

Business Briefing Electronics & Automotive Systems business

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FURUKAWA ELECTRIC CO., LTD.

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

Information in these statements reflects assumptions about such variables as economic trends and currency exchange rates.

Forward-looking statements incorporate known and unknown risks as well as other uncertainties that include, but are not limited to, the following items.

- Economic trends in the U.S., Europe, Japan and elsewhere in Asia, particularly with regard to consumer spending and corporate expenditures.
- Changes in exchange rates of the U.S. dollar, euro, and Asian currencies.
- Furukawa Electric Group’s ability to respond to rapid advances in technology.
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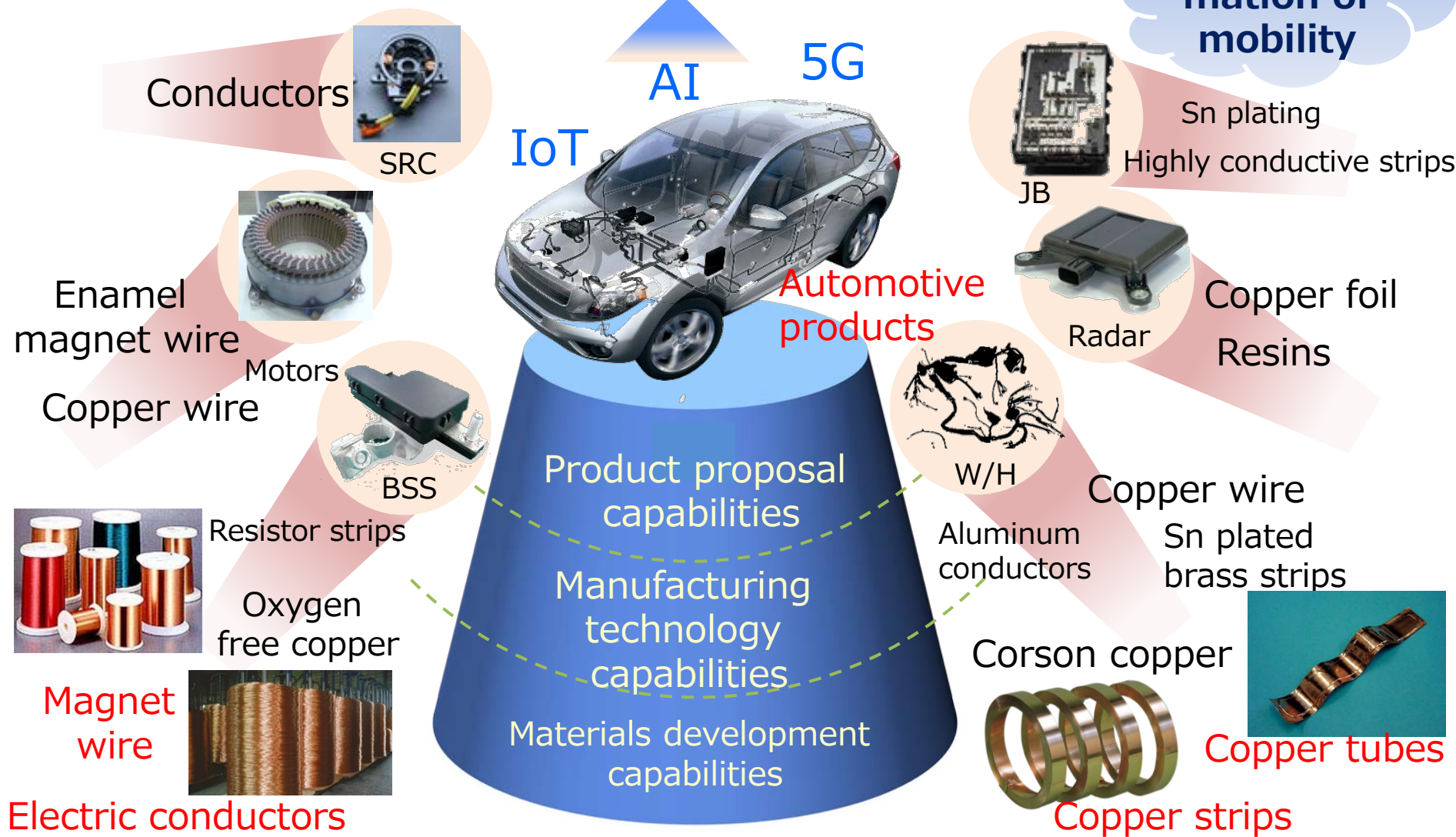
FURUKAWA ELECTRIC CO., LTD.

- 【 I 】 Strengths of the Electronics & Automotive Systems business**
- 【 II 】 Trends in the major markets**
- 【 III 】 Initiatives for improving earnings and growth**
- 【 IV 】 Response to the automotive and electronics markets**
- 【 V 】 Response in the Magnet Wire business**
- 【 VI 】 Future of the key products**

Increase the value of the Electronics & Automotive Systems (utilize the materials capabilities)



Transformation of mobility



As a result of increased opportunities to share information and knowledge as a result of IoT & AI and **vehicle electrification** & **autonomous driving** in the automotive market, the **market** for communications devices, sensors, control devices and passive components is **expanding** and the **materials are required to have various characteristics**



Automotive market

- Environmentally friendly vehicles are forecast to increase worldwide by **about 3.3 times in 2025 compared to 2018**
- Demand for in-vehicle electronic components (motors, inverter, batteries) will increase
- Initiatives for “safety” (autonomous driving) and “lightweight” will accelerate, and the demand for radar and lightweight wire harnesses will be firm



Electronics market

- The scale of the market for communications devices, sensors, passive components, control devices, etc. will be about **1.6 times larger in 2025 compared to 2018**
- As a result of the needs in relation to 5G, IoT and AI, new device products will successively be launched onto the market
- Metallic conductors will be used for the communications and electric power supply in consumer devices, and **the use of high performance copper materials, such as high strength, high conductivity and high bendability will increase**



Initiatives for improving earnings

● 2018

● 2019

● 2020



4G

ADAS



5G

Connected
Autonomous
Shared & Services
Electric

- ✓ 2019 will be a transition year for smartphone related demand ahead of the full-scale introduction of 5G
- ✓ In-vehicle electronic devices for ADAS following advancements in autonomous driving will provide underlying support

➤ Initiatives

Respond to the low margin businesses

Withdraw from the refrigerant pipe business (Okamura Metals)

Withdraw, downsize or increase prices for unprofitable products

- Downsize / withdraw from phosphor bronze
- Increase the price for pure copper and brass

Transform & strengthen

Strengthen competitiveness

Expand and shift to high value added products

- Expand sales of functional products (automotive)
- Promote sales of new alloys (high performance connector strips, NT alloy)

Strengthen the organization (cost competitiveness / productivity)

- Increase production at overseas locations
- Promote manufacturing automation

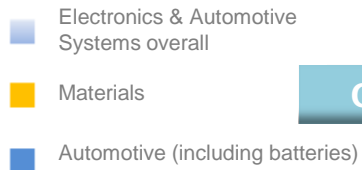
Electronics & Automotive Systems business – FY2019 initiatives

【Policy】

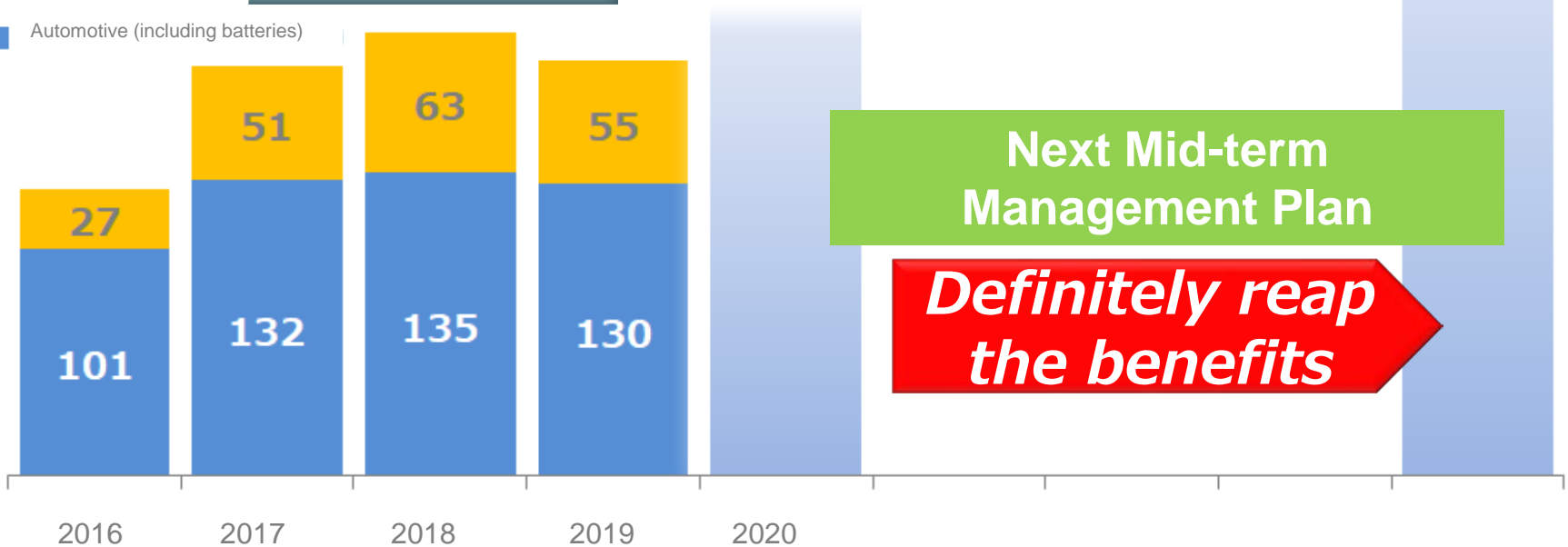
- ✓ Transform and strengthen the business
- ✓ Strengthen cost competitiveness
- ✓ Respond to low margin businesses
- ✓ Strengthen downstream & components businesses

【Initiatives】

- Expand the Philippines site directed at increasing wire harnesses for North America
- Expand production capacity of aluminum wires for wire harnesses
- Acquire new orders for the next generation high precision radar
- Improve the product mix and increase productivity
- Promote sales of original alloys (high performance connector strips, etc.)
- Expand the vehicle models using the automotive magnet wire and promote sales in overseas markets



Operating income



Next Mid-term
Management Plan

*Definitely reap
the benefits*

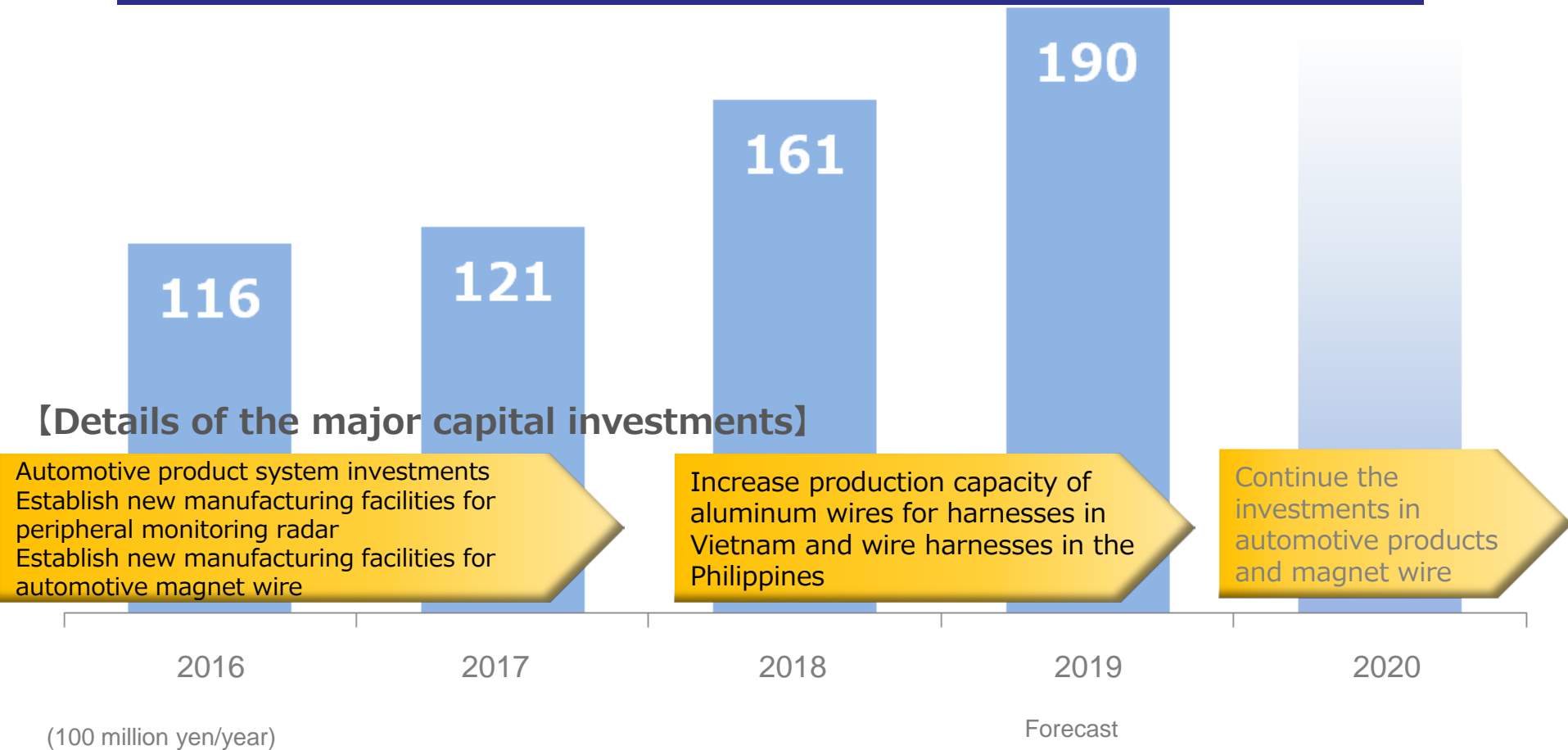
(100 million yen/year)

Forecast

From FY2019, the superconductor business was transferred from the Electronics Component Materials segment to the Service and Developments, etc. segment

Initiatives for growth (capital investments)

- Actively invest in components and materials for the automotive market
- Continue the projects aimed at strengthening the organization, including increasing productivity and rationalization
- Implement the BCP project in a planned manner



Market

Automotive

Trends

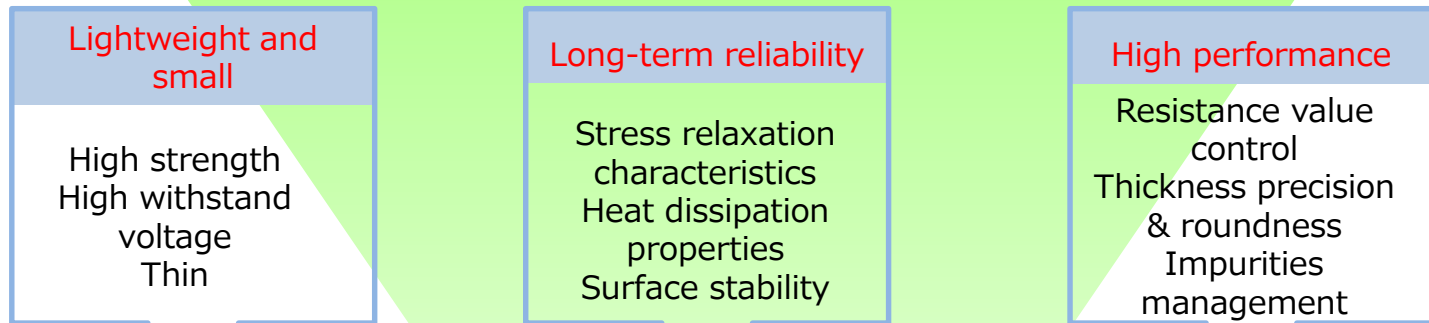
As a result of the requirements for **lightweight and small** in relation to the hybrid systems, which will become mainstream, advanced electronic control will be introduced, and the components will need to have further **long-term reliability**. Also, **high performance** sensing components will be essential for ADAS*.



*Advanced Driver-Assistance Systems

Needs

Requirements



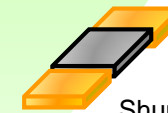
Strengths of Furukawa Electric



[Materials]



Anti-corrosion (α) terminal



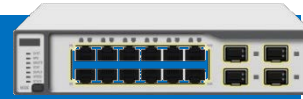
Shunt resistance

- High withstand voltage rectangular wire HVWW[®]
- High performance vehicle terminal strips (FAS series)
- Aluminum electrical wires
- High purity copper (oxygen free copper)
- High performance vehicle terminal strips (FAS series)
- Thermal resistance reflow tin plated strips
- Resistance materials (strips & wires)
- Enamel rectangular wire
- Copper foil

Utilize the strengths in components and materials, and develop the market through strategic solutions

Market

Electronics



Trends

With the full-scale introduction of 5G, **thermal control** will become an issue for all devices from data centers to mobile terminals. Also, the **modularization** (unification of devices) of components will accelerate, and strict **EMS* control** will be necessary.



*EMS: Electro Magnetic Susceptibility

Needs

Thermal control

Thermal dissipation
Thermal conductivity

Modularization

High strength / highly processed

Thinner

EMS control

Non-magnetic
Insulation
Deep drawing

Requirements

Stress relaxation characteristics

Support high frequencies

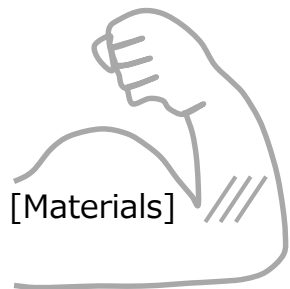
Strengths of
Furukawa
Electric



- High purity copper (oxygen free copper, GOFC)
- Heat pipes (copper tubes)
- Highly conductive connector strips (EFTEC-550, 700)

- High performance connector strips (EFCUBE)
- Ribbon wire
- Strips and wires with various plating

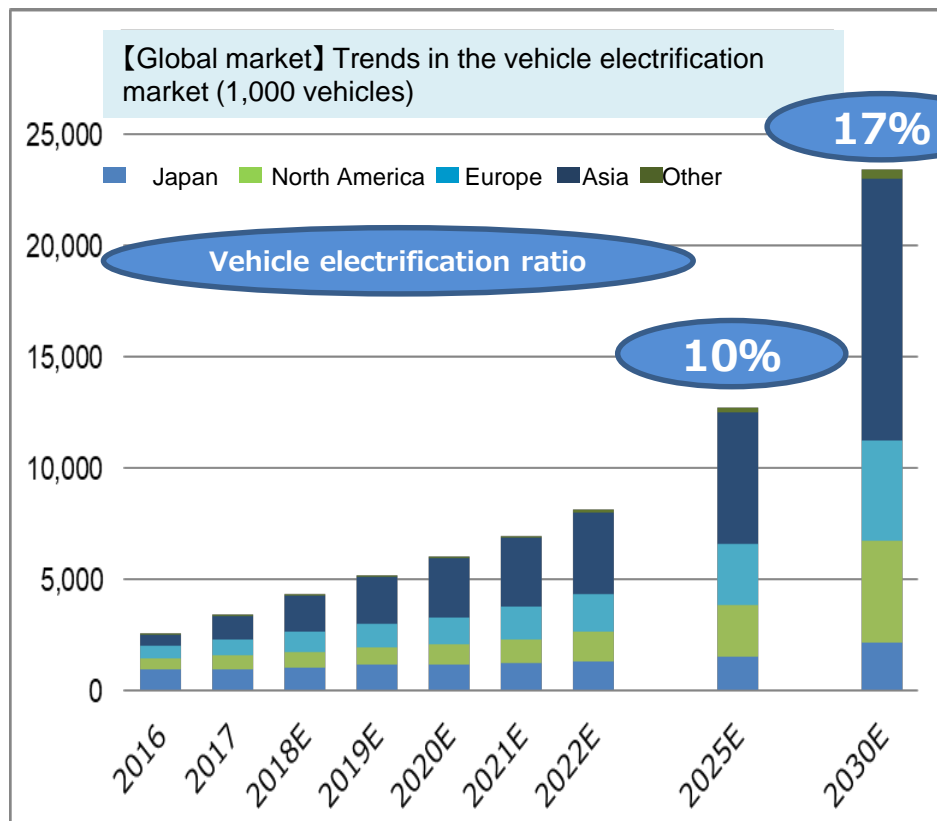
- Lead frame strips (EFTEC-64T, MF202)
- 3 layer insulated wire (TEX)
- High performance connector strips (EFTEC-97)



[Materials]

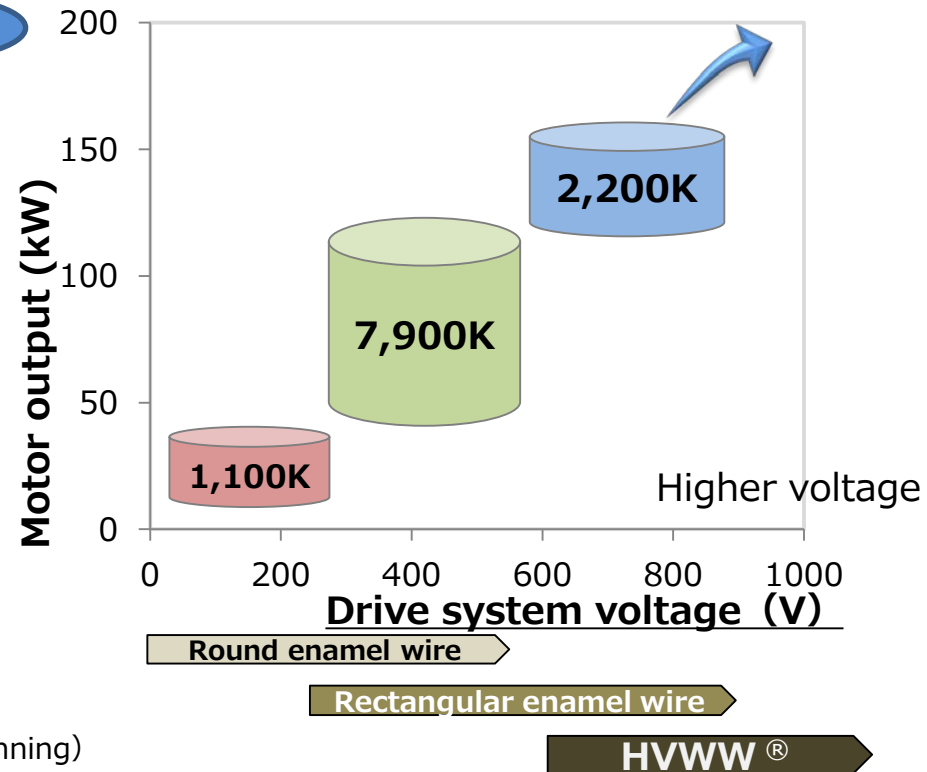
Develop new markets through value proposals and the development of materials that satisfy the market needs

Response in the Magnet Wire business FURUKAWA ELECTRIC



(Source: FY2019 Edition by Sogo Planning)

Motor characteristics and market size (2025)



Market growth in Europe and China HVWW® for ultra high voltages

Europe market: Strengthen the sales activities through the local company (EFMWE*) directed at mass production

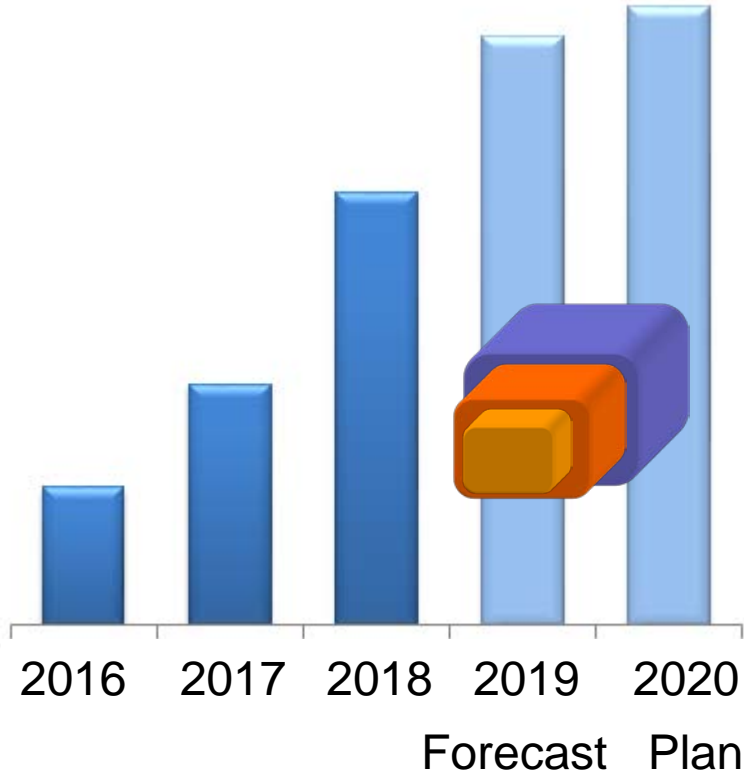
There have been many inquiries, and multiple orders have been received

China / North America market: Looking into strengthening and expanding the cooperative venture with Superior Essex (Start technical support in some areas)

*EFMWE : Essex Furukawa Magnet Wire Europe (Germany, Bad Arolsen)

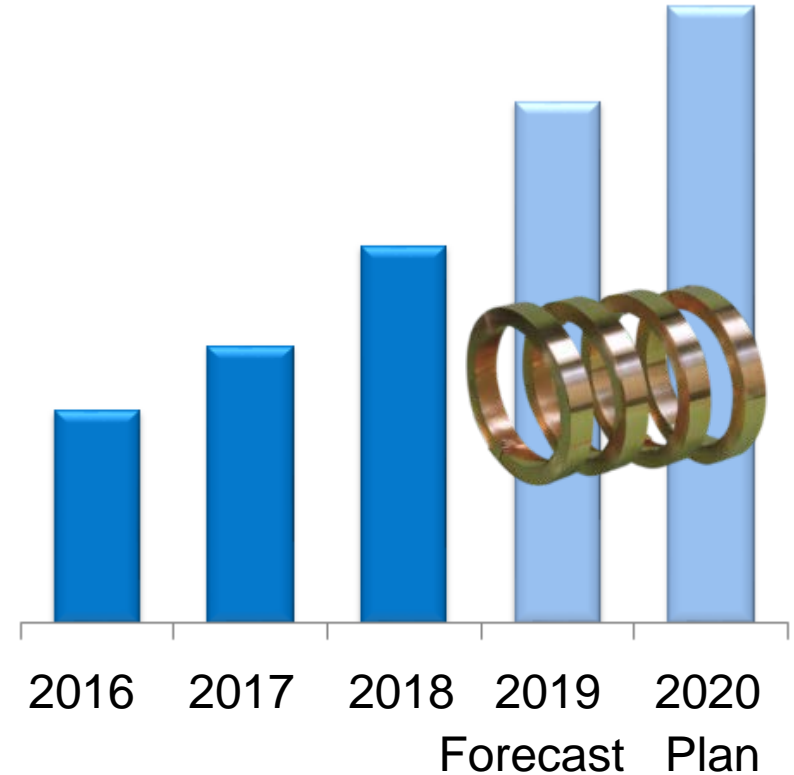
Future of the key products

【Magnet wire】 Sales volume High
withstand voltage rectangular wire



2nd generation HVWW®

【Copper strips】 Profits High value
added products



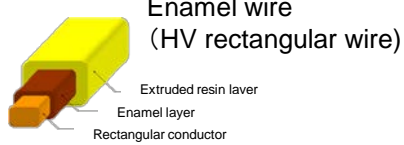







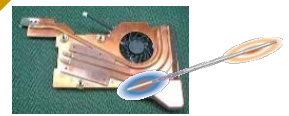

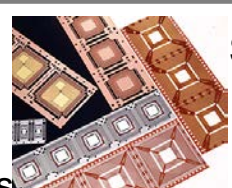





Lead frame strips, highly conductive/ high performance connectors, resistance materials, etc.

In addition to market growth, contribute to profits through product design and development, and cultivate new markets

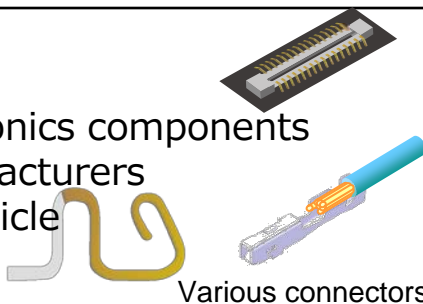

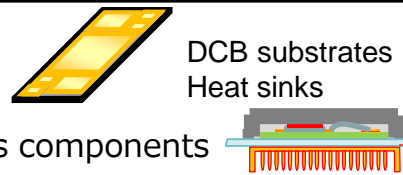
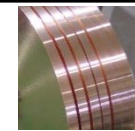
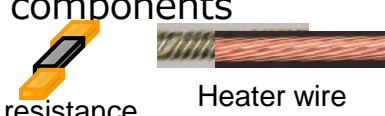

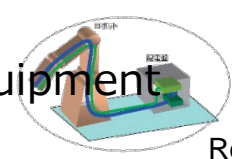



Thank you very much
for your attention.



Main products in the Electronics Component Materials business

Markets			Applications		Main products	
Automotive	Electronics	Infrastructure	 <p>Enamel wire (HV rectangular wire)</p>	 <p>Ribbon wire</p>	Copper wire	
			 <p>Wire harnesses</p>	 <p>Cable</p>		
			 <p>Target (Backing plate)</p> <p>Power semiconductors</p>	 <p>Copper tubes</p>		
			 <p>Super conducting wires</p>	 <p>Heat pipes</p>	Oxygen free copper	
			 <p>Semiconductor frames</p>	 <p>SRC conductors</p>		
 <p>Harness terminals</p>	 <p>Anti-corrosion (α) terminal</p>	 <p>Connector materials</p>	Thin sheets (strips)			

Products, applications and customer segments in the Copper & High Performance Materials Products Div.

Markets			Main customer segments (end users)	Applications	Key products
Automotive	Electronics	Semiconductors	Electronics components In-vehicle  Various connectors	Small electronic devices W/H terminals 	Corson copper (EFTEC-97 EFCUBE, etc.) (FAS-680)
			Electronics components  DCB substrates Heat sinks	Power modules (DCB substrates) Thermal dissipation materials 	Oxygen free copper (OFC·GOFC)
			Electronics components In-vehicle  Shunt resistance Heater wire	Current sensors Seat heaters 	Resistance materials (Strips & wires)
			Industrial equipment  Robots	FA cable 	Wire and rods (Alloy wires)
			Electronics components  Motors Switches	Switch Contact points 	Plating (Noble metals)