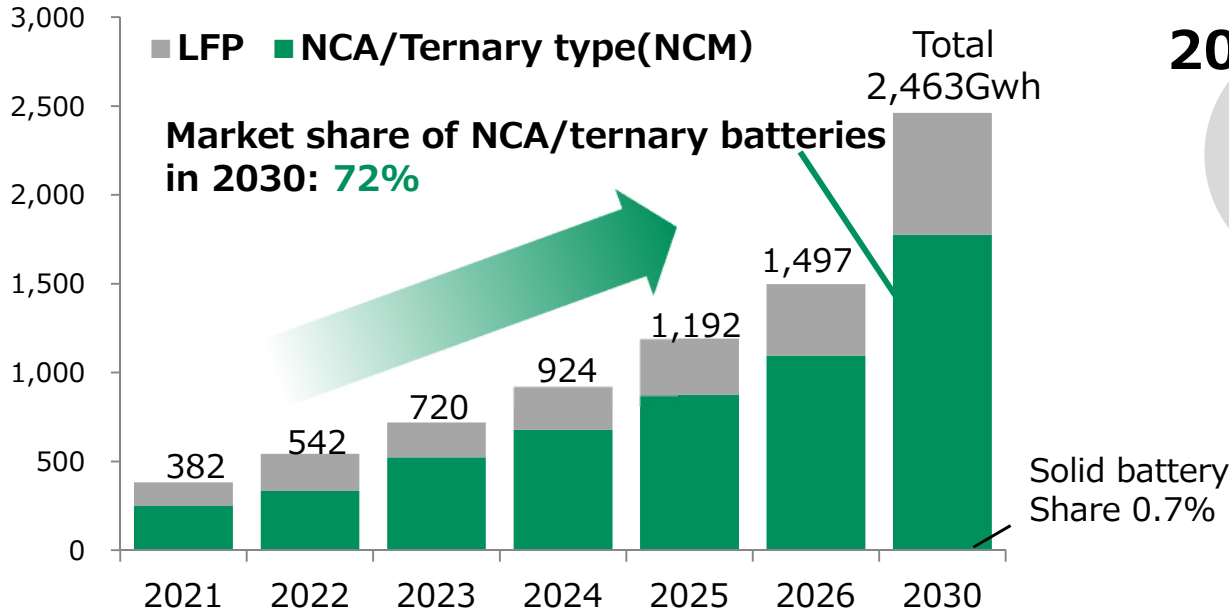
- With increase in BEV sales volume, it's essential for demand expansion of high capacity LiB.
- Demand for CNT dispersions, essential as a conductive agent for high-capacity LiB, is also expanding significantly

*Estimated by our company using SOGO PLANNING, Inc. 「2022 Trends and Future Forecast of EV related markets」

Market Size Forecast and Scenario for the Company's Business Expansion

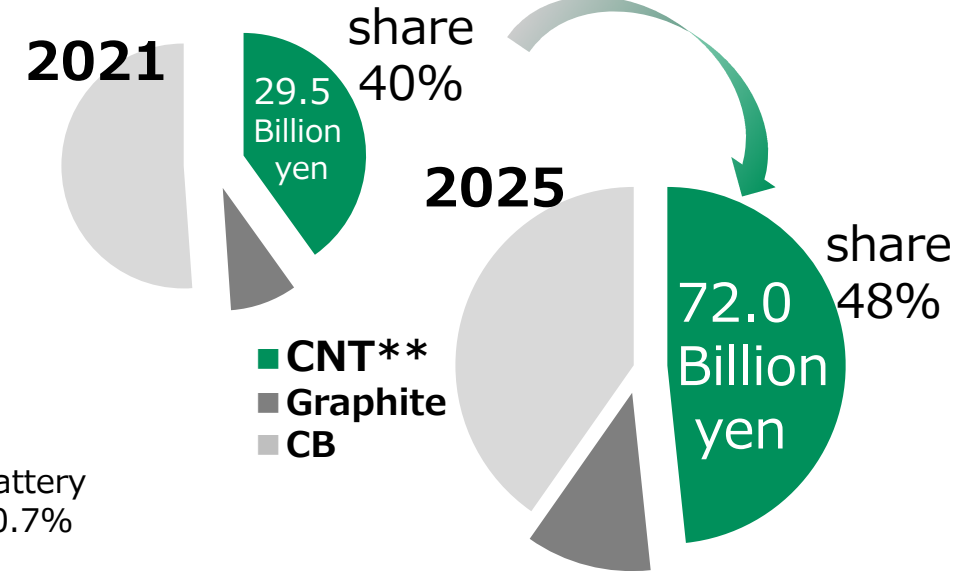
1) Demand forecast: LFP and NCA/Ternary type(NMC)

(unit : GWh)



Sources : Estimated by our company using Pwc 「Gigafactories & Raw Materials」 August2022 and SOGO PLANNING, Inc.「2022 Trends and Future Forecast of EV related markets」

2) Market size forecast of conductive agents* by type (sales)



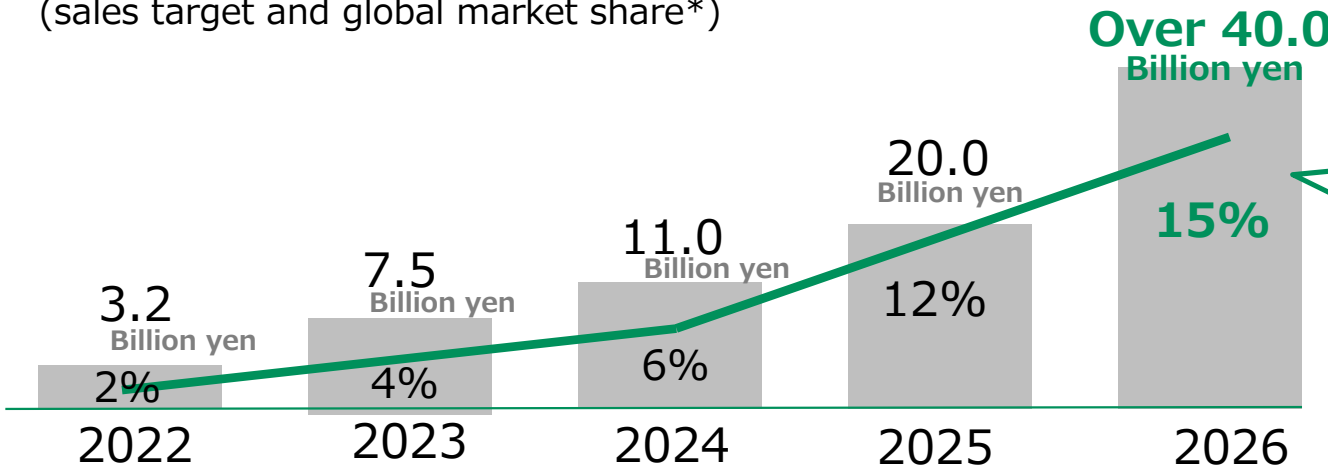
Source : Fuji-keizai August2022

*Note: The market size of conductive agents is based on powder.

**Values that include CNT and CNF

3) Scenario for expansion of business on CNT dispersions for LiB

(sales target and global market share*)



PLAN FY2026
Sales **over 40.0 billion yen**
Global share **15%**

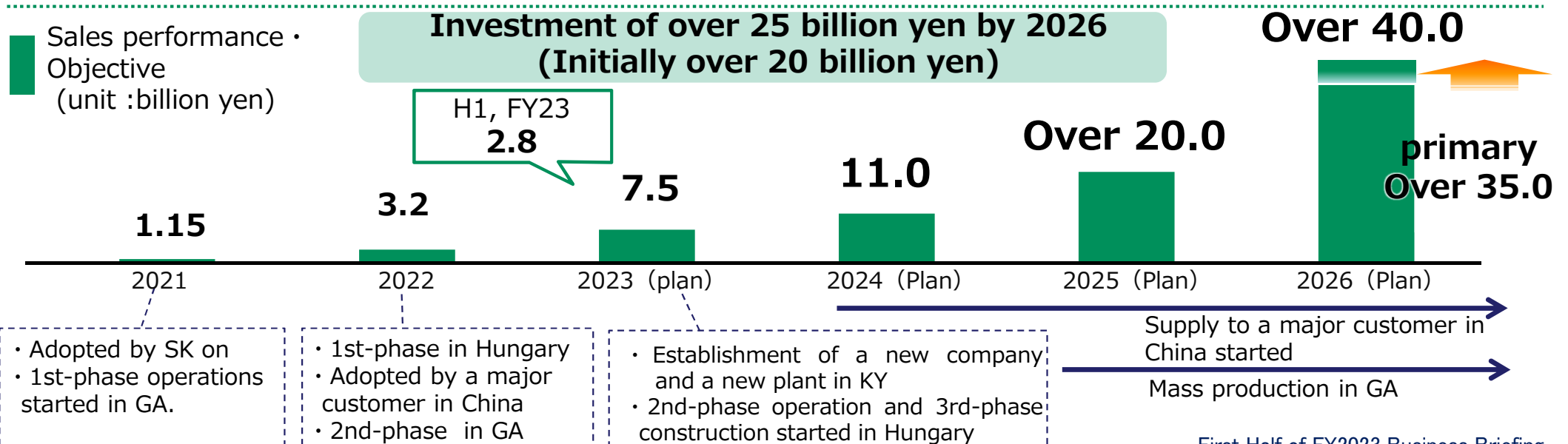
Ref: *Share is % of Automotive LiB capacity(GWh)

First Half of FY2023 Business Briefing

— Sales Target and Investment Amount Revised Upward —

- The sales target for FY2026 was revised to above 40.0 billion yen, and the capital investment amount to above 25.0 billion yen. Each was increased 5.0 billion yen from last report.
- Three customers (North America) have made an informal decision to newly use that Company's products, and steady progress in production has been made in Europe, the U.S. and Japan.

User/Market	Toyo Production Site	Progress
SK on	US(GA) · Hungary	Demand declined temporarily in the first quarter, but it later recovered and has been steady.
North America	US(KY)	Three companies have made an informal decision to newly use the Company's products. A new company and a new plant were established for the commencement of operations in 2025.
China	Zhuhai	Facilities were increased to increase production capacity, aiming for a market launch in 2024.
Others	Planning to supply with five production bases in four regions in the world	Actively working to obtain offers from 4 U.S. companies, 2 European companies, 2 Japanese companies, and 1 Chinese company, including materials for negative electrodes.



The Only CNT Dispersion Manufacturer that supply with five production bases in four regions of the world



North America		Europe	China	Japan
<p>State of Georgia</p> <p>LioChem LLC is the key CNT dispersions production base in North America. In 2023, mass production started at its facilities installed through 2nd-phase investments. The production volume will be increased by the facilities, which are located close to customers including SK on.</p>	<p>State of Kentucky</p> <p>LioChem e-Materials LLC was established in January 2023 to augment production capacity in anticipation of the rapid growth of demand. The plan is to start mass production in 2025, and the production capacity in North America is expected to increase up to 400%.</p>	<p>Hungary</p> <p>TOYO INK HUNGARY KFT. began mass production at its 2nd-phase facilities in 2023. Demand is growing as initially forecast, and facilities installed through 3rd-phase investments are expected to begin operating in 2024.</p>	<p>Zhuhai</p> <p>Zhuhai Toyocolor, which is the Toyo Ink Group's dispersion manufacturing base in China, decided to expand its facilities in 2023 in response to the adoption of its products by a major battery manufacturer in China. The plan is for our products to be used in models mass produced in 2024.</p>	<p>Fuji</p> <p>In response to the adoption of our CNT dispersions for HEVs, the plan is to begin mass production in the third quarter of FY2023. We also plan to expand facilities in the future to respond to the expected growth of the demand for CNTs.</p>

▲LioChem e-Materials LLC

▲TOYO INK HUNGARY KFT.

▲Zhuhai Toyocolor Co., Ltd.

▲Fuji factory, Toyocolor Co., Ltd.

First Half of FY2023 Business Briefing

Message from TOYO INK HUNGARY KFT.



Our competitive advantages

1) A professional in dispersion

We have proprietary technologies for dispersion and CNT's surface modification that have been accumulated over many years.

2) Many years of trust and a long track record

A long track record in materials for automotive LiB

3) The only CNT dispersion manufacturer that supply

with five production bases in four regions of the world

We have built a system for stable local procurement, production, and supply in the U.S., Europe, China, and Japan as major markets.

Direction of future technology development

- We will also develop related materials, including those for anode materials, and take steps to have their samples evaluated by customers.
- We will also advance the development of future technologies, including technologies for all-solid-state batteries, by working together with external partners including Tokyo Institute of Technology.

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■ **Inquiries on IR**

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■ **Website**

<https://schd.toyoinkgroup.com/en/>

■ **Major News Releases**

- Toyocolor to Supply SK Innovation with Li-ion Battery Materials for Use in VW and Ford EVs (Jul. 8, 2021)

<https://schd.toyoinkgroup.com/en/news/2021/21070801.html>

- Toyo Ink Establishes Second U.S. Production Site for Li-ion Battery Materials (Feb. 13, 2023 / updated on Mar. 15)

<https://schd.toyoinkgroup.com/en/news/2023/23021301.html>

- Chinese EV Battery Maker To Adopt Toyocolor's Battery Materials (Feb. 13, 2023 / updated on Mar. 15)

<https://schd.toyoinkgroup.com/en/news/2023/23021302.html>