

Business Briefing Functional Products Business

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Furukawa Electric Co., Ltd.

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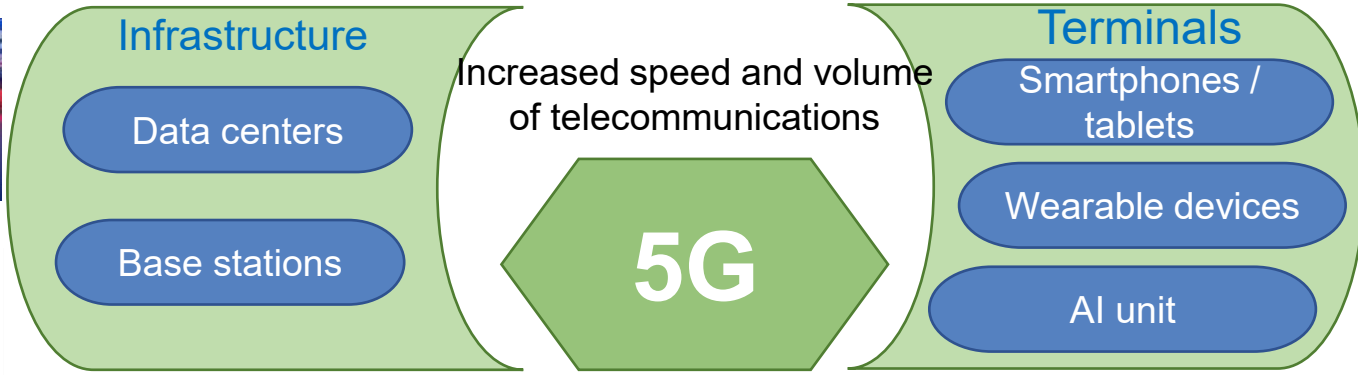
FURUKAWA ELECTRIC CO., LTD.

1. 2025 Mid-term Plan (Road to Vision 2030 -Transform and Challenge-)
 - (1) Basic policy and product lineup for solving social issues
 - (2) Market overview (medium-term)
 - (3) Policy & strategy
 - (4) Net sales & operating income (FY21 actual, FY22 forecast, FY25 forecast)

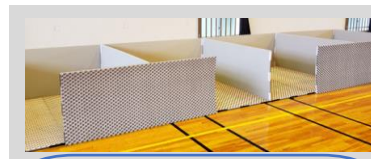
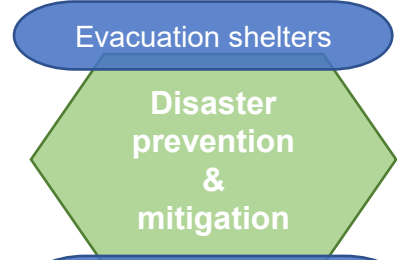
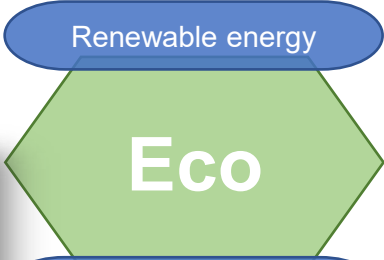
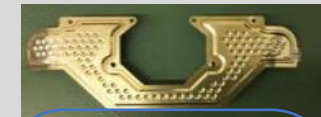
2. FY2022
 - (1) Policy & strategy
 - (2) Business growth, profit improvement measures, net sales forecast
 - AT & Functional Plastics Division
 - Thermal Management Solution & Products Division
 - Memory Disk Division
 - Copper Foil Division

Create in partnership with the customer, and provide solutions

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



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

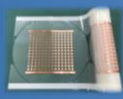


Functional product lineup that supports the growing telecommunications and social infrastructure markets

Tougher infrastructure / Increased data traffic



Tape for 5G next generation devices



Smart cities / high performance troughs



Thermal dissipation products for CPUs



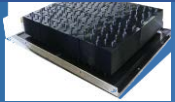
Aluminum HDD blanks



Electrolytic copper foil for printed wiring boards



Carbon-free society / renewable energy



Thermal dissipation for solar power



Troughs for slopes

Clean energy



Nikko hydroelectric power station



Solar power at the copper foil plant

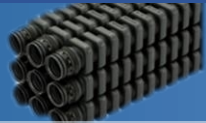


Use of renewable energy at the Imaichi Plant



Use of renewable energy at the plant in the Philippines

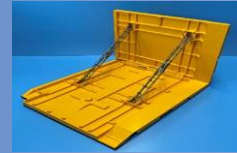
Realize cities that remain functional during disasters / disaster prevention & mitigation



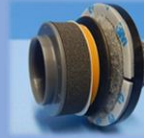
Square EFLEX



Mat for evacuation centers



Folding water barrier

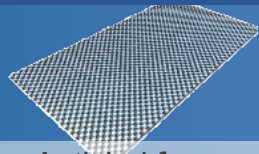


Exterior wall penetration



Moisture activated waterproofing

Safe, peaceful, rewarding society / antibacterial & antiviral



Antiviral foam



UV reflective sheets for disinfection



Desk partitions

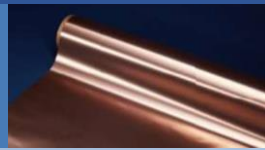


Face shields

Recycling based society / environmental recycling



Green trough



Electrolytic copper foil



EFCELL packaging material



EFCELL office supplies



Foil recycling: EFLEX filler



Social issues

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



7 AFFORDABLE AND CLEAN ENERGY



11 SUSTAINABLE CITIES AND COMMUNITIES



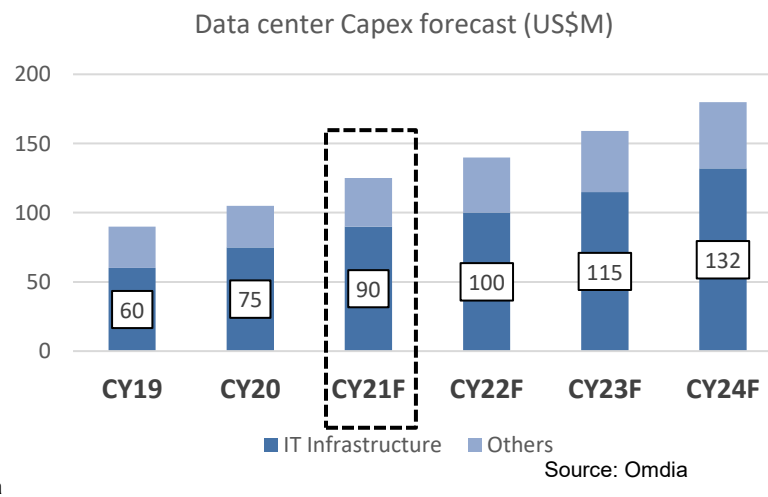
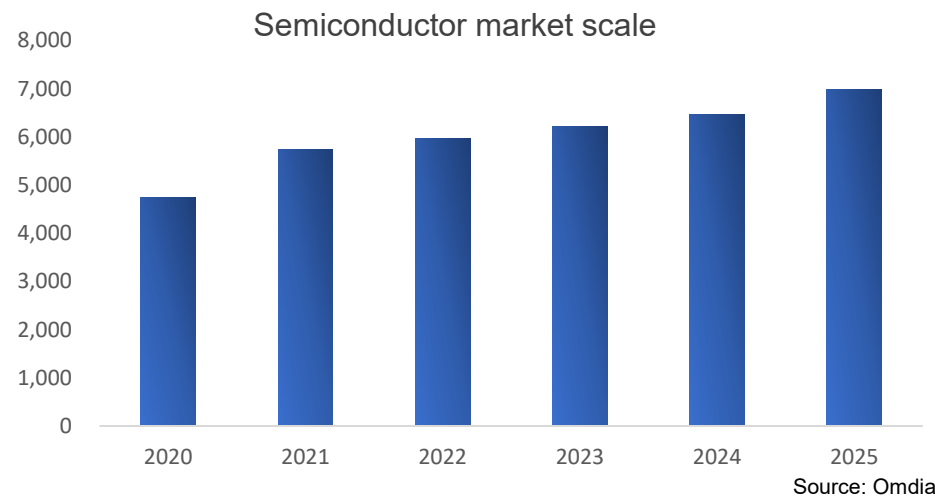
3 GOOD HEALTH AND WELL-BEING



12 RESPONSIBLE CONSUMPTION AND PRODUCTION



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



Functional Products segment

- (1) Continue to develop products in quick response to changing customer requirements, provide electronics products with awareness of “high performance” and “well differentiated” to growth markets and support the telecommunication and social infrastructure markets.
- (2) Contribute to realizing a sustainable society using new products aimed at Society 5.0 for SDGs and “differentiation” aimed at solving social issues by creating a framework for becoming carbon neutral, and secure the next generation profit base.

AT & Functional Plastics business

- 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 business

- 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 in response to water cooling and liquid immersion, and help customers decarbonize, including through energy saving. Work to install clean energy at the main manufacturing sites.

Memory Disk business

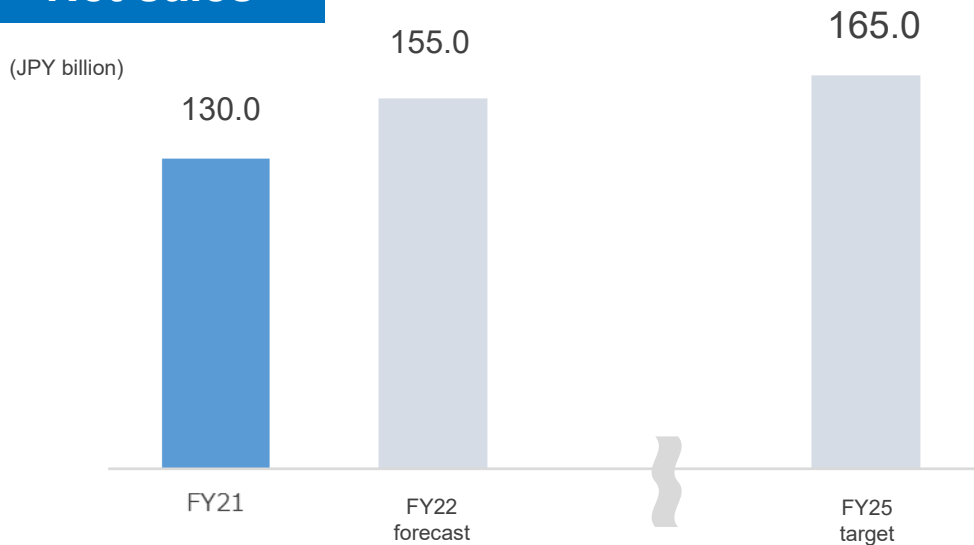
- Based on the technology accumulated over the past 50 years, continue to provide high performance materials to customers.
- Support safe, high quality storage infrastructure worldwide through the customer.

Copper Foil business

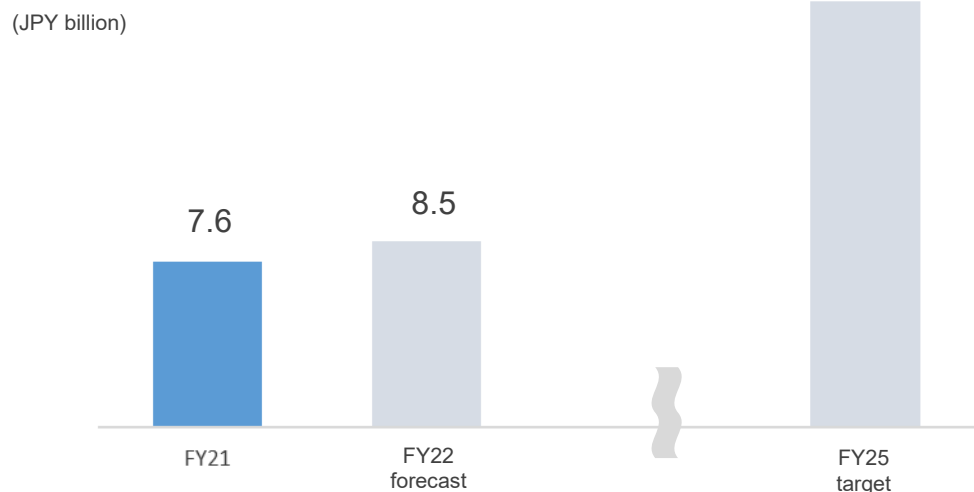
- Along with supplying highly reliable copper foil with characteristic features to CCL manufacturers and battery manufacturers, also supply to new customers in new domains.
- With the aim of developing new applications for electrolytic copper foil, create in partnership with customers in new domains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

2025 Mid-term Plan Net sales and operating income forecast

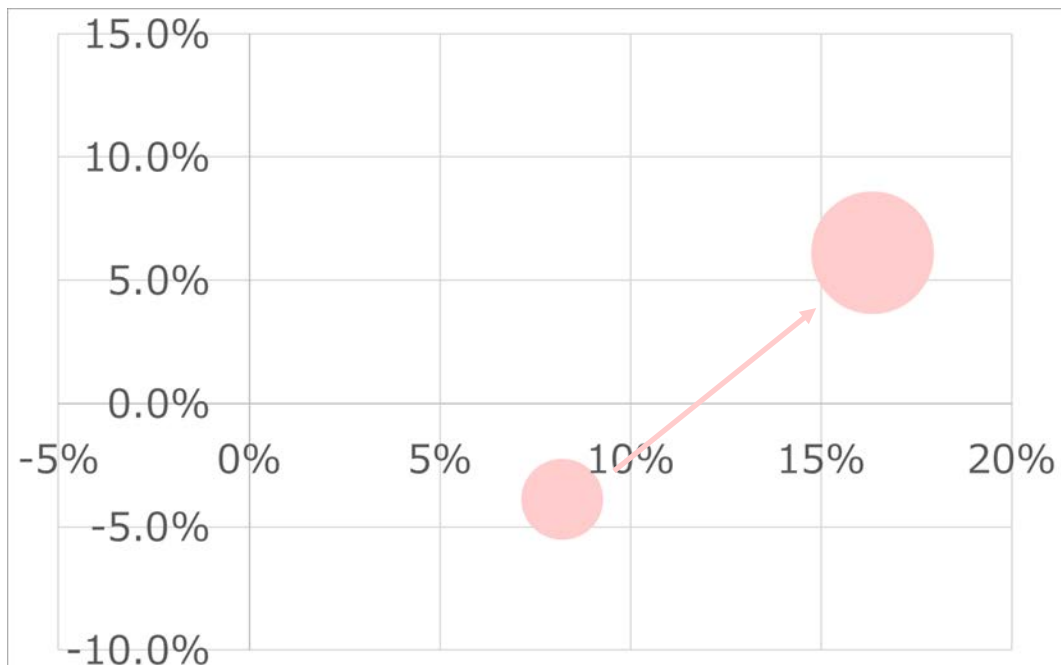
Net sales



Operating income



ROIC (FY21 actual → FY25 target)



Vertical axis: Net sales CAGR (FY17-21→FY21-25)
Horizontal axis: ROIC (FY21→25)
Bubble: NOPAT (FY21→25)

	FY21	FY22 forecast	FY25 target
Average market price of copper (JPY/kg)	1,136	1,260	1,085
Average exchange rate (JPY/USD)	112	120	110

Functional Products segment

In FY2022, continue to achieve growth by acquiring new customers in new domains through “high performance”, “well-differentiated” products for the robust markets. Also, in response to the soaring raw material prices, fuels costs and transportation expenses, obtain the customer’s understanding and fully incorporate those costs into the sales price.

AT & Functional Plastics business

- Based on experience in conforming to the specifications for cutting edge process projects for the issue of heat generation and thinner wafers, increase sales by further expanding the products and acquiring new projects.
- Increase sales through expansion into new domains and applications that utilize the group’s next-generation infrastructure and foam technology.

Thermal Management Solution & Products business

- 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 business

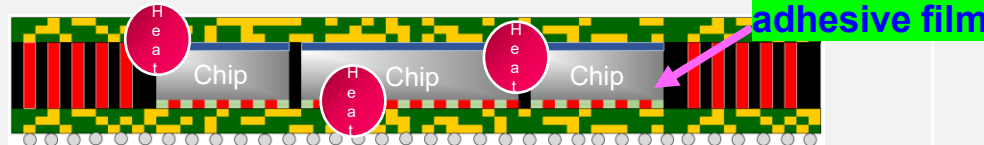
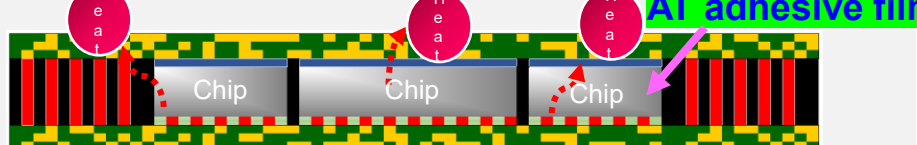
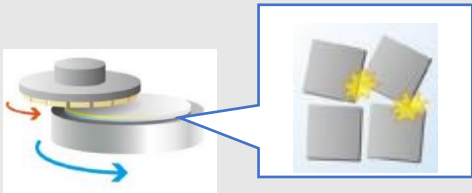
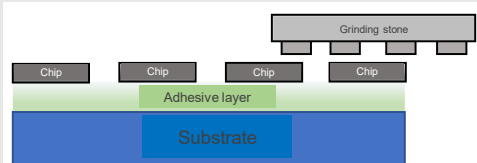


- Following the need to thinner blanks, aim to continue launching well-differentiated new materials onto the market.
- Increasing sales volumes of the high value added thin blanks is KSF in both the short and medium term, and continue to increase orders.

Copper Foil business

- By increasing new value as a true partner to new customers in addition to existing customers, enhance the added value and competitiveness of the products.
- Based on a strong awareness of carbon neutral, install renewable energy, and actively work to achieve energy saving.

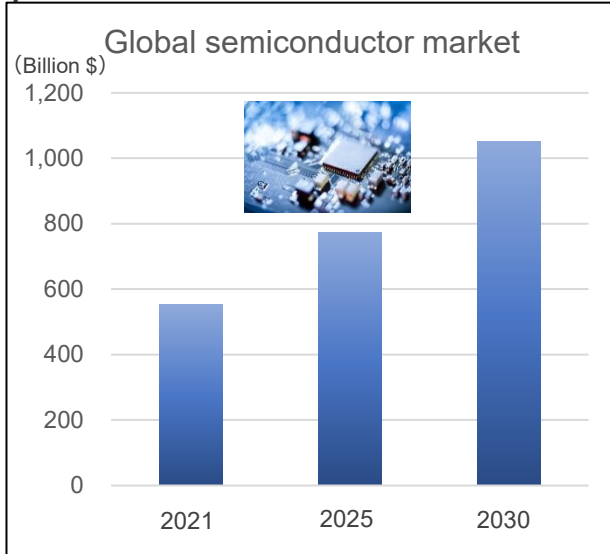
Contribute to the further evolution of semiconductors through technology for adhesive material design and monozukuri



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>Heat generated from increased chip density builds up in the package and reduces performance</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 3D 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> 

Business environment

- Medium to long-term demand growth in the semiconductor market
- Increased requirements for lower environmental impact



※Estimate by Furukawa Electric

【Market changes and technology issues】

- More heat generated from the wiring due to higher densities
- Thinner wafers as a result of 3D stacking in response to increased data volume
- Use of FOWLP packages that enable increased chip density and high speed transmission is becoming more widespread
- = Trend toward ultra-high bumps

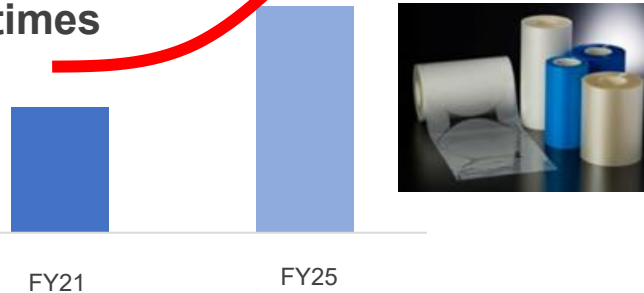
*FOWLP=Type of semiconductor package that requires minimal space when attaching individual highly integrated semiconductors to the printed wiring board

Business strategy

Continued semiconductor demand growth

⇒Secure a stable supply network

Increase sales 1.8 times



Device & process advancements
Enhance the strengths in technology & MONOZUKURI

⇒Continue to provide high performance / well differentiated products

Adhesive, thermal conduction, base film design

Initiatives for realizing the strategy

Expand production capacity

CAPEX: Approx. JPY 7.0 bil. (FY22-FY25)

Start construction in Sep. 2022 with mass production planned to start in April 2025

- ※ Implement measures to reduce environmental impact
- Waste heat collection
- Solar power



New building and manufacturing line at the Mie Works

Response to technology issues

- Heat generation
 - Dissipate heat from the semiconductor chip using adhesive film with good thermal conductivity
- Thinner wafers
 - Optimize the conditions to prevent chipping by controlling the base film and adhesive properties
- Ultra-high bumps
 - Achieve excellent contour fit for ultra-high bumps

Contribute to building next-generation infrastructure

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



11 SUSTAINABLE CITIES AND COMMUNITIES



Launch new products using foam technology for new markets and higher performance products

Contribute to next-generation infrastructure Total route design through systemized conduits

Square EFLEX EFLEX Through Plastic HH Trough bridge for slopes



Short-length EFLEX



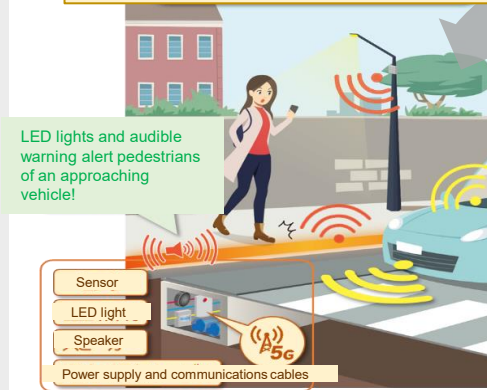
Connector materials



Promote total route design through systemized conduits that suit a wide range of installation locations (underground, above ground, slope, etc.)

Higher performance such as supporting heavier loads

Roads that connect pedestrians and vehicles
Intelligent sidewalks

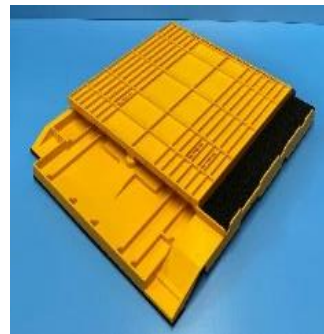


High performance troughs



Develop new market applications using foam technology

Folding water barrier



Mat for evacuation centers



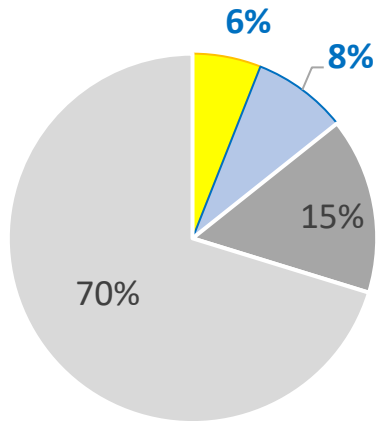
Higher frequency through technology for reducing air bubble size

High frequency circuit board

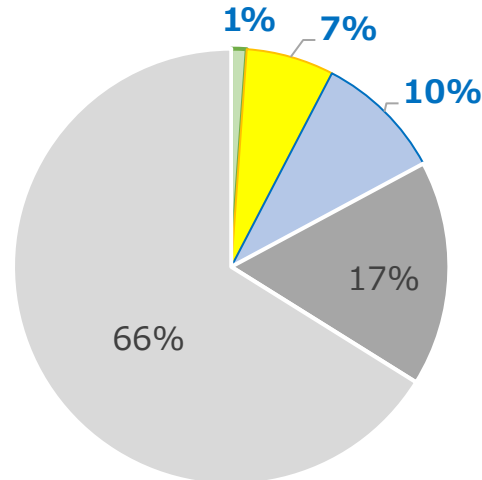


【AT & Functional Plastics】 Net sales forecast

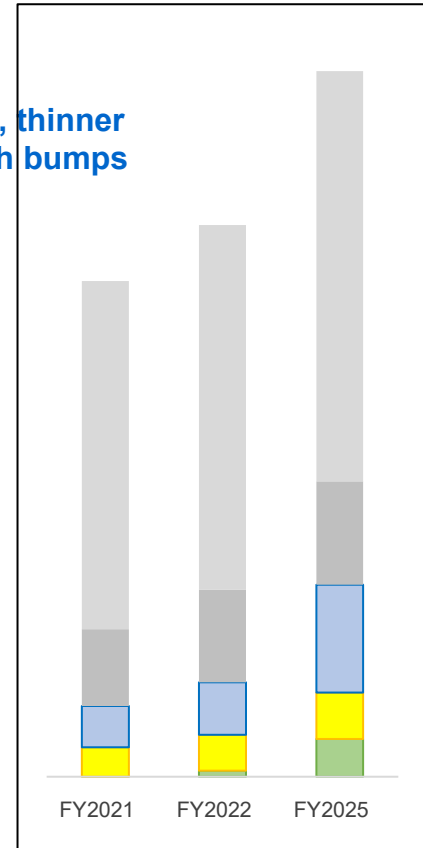
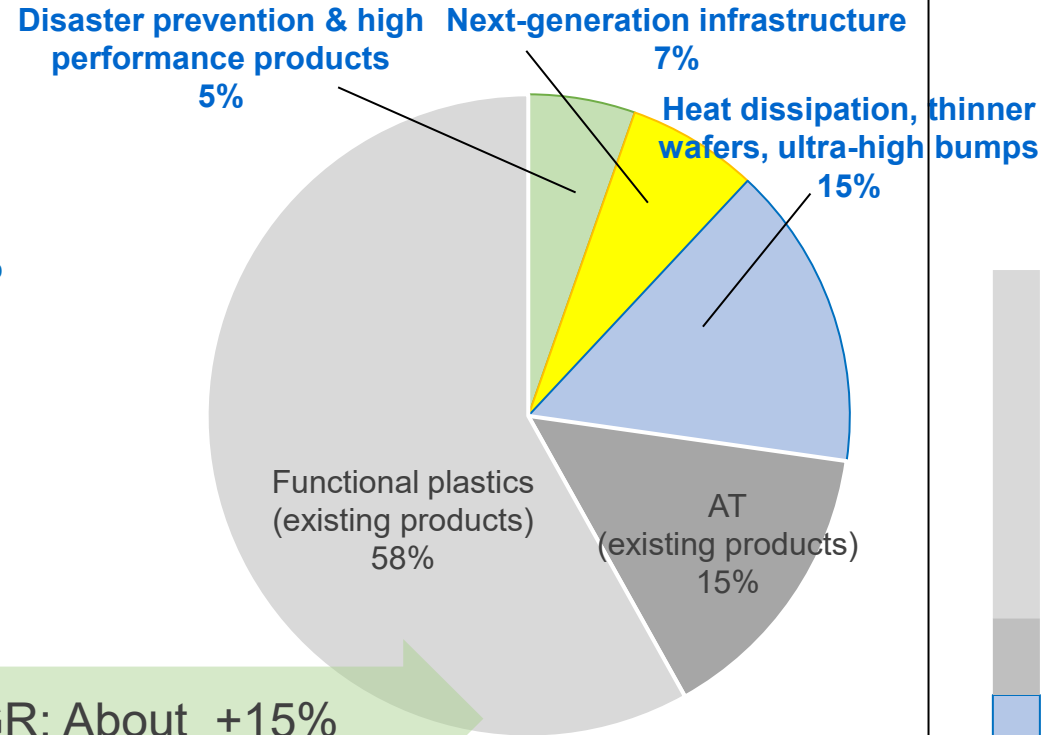
FY2021 Actual



FY2022 Forecast



FY2025 Plan



【AT】

Net sales CAGR: About +15%

【Functional Plastics】

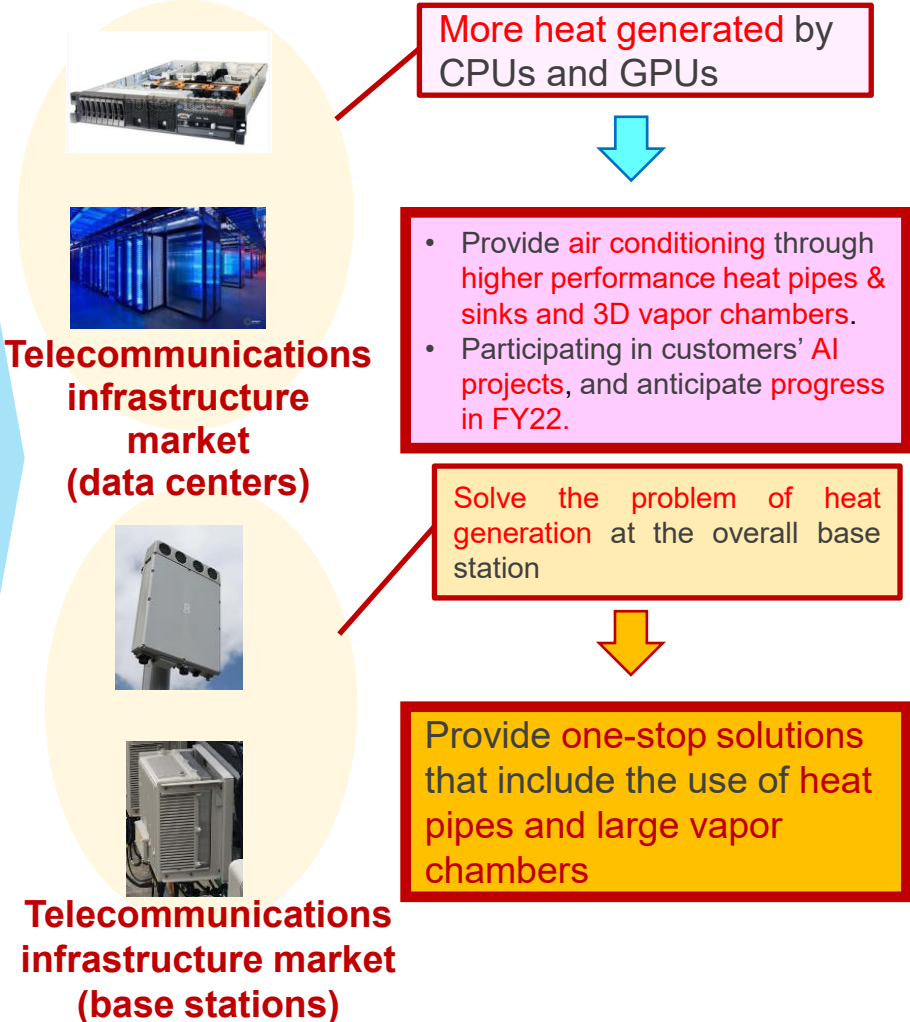
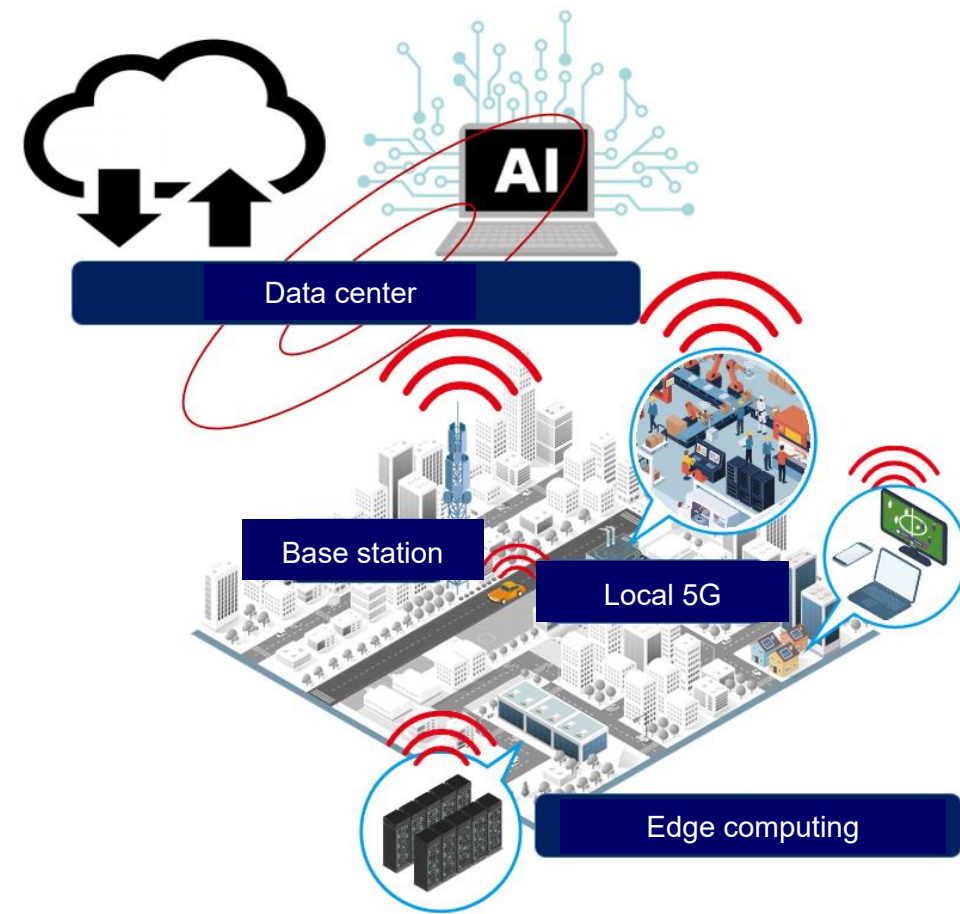
Net sales CAGR: About +5%

Point

AT will focus on cutting edge semiconductor processes, and functional plastics will focus on increasing net sales in the businesses that provide solutions for safety and security.

【Thermal Management Solution & Products】 Future outlook **FURUKAWA ELECTRIC**

- Telecommunications infrastructure needs will increase as data traffic grows. There is expected to be particular advances in AI projects in FY2022
- Install clean energy at the main production site (FTL in the Philippines), and reduce CO2 emissions



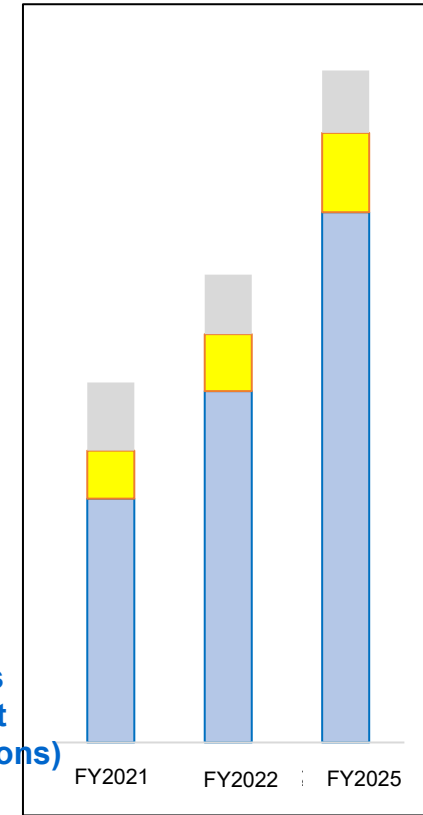
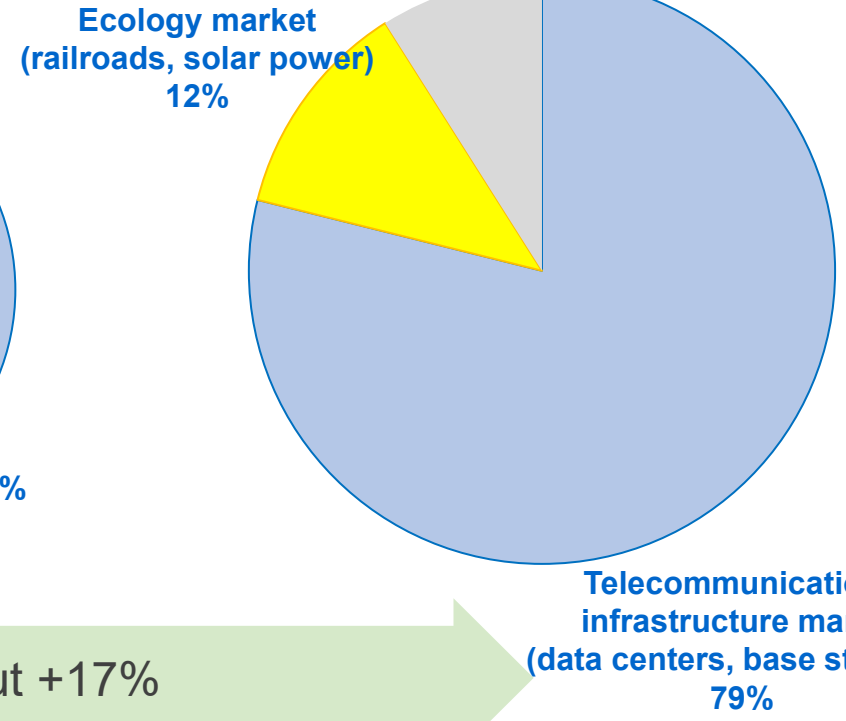
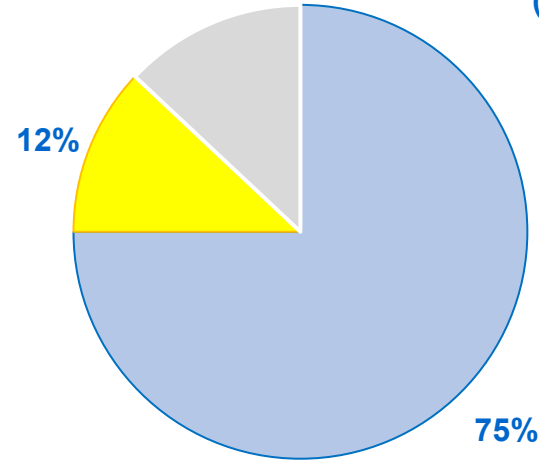
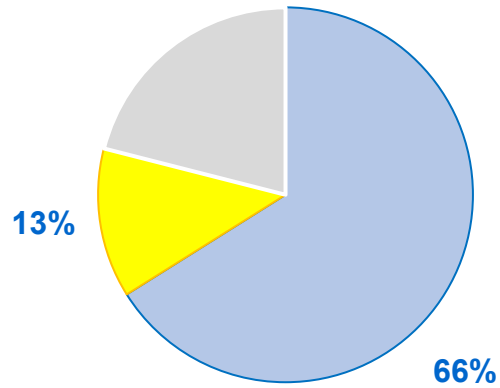
- Install clean energy at the main manufacturing site (FTL) of products for the data center market.
- About 50% has already been installed, and planning 100% completion by the end of FY22.

【 Thermal Management Solution & Products】 Net sales forecast

FY2021 Actual

FY2022 Forecast

FY2025 Plan



Net sales CAGR: About +17%

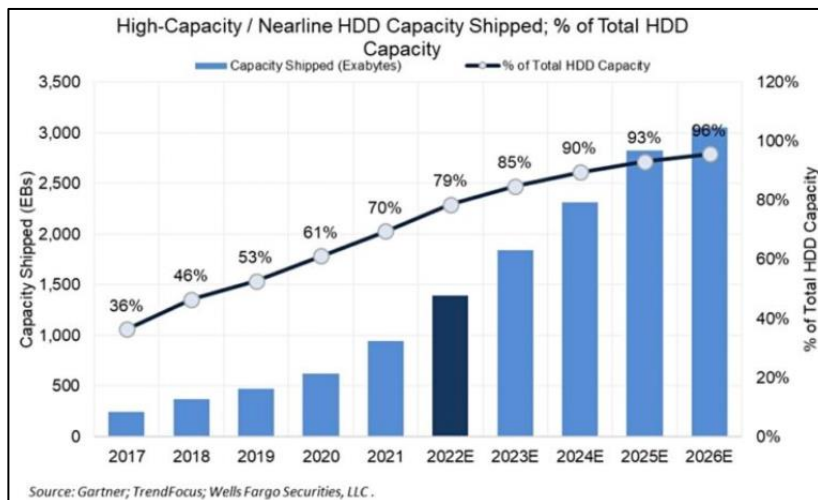
Point

In FY2022, in the data center market, increase profits by participating in customers' AI projects that are expected to be in high demand by multiple domains including the finance, medical and retail. From FY2023, continue to increase profits by providing well differentiated products and services in the growing telecommunications infrastructure market.

【Memory Disk】 Future outlook

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】



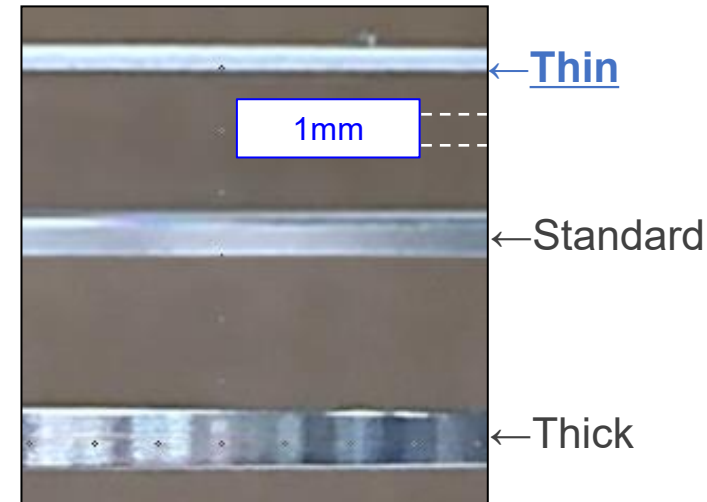
In 2025, total shipped capacity of high capacity HDD is expected to double compared to today

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

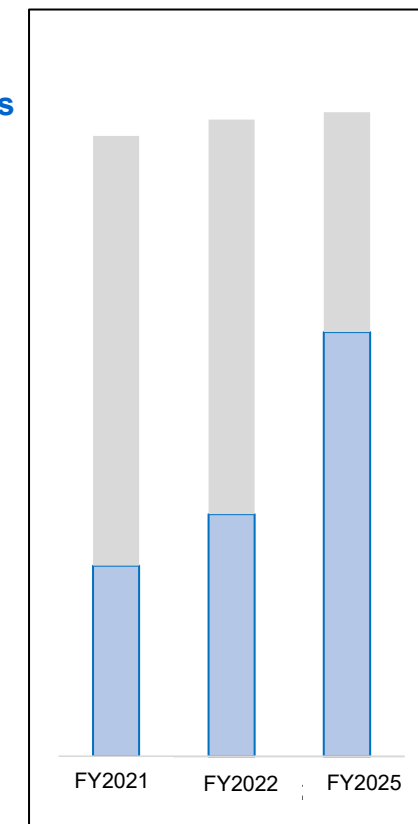
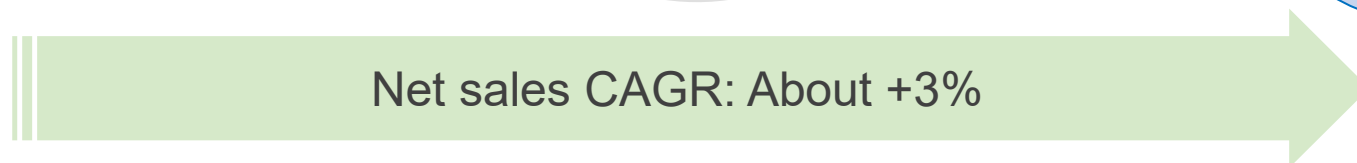
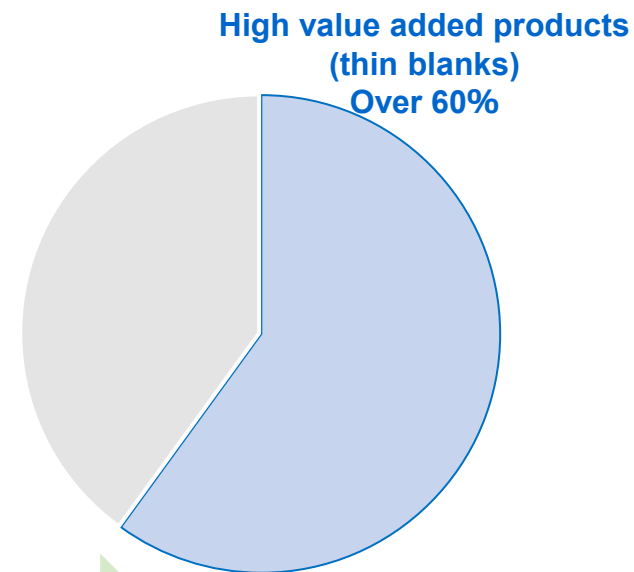
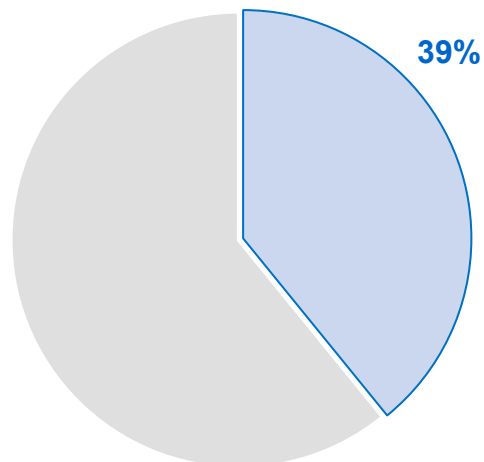
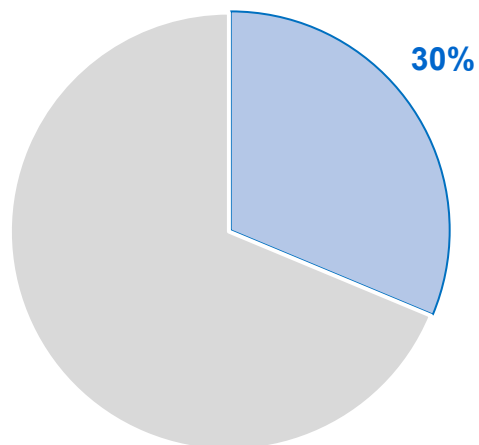
- ✓ As data volume increases, HDD will continue to be equipped with more disks per unit
- ✓ In order to increase the number of disks, each disk will need to be thinner
- ✓ Respond to the customer need for thinner, and fulfill market expectations by launching well-differentiated new materials

【Memory disk】 Net sales forecast

FY2021 Actual

FY2022 Forecast

FY2025 Plan

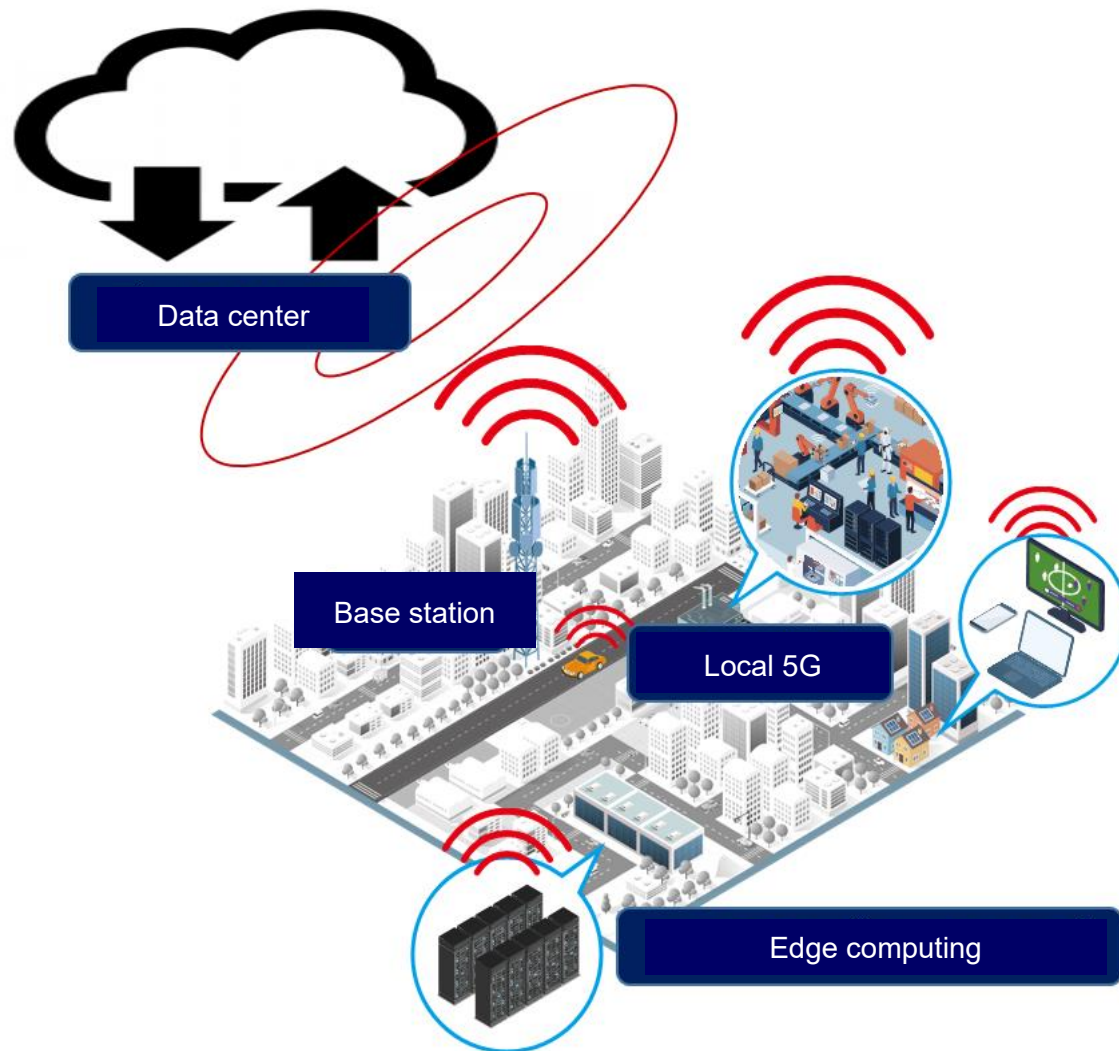


Point

Market for high capacity HDD remains strong mainly for data centers, and as the capacity of each HDD unit continues to increase, the blanks need to be thinner. Continue to respond to customer needs by launching well-differentiated new materials onto the market.

【Copper Foil】 Future outlook

Develop and market next-generation copper foil for high frequency circuit boards that reduce transmission loss in the high frequency area



As data traffic grows, transmission in the high frequency range is becoming increasingly required



Telecommunications infrastructure market
(Data centers and base stations)

Through copper foil with reduced surface roughness, provide copper foil that “minimizes transmission loss in the high frequency range”



Mobile device market
(smartphones)

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

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

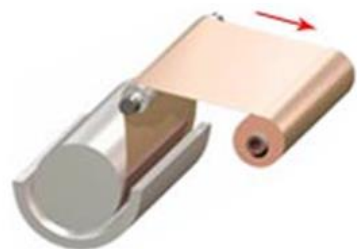
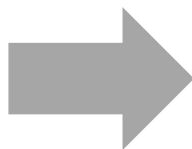
【Copper Foil】 Initiatives for becoming carbon neutral

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

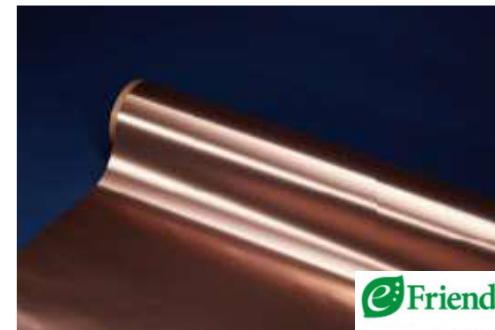
Raw material is 100% recycled copper cable



Used copper power cable



Electrolytic copper foil manufacturing process

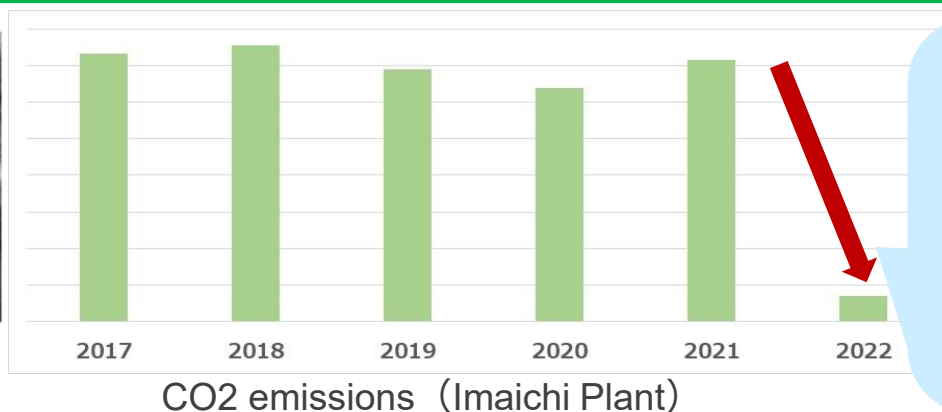


The e-friendly mark

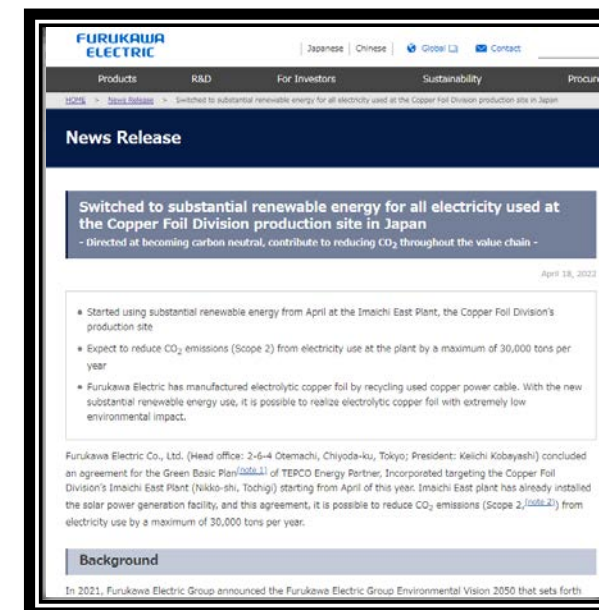
In addition to installing solar power, started using electric power generated by renewable energy



Imaichi Plant

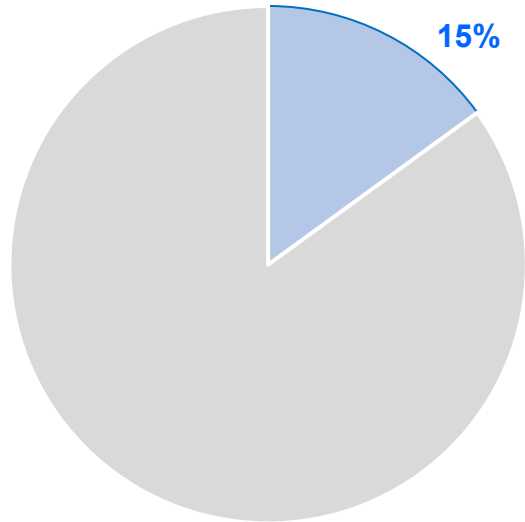


Through the proactive installation of solar power and use of renewable energy, greatly reduced CO2 emissions at the manufacturing site in Japan

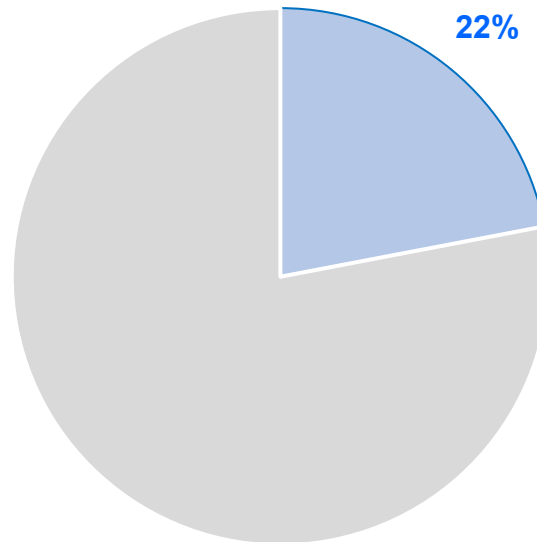


【Copper Foil】 Net sales forecast

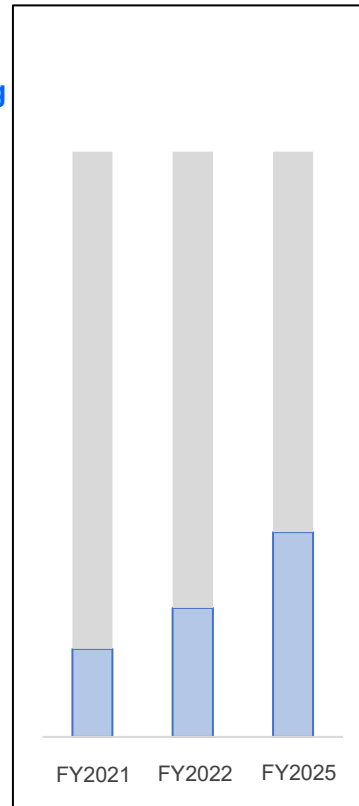
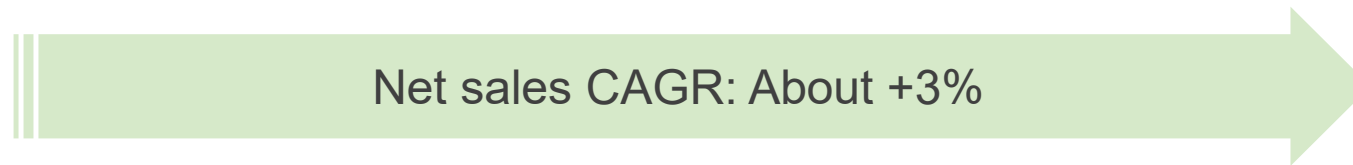
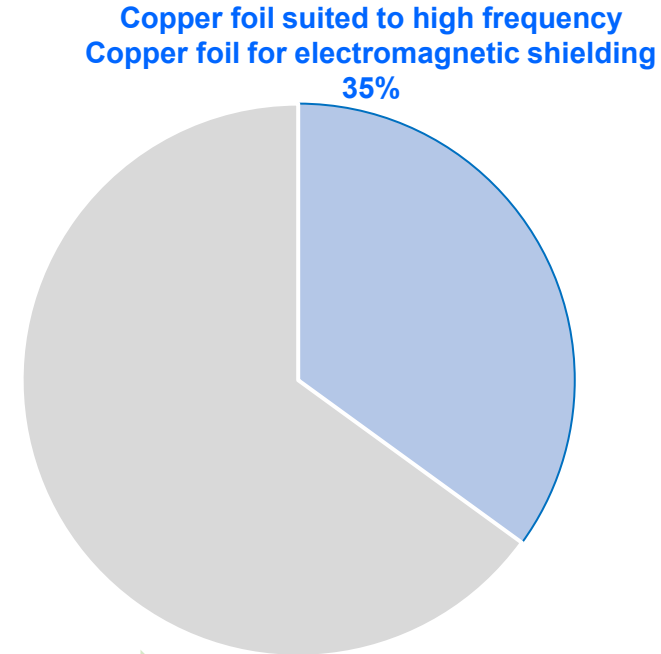
FY2021 Actual



FY2022 Forecast



FY2025 Plan



Point

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

Thank you very much for you attention.



Appendix – Business overview



【2025 Mid-term Plan (Road to Vision 2030 -Transform and Challenge-) Basic policy】
 Create in partnership with customers, and provide solutions.
 Using our strengths in proposing and developing products that match customer needs, we will support the growing telecommunications and social infrastructure markets

【Business environment, strengths and issues】




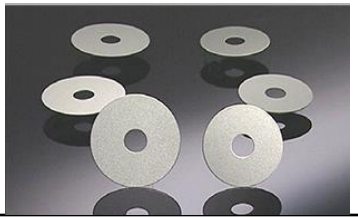

Business environment – Main revenue opportunities <ul style="list-style-type: none"> Telecommunications and social infrastructure demand will continue to grow resulting from increased data traffic and more widespread use of 5G Solving social issues such as SDGs and carbon neutral 	Strengths as a division <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 menace and risks <ul style="list-style-type: none"> Supply instability within the supply chain caused by political factors (including geopolitical risk and war) Disruption to the global economy caused by a natural disaster, pathogen or virus 	Issues as a division <ul style="list-style-type: none"> Maintain and improve design/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 】

- We will continue to develop products aimed at swiftly responding to changing customer requirements, provide electronics products to growing markets based on an awareness of “high performance” and “differentiation” and support the telecommunications and social infrastructure markets.
- Leveraging the products directed at Society 5.0 for SDGs and “differentiation” directed at solving social issues by creating a framework for becoming carbon neutral, we will contribute to the realization of 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 	