

Business Briefing

Functional Products Business

June 9, 2023

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Functional Products Division
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Projections of future sales and earnings in these materials are “forward-looking statements.”

Management offers these projections in good faith and on the basis of information presently available.

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FURUKAWA ELECTRIC CO., LTD.

1. 2025 Mid-term Plan - Road to Vision 2030

- ① Looking back on FY2022 and current situation
- ② Basic policy and product lineup designed to solve social issues
- ③ Market overview (medium-term)
- ④ Policy & strategy
- ⑤ Net sales & operating income (FY22 actual, FY23 forecast, FY25 forecast)

2. FY23

- ① Policy & strategy
- ② Measures to grow the businesses and improve earnings, and net sales forecast

AT & Functional Plastics Division

Thermal Management Solution & Products Division

Memory Disk Division

Copper Foil Division

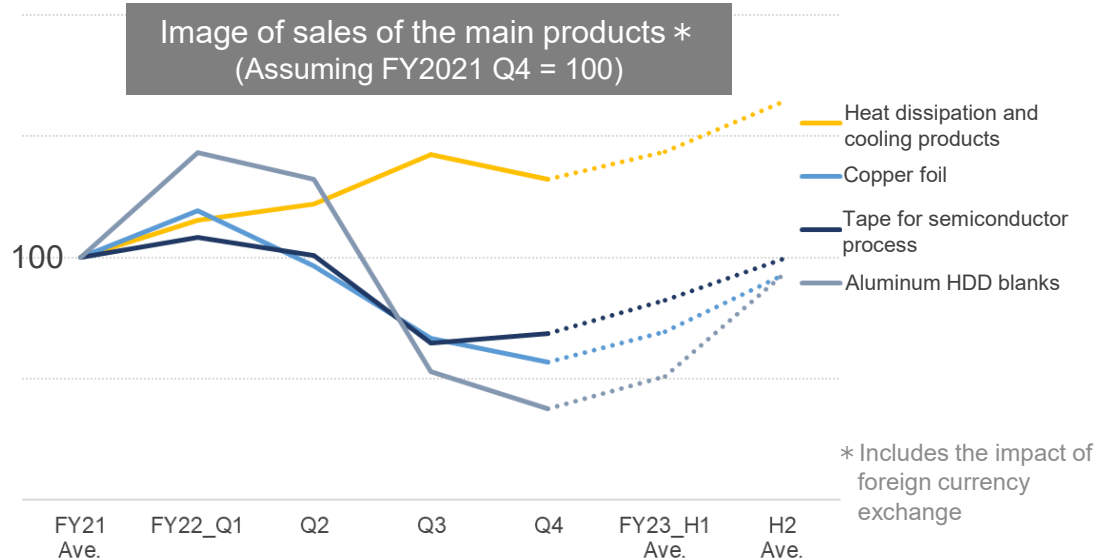
- Although the market has greatly deteriorated since the latter part of H1 in FY22, it is still expected to grow over the medium-term
- In FY2023, continue to grow by acquiring new domains and new customers through “high performance” and “well-differentiated” products
- Establish a system that can immediately respond when the market recovers from the second half of FY2023

Elimination of inventory in the supply chain and market recovery is expected to occur from the second half of FY23

Issue

Decreased orders due to rapidly falling demand

Sudden drop in orders for high value added product lineups



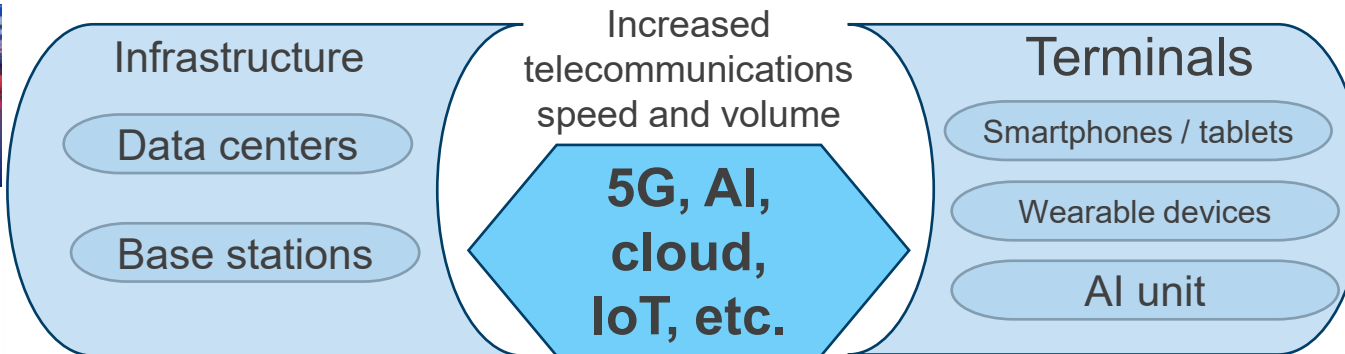
Response

- Temporarily halt production and limit business expenses
- Continue the activities for aligning the products with the specifications for new customers
- Enhance communication with customers to grasp the status of inventory within the supply chain
- Production response when demand rapidly recovers
- Continue to incorporate the higher costs in the sales price

Functional products market and basic business policy

Create in partnership with the customer, and provide solutions

Support the growing telecommunications and social infrastructure markets by leveraging our proposal and development capabilities for new products that match customer needs.



Functional product lineup that supports the growing telecommunications and social infrastructure markets



Aluminum blanks



Heat sinks



Tape for semiconductor process



Electrolytic copper foil

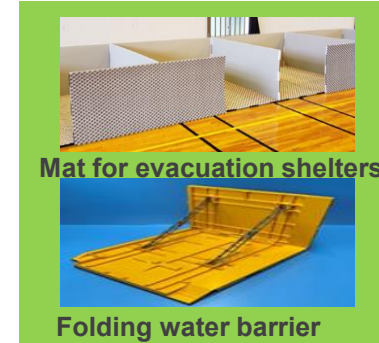
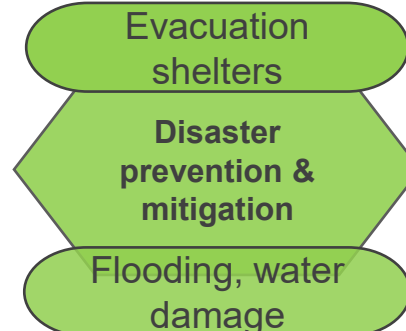
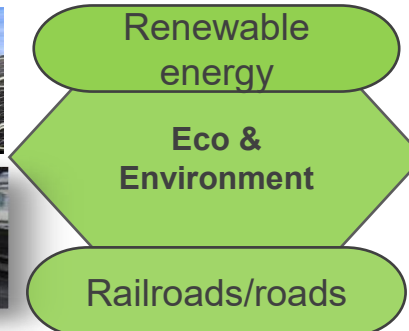


Vaper chamber



Heat sinks for solar power

Green trough



Mat for evacuation shelters

Folding water barrier

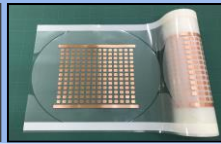
Functional product lineup that supports the growing telecommunications and social infrastructure markets

Broad, characteristic lineup of high performance, well-differentiated products that respond to various social issues

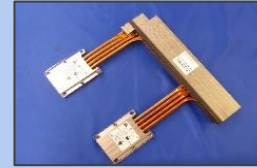
Realize tougher infrastructure/increased data traffic



Tape for 5G next generation devices



Smart cities/
high performance troughs



Thermal dissipation products
for CPUs

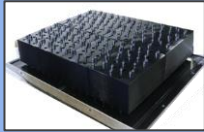


Aluminum HDD
blanks



Electrolytic copper foil for printed
wiring boards

Realize a carbon-free society/renewable energy



Thermal dissipation for solar power



Troughs for slopes



Nikko hydroelectric
power station

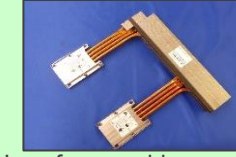


Solar power
at the copper foil plant

Clean energy



Use of renewable energy
at the Imaichi Plant



Use of renewable energy
at the plant in the Philippines

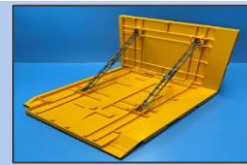
Realize cities that remain functional during disasters/disaster prevention & mitigation



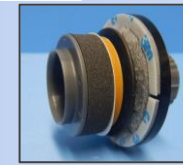
Square EFLEX



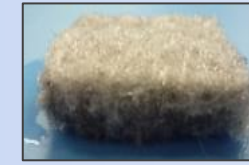
Mat for evacuation shelters



Folding water barrier



Exterior wall penetration



Moisture activated
waterproofing

Realize a recycling based society/environmental recycling



Green trough



Electrolytic
copper foil



EFCELL packaging material



EFCELL office supplies



Foam recycling: EFLEX filler



Social issues

9 INDUSTRY, INNOVATION
AND INFRASTRUCTURE



7 AFFORDABLE AND
CLEAN ENERGY



11 SUSTAINABLE CITIES
AND COMMUNITIES



3 GOOD HEALTH
AND WELL-BEING



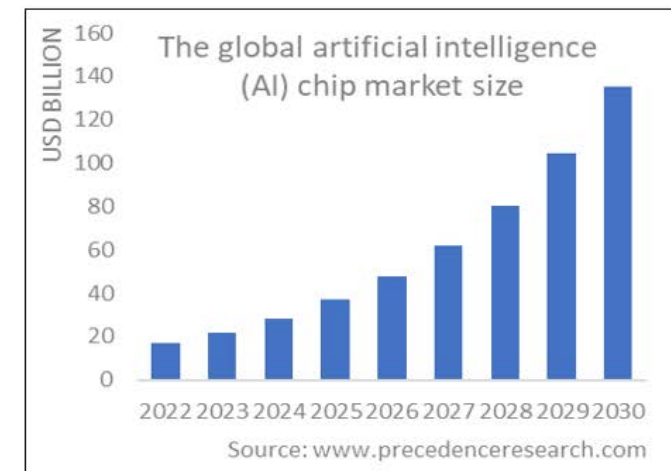
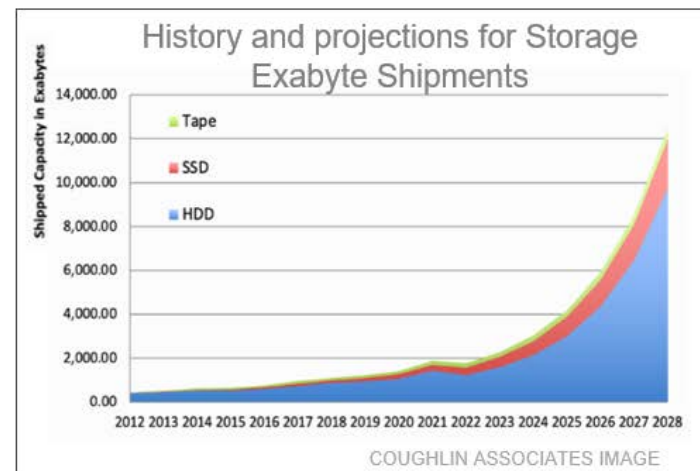
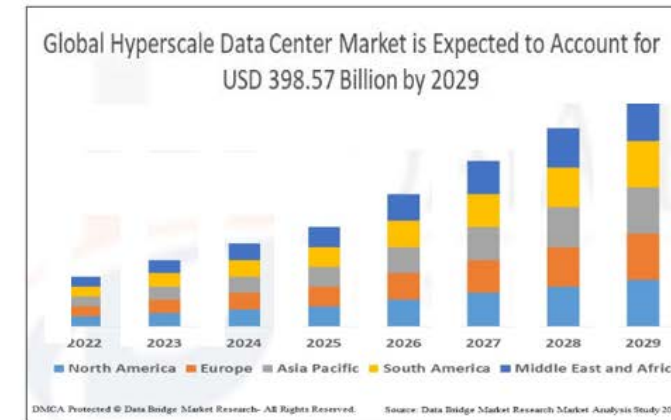
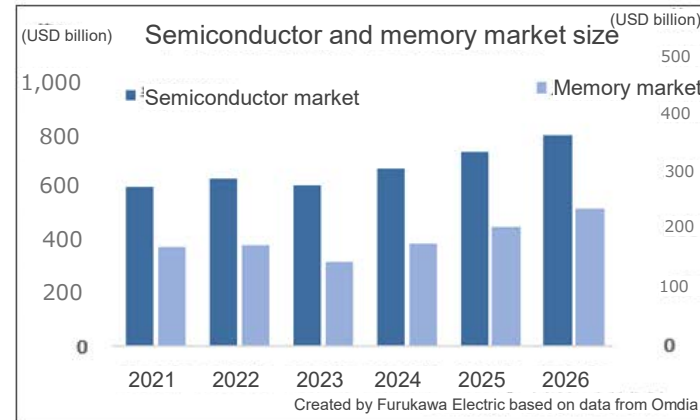
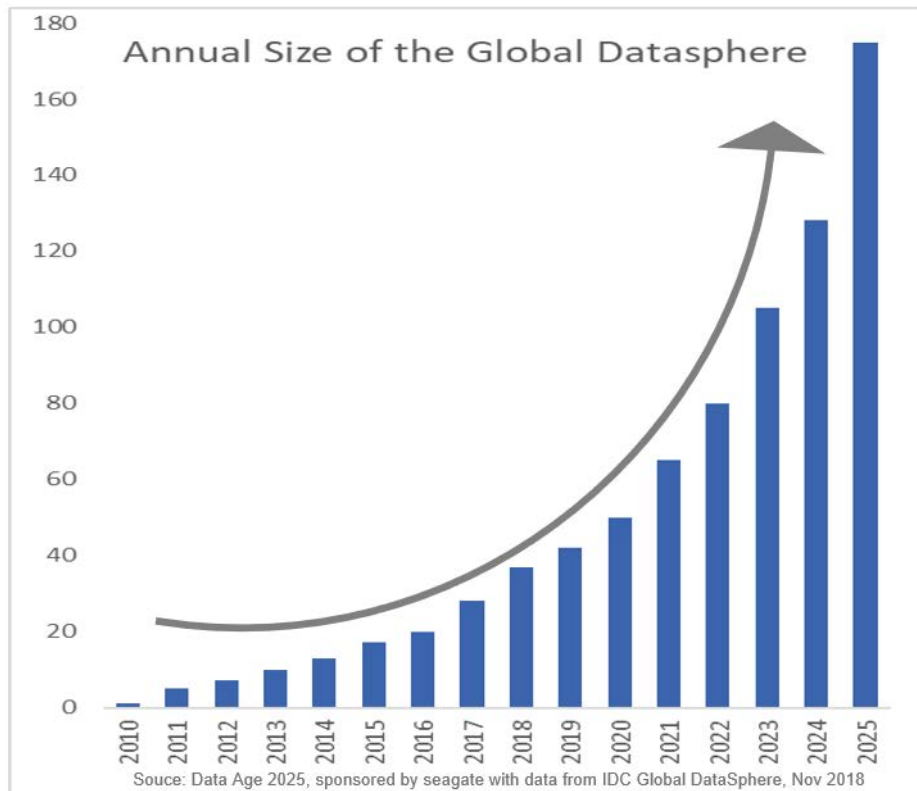
12 RESPONSIBLE
CONSUMPTION
AND PRODUCTION



Focus on the trend markets, and provide “high performance”, “well-differentiated” products to the related markets

Although the market is currently undergoing a correction, the volume of data generated worldwide and data traffic will increase in the future

Most functional product businesses and product markets will grow in the medium- to long-term following the increased data volumes



Functional Products segment

1. Continue to develop products aimed at swiftly responding to the changing customer requirements, provide electronics products with an awareness of “high performance” and “well-differentiated” to growth markets and support the telecommunications and social infrastructure markets.
2. Leveraging the new products directed at Society 5.0 for SDGs and “differentiation” aimed at solving social issues by creating a framework for becoming carbon neutral, contribute to realizing a sustainable society and secure the next generation profit base.

AT & Functional Plastics

- By solving the issues arising as communications speed and volume increase, support the telecommunications infrastructure in society.
- Contribute to disaster prevention & mitigation and increasing national resilience through tangible infrastructure, disaster prevention and mitigation products and high performance foam products.

Thermal Management Solution & Products

- Continue to provide well-differentiated cooling solutions to maximize the potential of semiconductors that continue to generate more heat.
- For the heat generated by semiconductors, provide next-generation cooling solutions including water cooling and liquid immersion, and help customers save energy and decarbonize. Work to install clean energy at the main manufacturing sites.

Memory Disk

- Based on the technology accumulated over the past 50 years, continue to provide high performance materials to customers.
- Support safe, high quality storage infrastructure worldwide through the customer.

Copper Foil

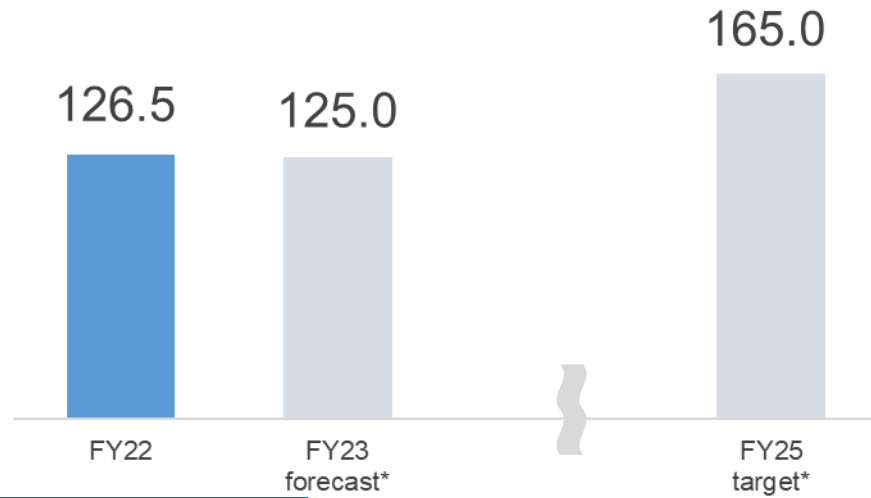
- Along with supplying highly reliable copper foil with characteristic features to CCL manufacturers and battery manufacturers, also supply to new customers in new domains.
- With the aim of developing new applications for electrolytic copper foil, create in partnership with customers in new domains in addition to the existing customers.

Net sales and operating income during the 2025 Mid-term Plan

Net sales

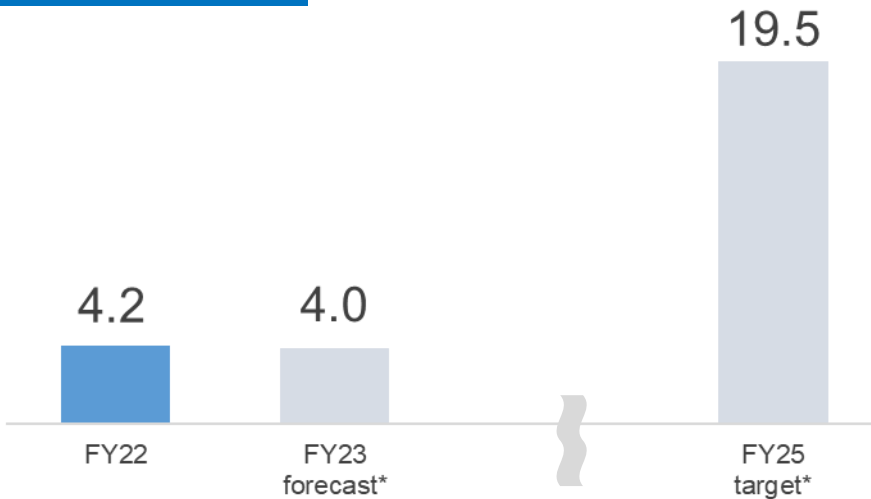
JPY billion

*FY23: Impact of the deconsolidation of TOTOKU ELECTRIC CO., LTD.
(Net sales: JPY (12.1) billion, Operating income: JPY (2.3) billion)
FY25: Before the impact of TOTOKU Electric Co., Ltd. deconsolidation

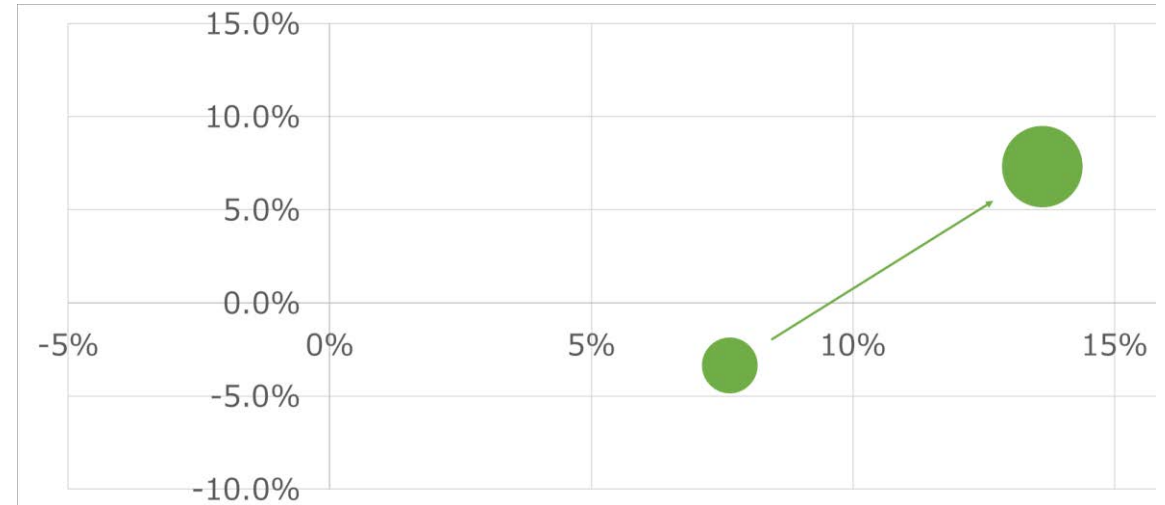


Operating income

JPY billion



ROIC (FY22 actual → FY25 target)



Vertical axis : Net sales CAGR (FY18-22→FY22-25)
Horizontal axis: ROIC (FY22→25)
Bubble : NOPAT (FY22→25)

- ※ Net sales and invested capital in FY24 and FY25 have been adjusted based on the FY23 forecast average market price of copper and average exchange rate
- ※ The lower ROIC for Functional Products (compared to when the 2025 Mid-term Plan was announced in May 2022) is due to the impact of the sale of TOTOKU ELECTRIC
- ※ CAGR: Compound annual growth rate, ROIC: Return on invested capital (after taxes), NOPAT: Calculated as net income + interest expenses after tax in accordance with IFRS

	FY22	FY23 forecast	FY25 target
Average copper price	1,209	1,180	1,085
Average exchange rate	135	130	110

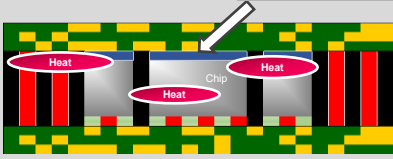
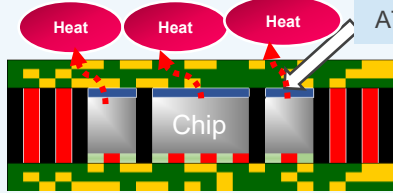
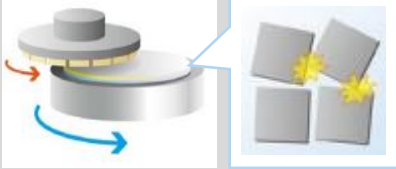
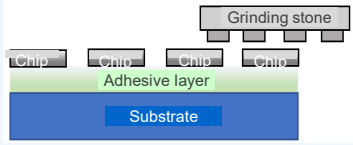
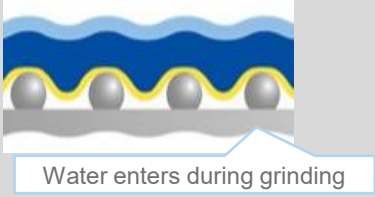

Functional Products segment

- In 23, continue to achieve growth by acquiring new customers in new domains through “high performance”, “well-differentiated” products.
- Establish a system that can immediately respond when market demand recovers from the second half.

AT & Functional Plastics	Thermal Management Solution & Products
<ul style="list-style-type: none"> • Along with preparing a system for stable supply directed at the market recovery, increase sales by expanding conformance to the specifications for cutting edge processes, and actively develop new projects. • Roll out new developments in new domains that apply next-generation infrastructure and foam technology, and promote new proposals for the disaster prevention & mitigation market. • Work to develop and increase sales of environmentally-friendly products. 	<ul style="list-style-type: none"> • Through the provision of well-differentiated solutions and services, continue to contribute to solving social issues as a core partner, and increase topline sales. • Quickly grasp the risks and opportunities based on global, market and customer trends, and increase profits by swiftly and proactively formulating and executing specific measures.
Memory Disk	Copper Foil
<ul style="list-style-type: none"> • Following the need for thinner blanks, aim to continue launching well-differentiated new materials onto the market. • Increasing sales volumes of the new high value added thin blanks is KSF in the short and medium term, and continue to increase orders. 	<ul style="list-style-type: none"> • As a true partner to customers, “quickly” develop products that respond to changing customers’ requirements, and continue to provide new products with an awareness of “high performance” and “well-differentiated” to future growth markets. • Based on a strong awareness of carbon neutral, install renewable energy and actively work to save energy.

AT business and Functional Plastics business

Contribute to the further evolution of semiconductors by solving the technology issues for cutting-edge processes

Technology trend	Issue faced by the customer	Solution provided by Furukawa Electric
<p>Heat generation Increased chip density results in larger amounts of heat generated</p>	<p>Standard adhesive film</p>  <p>Heat generated from increased chip density builds up in the package and reduces performance</p>	<p>AT adhesive film</p>  <p>Dissipate heat from the semiconductor chip using adhesive film with good thermal conductivity</p>
<p>Thinner wafers Wafers are becoming thinner in order to increase memory performance through chip stacking</p>	 <p>As semiconductor chips become thinner, chipping occurs more easily during grinding</p>	 <p>Optimize the conditions to prevent chipping by controlling the base film and adhesive properties</p>
<p>Ultra-high bumps Use of FOWLP packages that enable increased chip density and high speed transmission is becoming more widespread. BG tape is attached to the surface of the ultra-high bumps (solder bumps) and back grinding is conducted</p>	 <p>If the tape does not follow the contour of the bumps closely, thickness precision is reduced and water may enter during grinding</p>	 <p>Achieve excellent contour fit for ultra-high bumps</p>
<p>Diversification of sensor elements</p>	<p>When machining tracks the surface contours, issues arise such as cutting fluid penetration, reduced thickness precision and residual adhesive when the tape is removed</p>	<p>Through the application of substrate material with high rigidity and good contour fit in line with customer needs, improve tape removability by increasing machining precision and optimizing the adhesive</p>

Technology for cutting-edge processes

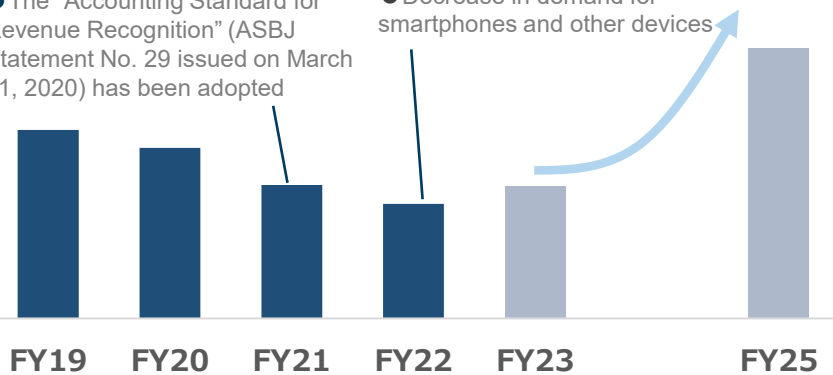
Establish a system for stable supply directed at the semiconductor market recovery and growing demand

□ Medium- to long-term demand growth in the semiconductor market

Sales of Furukawa Electric tape for semiconductor process

● The “Accounting Standard for Revenue Recognition” (ASBJ Statement No. 29 issued on March 31, 2020) has been adopted

● Decrease in demand for smartphones and other devices



- In FY2022, global demand for smartphones and other electronic devices declined, and customers started to correct their inventories
- Market is expected to gradually recover from the second half of FY2023 and continue to grow long-term thereafter

★ Establish a system for stable supply by increasing production capacity

Construct a new building at the Mie Works

CAPEX: About JPY 7.0 billion (FY22-25)

September 2022:
Commence construction

April 2025: Start mass production



- Reuse waste heat
- Install solar power

And implement other measures to reduce the environmental impact of the manufacturing process

Contribute to building next-generation infrastructure

Total route design through systemized conduits

Square EFLEX



EFLEX Through



ROM-Box



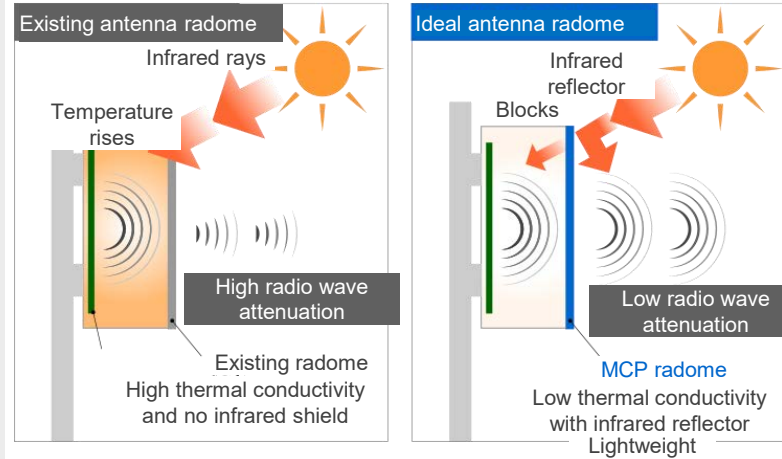
High performance such as supporting heavier loads

High performance troughs



Develop new markets and high performance products that use foam technology

Antenna radome



High frequency circuit board



Contribute to society through the development and sales of disaster prevention & mitigation products

Folding water barrier



Mat for evacuation centers

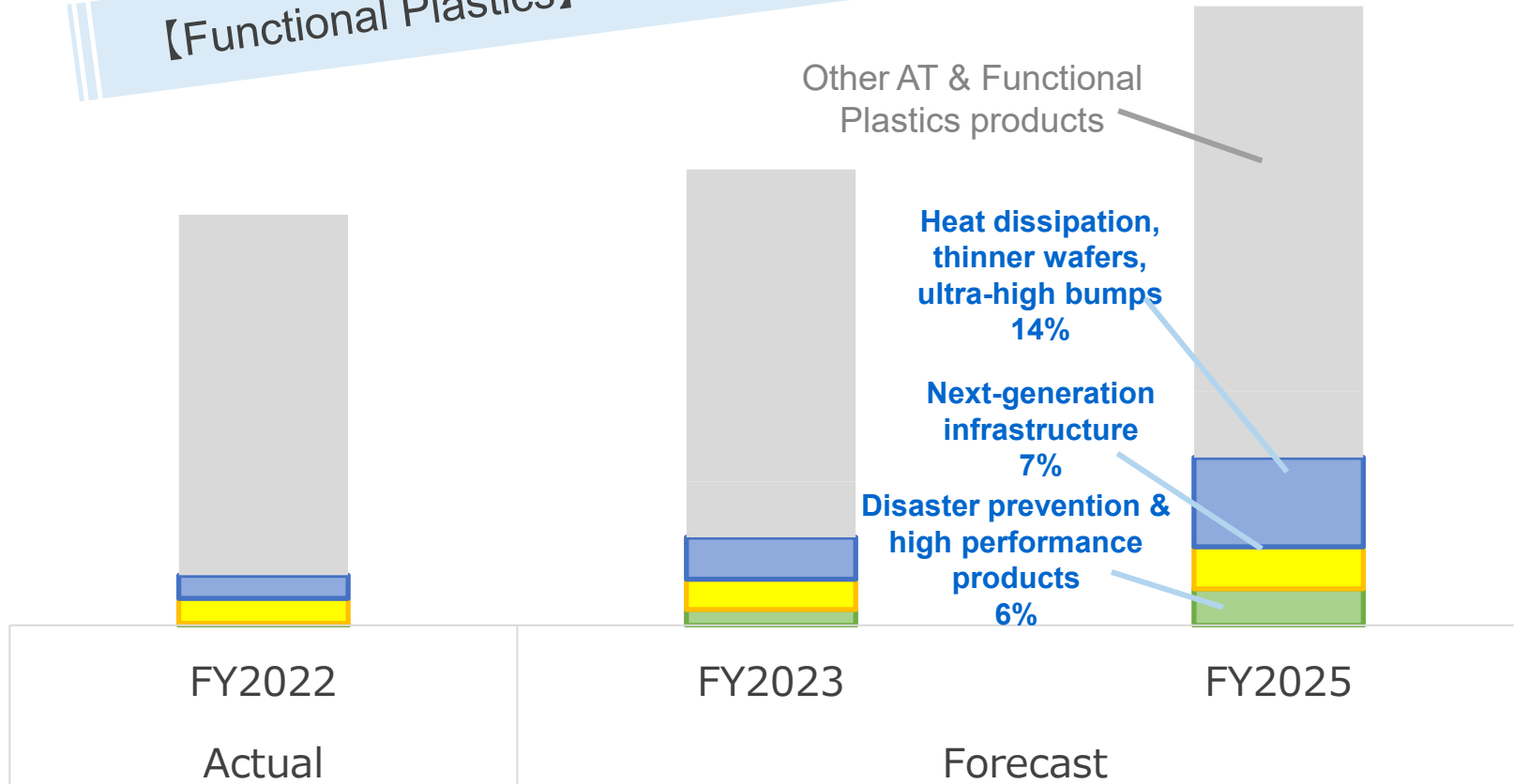


Use recycled materials and raw materials not derived from fossil fuels

【AT & Functional Plastics】 Net sales forecast

【AT】 Net sales CAGR approx. +22%

【Functional Plastics】 Net sales CAGR approx. +12%



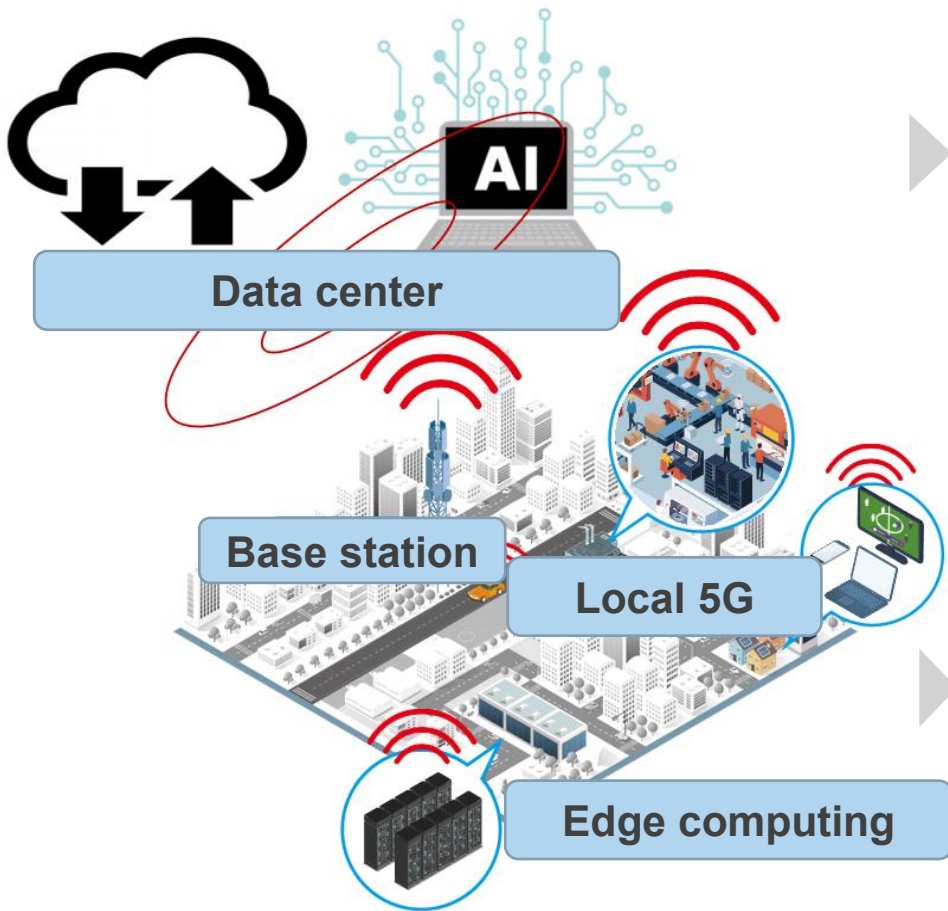
Point

Increased net sales by focusing on cutting edge semiconductor processes in AT, in businesses that provide solutions for a safety, peaceful and low environmental impact society in functional plastics

※“%” indicates the percentage of total sales

Thermal Management Solution & Products

Develop and provide high performance, well-differentiated products for the issue of heat generation centered on the main production site (FTL in the Philippines)



Telecommunications infrastructure market (data centers)

More heat generated by CPUs and GPUs

- Provide **air conditioning** through **high performance heat pipes & sinks and 3D vapor chambers**
- Participate in customers' **AI projects** and anticipate **progress in FY23**



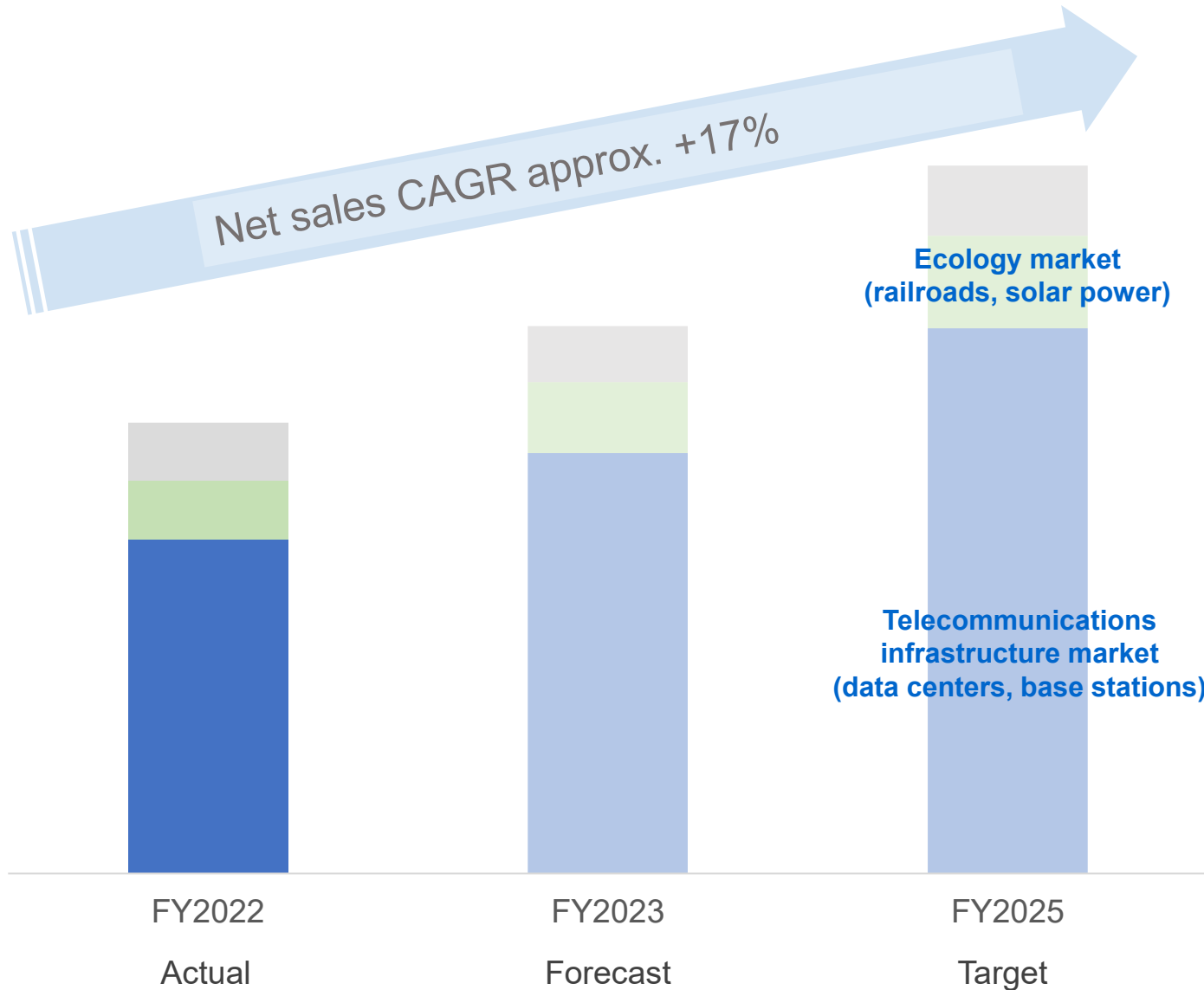
Telecommunications infrastructure market (base stations)

Problem of heat generation at the overall base station

Provide **one-stop solutions** that are lighter weight and include the use of **heat pipes and large vapor chambers**



100% completion of clean energy installation at the main manufacturing site (FTL) for products for the data center market



Point

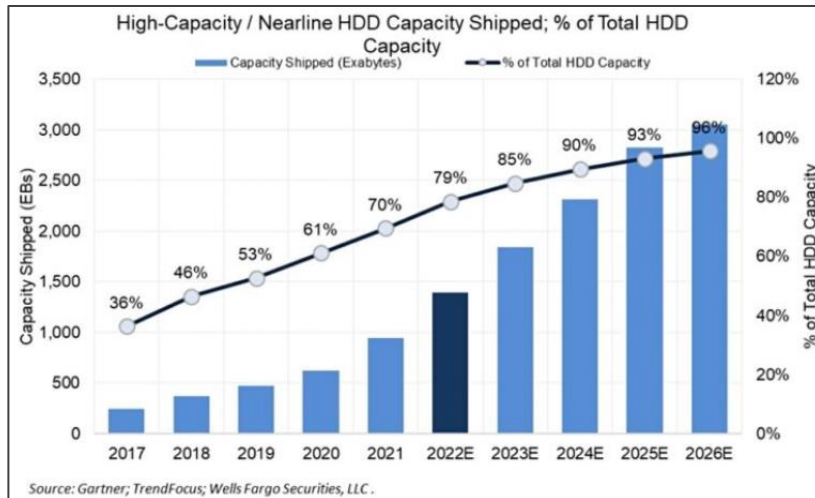
In FY23, in the data center market, increase profits by participating in customers' AI projects that are expected to be in high demand in multiple domains including finance, medical and retail.

From FY24, continue to increase profits by providing well-differentiated products and services in the growing telecommunications infrastructure market.

Memory Disk

As blanks continue to become thinner, grow by responding to customer needs through well differentiated materials

【Changes in total shipped capacity of high capacity HDD】



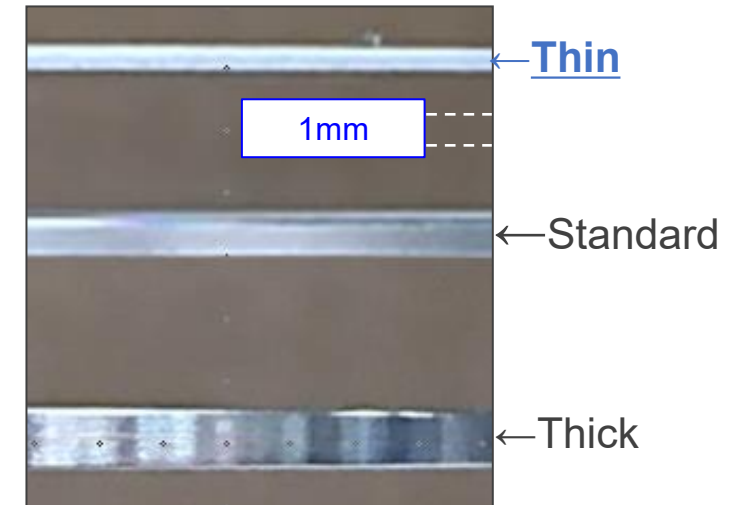
In 25, total shipped capacity of high capacity HDD is expected to almost double compared to today

【Internal view of a new HDD】



Number of disks continues to increase, and there are now HDD with 10 disks

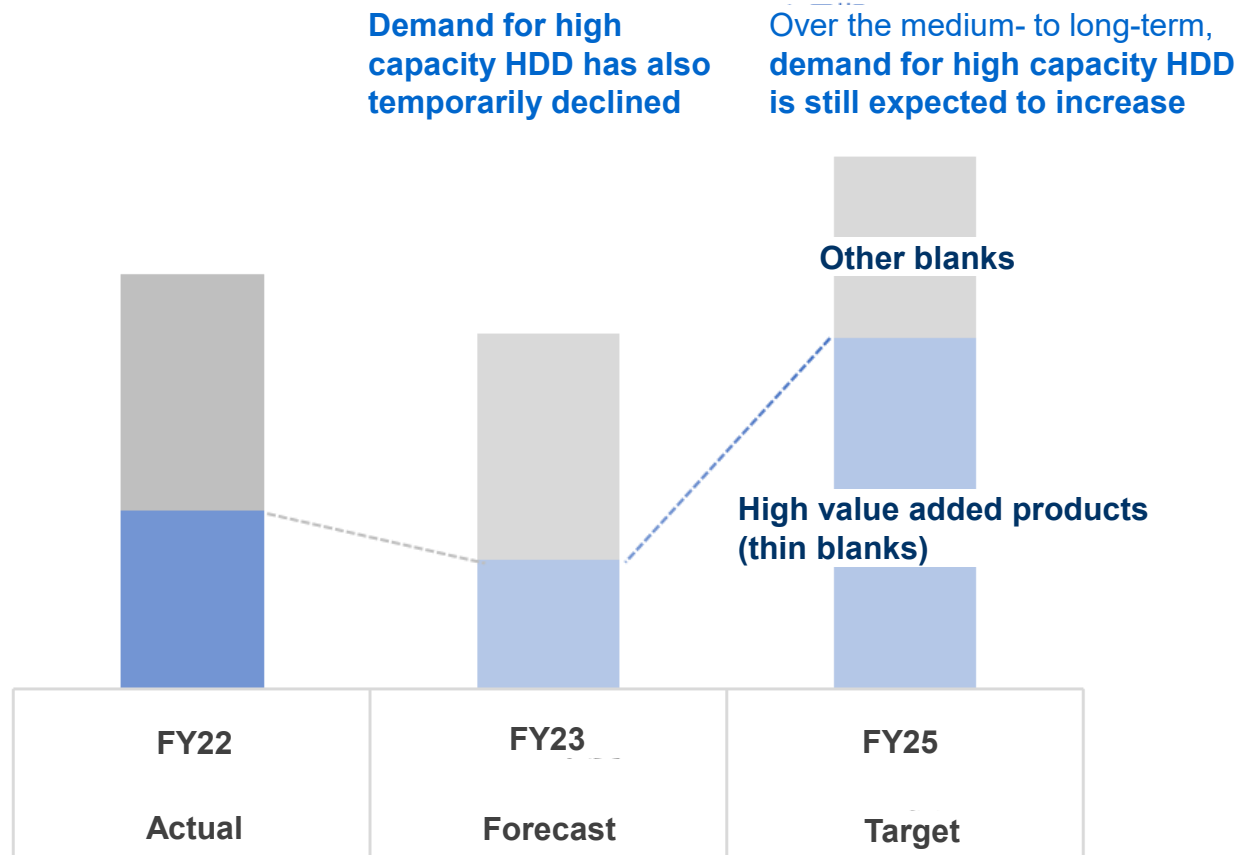
【Comparison of blank thickness】



Thin blanks have a thickness of less than 1mm (Images are all Furukawa Electric blanks)

- ✓ As data volume increases, HDD will continue to be equipped with more disks per unit
- ✓ In order to increase the number of disks equipped, each disk will need to be thinner
- ✓ Respond to the customer need for thinner, and fulfill market expectations by launching well-differentiated new materials

Net sales CAGR approx. + 5 %

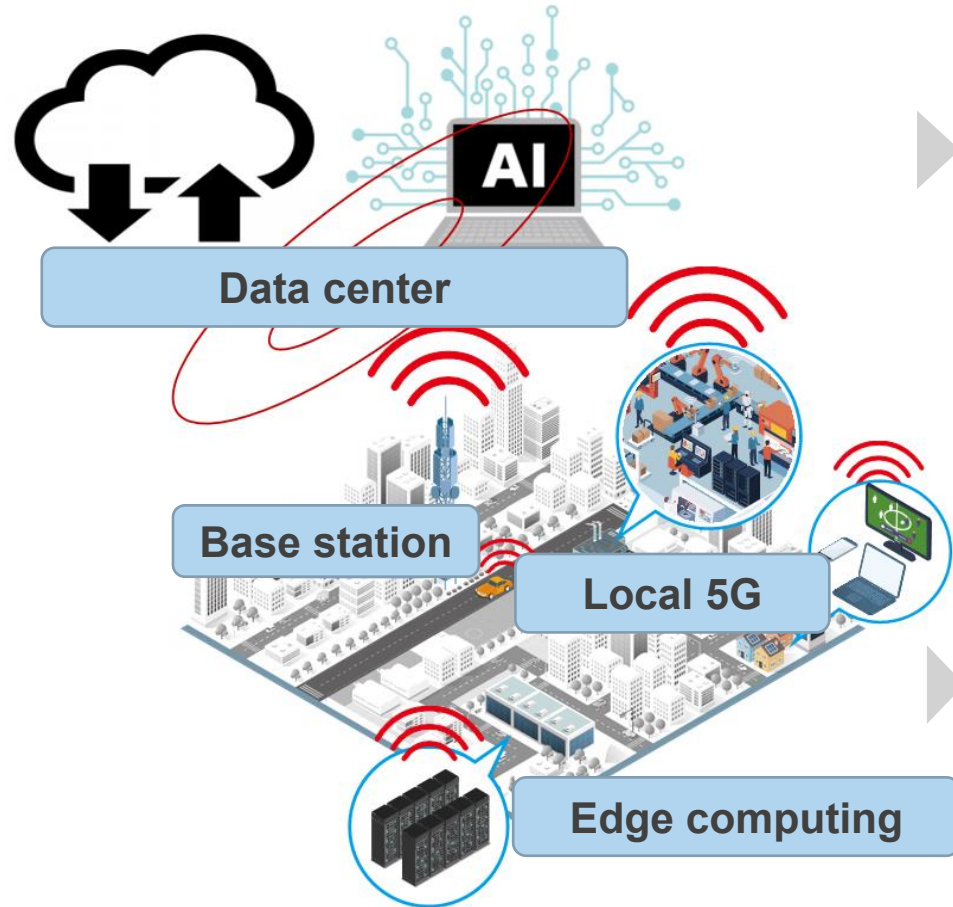


Point

- Although the market for high capacity HDD mainly for data centers has temporarily contracted, demand will remain strong over the medium- to long-term.
- The capacity of each HDD unit continues to increase each year. As a result, there are growing requests for thinner, high quality blanks.
- Continue to respond to customer needs by launching well-differentiated new materials onto the market.

Copper Foil

Develop and launch next-generation copper foil for high frequency circuit boards that reduces transmission loss in the high frequency range



Telecommunications infrastructure market (data centers and base stations)



Mobile device market (smartphones)

As data traffic grows, there is increased need for transmission in the high frequency range

By reducing the copper foil surface roughness, provide copper foil that **“minimizes transmission loss in the high frequency range”**

Increased need for copper foil with good adhesion to plastic and reduced electromagnetic noise in the near field

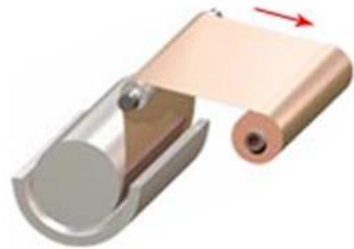
- By optimizing the copper foil surface roughness, develop copper foil with **both “low loss in the high frequency range” and “good adhesion to plastic substrates”**
- **Provide copper foil for electromagnetic shielding that has excellent machinability**

Promote carbon neutrality, and propose copper foil with extremely low environmental impact

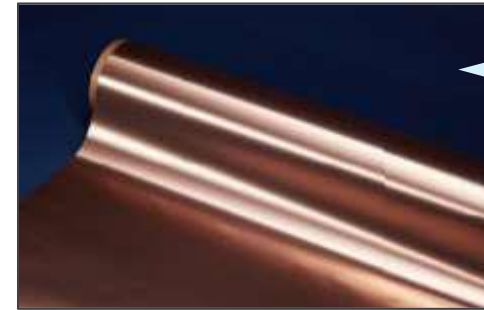
✓ Use 100% recycled copper cable as the raw material



Recycle used copper power cable



Electrolytic copper foil manufacturing process



Copper foil

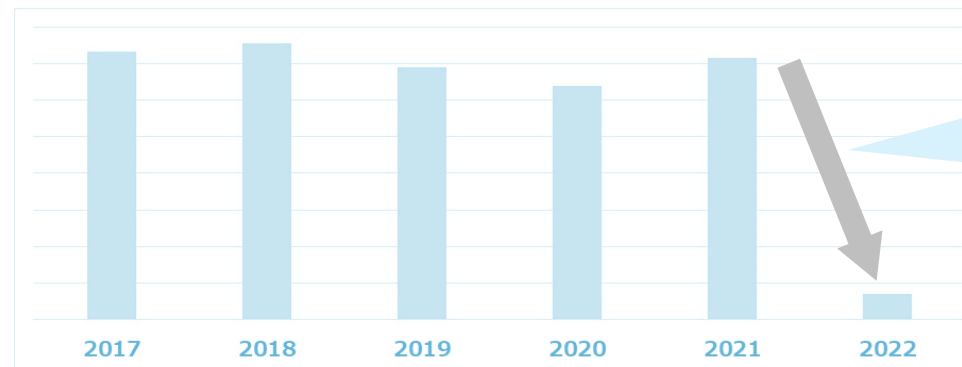
Completed UL Solutions' (US) third party validation based on **UL 2809** recycled content validation (August 2022)

✓ In addition to installing solar power, use electricity substantially derived from renewable energy



Solar power panels

Imaichi Plant (Tochigi Prefecture)



CO2 emissions (Imaichi Plant)

Through the installation of solar power and use of renewable energy, **greatly reduced CO2 emissions** at the manufacturing site in Japan and contributed to increasing the Furukawa Electric Group's "Ratio of renewable energy use to total consumption"

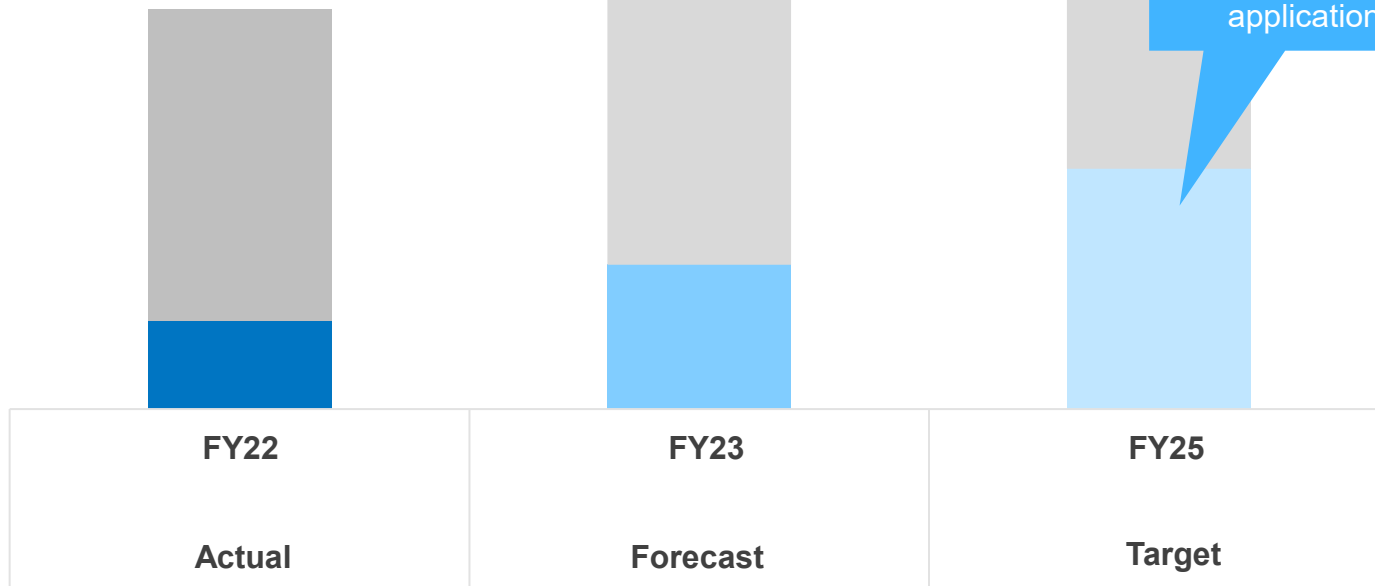
【Copper Foil】 Net sales forecast

Net sales CAGR approx. +7%

Although the markets were stable through the first half, demand greatly declined in almost all markets in the second half

Despite challenging conditions in the first half, expect higher revenue following normalization of orders in the second half

High value added products for high frequency applications



Point

Along with providing well-differentiated products based on a strong awareness of carbon neutrality and copper foil with high reliability and characteristic features to CCL manufacturers, battery manufacturers develop new applications and supply products to new customers.



Copper foil for high frequency applications



Copper foil for printed wiring boards



Copper foil for secondary lithium ion batteries

Thank you very much for your attention

Bound to  ***Innovate***



【25 Mid-term Plan (Road to Vision 2030 –Transform and Challenge-) Basic policy】
 Create in partnership with customers, and provide solutions.
 Leveraging our strengths in proposing and developing products that match customer needs, support the growing telecommunications and social infrastructure markets.

【Business environment, strengths and issues】


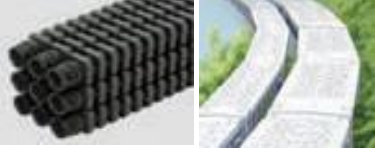
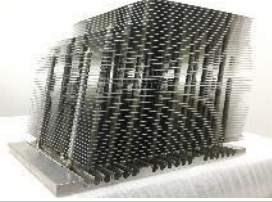
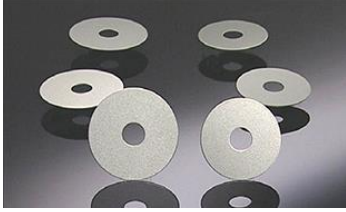

Business environment – Main revenue opportunities	Strengths as a division
<ul style="list-style-type: none"> • Further growth of telecommunications and social infrastructure demand resulting from increased data traffic and more widespread use of 5G • Solving social issues such as SDGs and carbon neutral 	<ul style="list-style-type: none"> • Strong technology development capability and patents for high performance products • Rapid, thorough customer service that combines engineering and sales
Business environment – Main menaces and risks	Issues as a division
<ul style="list-style-type: none"> • Supply instability within the supply chain caused by political factors (including geopolitical risk and war) • Downturn in the global economy caused by a natural disaster, pathogen or virus 	<ul style="list-style-type: none"> • Maintain and improve the design and development capabilities for continuing to generate well-differentiated technology • Optimize the locations with consideration for BCP

【Main strategy for achieving the 2025 Mid-term Plan】

- Continue to develop products aimed at swiftly responding to changing customer requirements, provide electronics products with an awareness of “high performance” and “well-differentiated” to growth markets and support the telecommunications and social infrastructure markets.
- Leveraging the new products directed at Society 5.0 for SDGs and “differentiation” aimed at solving social issues by creating a framework for becoming carbon neutral, contribute to realizing a sustainable society and secure the next-generation profit base.



Appendix – Product overview

	AT* & Functional Plastics *AT: Advanced Technology Tape		Thermal Management Solution & Products	Memory Disk	Copper Foil	
						
Renewable energy		●	●			
Telecommunications infrastructure	●	●	●	●	●	●
Mobility		●	●			●
Main products	<ul style="list-style-type: none"> ● Tape for semiconductor process 	<ul style="list-style-type: none"> ● Protective pipes for cables ● Troughs made from recycled materials ● Insulation materials 	<ul style="list-style-type: none"> ● Copper, etc. heat sinks and heat pipes 	<ul style="list-style-type: none"> ● Aluminum blanks for HDD 	<ul style="list-style-type: none"> ● Electrolytic copper foil for printed wiring boards 	<ul style="list-style-type: none"> ● Electrolytic copper foil for batteries
Main applications	<ul style="list-style-type: none"> ● Surface protection, immobilization, etc. during semiconductor wafer processing 	<ul style="list-style-type: none"> ● Protective pipes for underground cable ● Troughs for holding cables ● Insulation for air conditioning ducts 	<ul style="list-style-type: none"> ● Thermal dissipation and cooling for CPUs, power semiconductors, electronics components, high output LED lighting, etc. 	<ul style="list-style-type: none"> ● HDD for data centers, desktop computers, surveillance cameras, etc. 	<ul style="list-style-type: none"> ● Wiring boards for communications devices and electronic devices 	<ul style="list-style-type: none"> ● Cathode material in lithium ion batteries for electric vehicles, smartphones, power tools, etc.
Main customers	<ul style="list-style-type: none"> ● Semiconductor manufacturers ● Foundry manufacturers 	<ul style="list-style-type: none"> ● General construction companies and subcontractors ● Railroads ● Highway public corporations and road subcontractors ● Air conditioning duct manufacturers 	<ul style="list-style-type: none"> ● Data centers and telecommunications base station operators ● Smartphone and PC manufacturers ● Manufacturers of power conditioners for railroads and solar power ● Lighting equipment manufacturers 	<ul style="list-style-type: none"> ● HDD substrate manufacturers 	<ul style="list-style-type: none"> ● Wiring board material manufacturers ● Lithium ion battery manufacturers 	