

Exploring for new businesses

Exploration

Value Cultivation

[Business Creation Sector]

Vision for 2030 (What we should be in 2030)

A team of excited people co-creating value, and exploring the future with material intelligence

“Help build a better future.” By taking on this challenge and making it come true, we will help improve the sustainability of society and enhance the corporate value of Mitsui Kinzoku Group.

The mission of the Business Creation Sector is to provide our stakeholders with “exciting” value with our spirit of exploration and diverse technologies, and thus contribute to improving the corporate value of Mitsui Kinzoku Group.

The Business Creation Sector is responsible for Exploration in the ambidexterity-oriented management promoted by the Group. In the business portfolio, management resources are intensively allocated to this Sector as the area of Value Cultivation.

We are committed to achieving more than 10 billion yen in profit by 2030 by commercializing as many projects as possible from the current R&D subjects and existing business implementation units to meet the aggressive input of people, costs, and investments.

To achieve these goals, we work on R&D enhancement through DX and collaboration and co-creation with external parties; the enhancement of project commercialization by increasing human resources; and the improvement of strategic support by establishing mass-production process technologies for commercialization, expanding intellectual property and strengthening the quality assurance system.

Our market co-creation initiatives are also making steady progress, through which we aim to create new innovations by strengthening R&D capabilities and integrating our technologies with external resources.

We will continue collaborating with eSep Inc. (headquartered in Soraku-gun, Kyoto) and Helical Fusion Co. Ltd. (headquartered in Chuo-ku, Tokyo). With eSep, we are working to commercialize the production of green fuel from carbon dioxide by combining our strength in inorganic material technology with eSep's strength in separation membrane technology. With Helical Fusion, we are working to create a sustainable, stable, CO₂-free power generation method using a next-generation energy source by combining Helical's fusion reactor technology with our technology.

In FY2023, we began investing in and collaborating with a bio-venture company that uses algae for bio-manufacturing. What these co-creation initiatives have in common is the creation of new values that contribute to building a society in harmony with nature.

In our effort to achieve our Purpose of promoting the well-being of the world, we strive to contribute to a carbon-neutral, recycling-oriented society in harmony with nature, actively addressing numerous research and development subjects for their respective markets.

In FY2023, we concluded a basic agreement with the Indian Institute of Technology Delhi (Republic of India) for joint development on green hydrogen production technology, and for establishing a joint development center in the school.

India is expected to be a future hydrogen production and consumption center as the country's national policy is strongly driving its transformation into a hydrogen hub. In addition, since India is close to major international hydrogen production and consumption regions, such as Europe, many green hydrogen production projects are in progress, and India is becoming increasingly important in developing green hydrogen technology. In India, the Indian Institute of Technology Delhi has extensive knowledge and many research achievements in this field. We will work with the institute to develop water electrolytic electrodes to produce green hydrogen.

Through joint developments in the future, we aim to develop R&D personnel and contribute to realizing a decarbonized society by achieving results in the green hydrogen field.

Senior Executive Officer,
Senior General Manager
of Business Creation Sector

YASUDA Kiyotaka



Business Creation Sector
R&D Center

We work on many R&D subjects, aiming to launch the next commercialized products to the markets.

The picture at the bottom is the joint development center in the Indian Institute of Technology Delhi.

Commercialization through strategic investments ❶

Solid electrolyte for all-solid-state batteries

A-SOLiD®

All-solid-state batteries are expected to be the next generation of storage batteries. In FY2021, we started to produce and supply A-SOLiD®, a solid electrolyte that is a key material for all-solid-state batteries, at our mass production testing facility. We doubled our production capacity in FY2022. In FY2023, we decided to invest in a second expansion to triple it. We are developing facilities that enable large-scale mass production and stabilize quality.

Thanks to their excellent battery properties and heat resistance, all-solid-state batteries have already been adopted in industrial applications. In addition, automakers are actively and seriously developing next-generation EVs equipped with all-solid-state batteries, which are expected to shorten charging time and increase driving distance. Automakers aim to launch next-generation EVs in the late 2020s, and demand for solid electrolytes is expected to grow dramatically in line with this movement.

We will continue to ensure the high quality and supply capacity of A-SOLiD® to meet this strong demand growth.

Commercialization through strategic investments ❷

For next-generation semiconductor chip mounting

HRDP®

Product development using our HRDP®, a special carrier for next-generation semiconductor chip mounting, is now commencing at 26 customers, including composite chip module and IC chip mounting device manufacturers. It is highly evaluated as contributing to shorter cycle times and higher yields in the production processes of next-generation semiconductor packages. These customers plan to use HRDP® in mass production from 2024 to 2030. Aligning with these customers' plans, we have decided to install a second HRDP® production line in 2023 at the Ako Factory of our collaborative partner, GEOMATEC Co., Ltd., and investments are being made sequentially. Fully automated lines are scheduled to start operations in 2025 to improve quality and increase production capacity. We are striving to make HRDP® the mounting platform for next-generation semiconductor packages and the de facto standard in the market.

Currently moving towards commercialization

For next-generation power semiconductors

Cu sinter paste

Power semiconductors control motors and other devices, and convert power and electrical signals. Since they handle high voltage and currents, they require high quality in terms of heat resistance and thermal conductivity. Sintered pastes with high heat dissipation and high reliability are seen as promising bonding materials to meet these needs, replacing conventional solder. Sintered silver pastes are already in practical use.

We use copper, which is cheaper than silver, to develop sintered copper paste in our integrated in-house system, which includes the design, development, and production of particles to pastes. Our sintered copper paste provides dissipation, reliability, and other performance equal to or better than the silver pastes that preceded it.

Next-generation power semiconductors are expected to be used in EVs that need more power, and also in renewable energy facilities, such as those for wind and solar power generation. They are indeed key devices for global decarbonization and energy conservation. As next-generation power semiconductors become more widespread, the market for sintering paste as a bonding material is also expected to expand significantly by 2030. We will grasp this market movement correctly and establish solid systems for mass production and the supply of copper paste.

To fuse the respective technologies together

Corporate Venture Capital

We also continue and accelerate our market co-creation efforts, innovatively fusing our core technologies with external partners. In FY2023, we newly invested in CHITOSE BIO EVOLUTION PTE. LTD. (headquartered in Singapore). It supervises the Chitose Group, which is working on creating an algae industry. Algae efficiently produce a variety of beneficial organic compounds from CO₂ through photosynthesis. Algae and biomanufacturing utilizing algae are expected to be a means of realizing a sustainable society that does not depend on fossil resources. CHITOSE BIO EVOLUTION has extensive knowledge of the mass cultivation of algae, microorganisms, and cells. They work to realize a bio-circular economy by converting CO₂ into resources through algae. Through applying our catalyst technology as well as separation and purification technology, we aim to contribute to creating a value chain for algae bio-manufacturing.

Engineered materials

[Engineered Materials Sector]

Exploitation

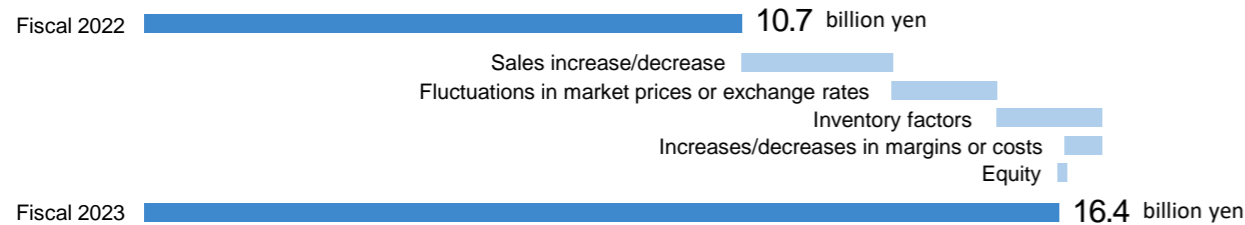
Value Expansion

Vision for 2030 (What we should be in 2030)

FY2030 targets: ¥180 billion net sales, ¥40 billion ordinary income

More than 70% of newly launched products and more than 50% of sales are environmental contribution products.

Difference Analysis of Ordinary income



One of the reasons Mitsui Kinzoku has been able to continue conducting business for a century and a half is its engineered materials. What are the nature and characteristics of nonferrous metal materials, and can they be processed or combined to create unprecedented properties and new value? Constantly thinking and engaging in research and development, we have engineered many intermediate materials for applications and industries unimaginable in the past and useful to people's lives.

The Engineered Materials Sector refines and evolves the products and businesses which are the fruit of the creativity and efforts of our predecessors over the generations. It strives to enhance and expand our economic value by providing valuable, high-performance products that satisfy customer needs and contribute to solving social issues.

Looking back at FY2023, in the copper foil business, orders for our mainstay product of MicroThin™ recovered as inventory adjustments were almost complete throughout the supply chain, particularly for semiconductors. For HDIs, smartphone demand increased in North America slightly, but we were able to increase new orders for Chinese smartphones.

In the engineered powders business, we modified our sales plan for copper powder due to the slowdown in the multilayer ceramic capacitors (MLCC) market. We will continue to expand our market share and applications among existing customers.

In the rare metals business, NIPPON YTTRIUM CO., LTD., which owns rare earth elements, became a wholly owned subsidiary of the Company to create synergies such as more efficient recycling and faster development of new products and advanced materials.

"iconos™" rare metal solution and "NANOBIK™" abrasive for SiC wafers are next-generation products we have been focused on, and with which we have been accelerating development, in our current medium-term management plan. They have been adopted by several customers, and are steadily producing positive results.

The ceramics business develops and supplies new kiln tools for firing used in MLCC production (such as CeraMesh™). We work to provide products that help customers improve production yields and reduce electricity use.

Seven of the Sector's environmental contribution products have already received internal certification. We are also making steady progress in creating an organization in which highly engaged people with diverse backgrounds can play an active role, and also in introducing DX in each business of our Sector. We will continue to work with our customers and other stakeholders to create value.

Representative Director Senior Managing Director, Senior Managing Executive Officer, Senior General Manager of Engineered Materials Sector

OKABE Masato



Progress of our initiatives in Fiscal 2023

Our growth story will continue.

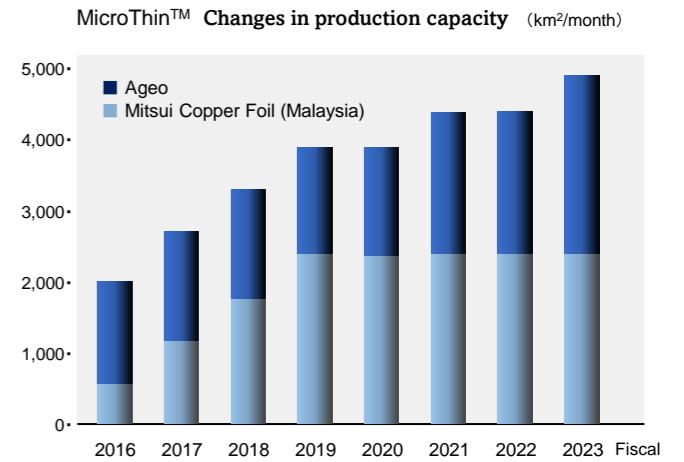
Increasing production capacity of ultra-thin copper foil

Our MicroThin™ ultra-thin copper foil with a carrier is a product that combines copper foil at thickness suitable for forming microcircuits, 1.5µm to 5µm thick, with multiple types of fine roughening treatment. It is mainly used for packaged substrates and smartphone motherboards (HDI printed circuit boards), with a global market share of over 95% for the former and almost 100% for the latter.

In packaged substrate applications, the number of parts used in smartphones is increasing due to their higher functionality, such as 5G compatibility. Besides smartphones, demand is also expected to continue to grow due to increased use in data centers and memory substrates for in-vehicle applications.

In FY2023, we increased the monthly production capacity at the Ageo Plant, the mother plant of our copper foil business, from 2 million m² to 2.5 million m², without major capital investment. We improved the operating rate, yields, and other technical factors and labor productivity by introducing DX for collecting and analyzing production data.

As a result, the Group's total production capacity, including the current MicroThin™ production capacity of 2.4 million m² per month at the Malaysian plant, increased from 4.4 million m² per month to 4.9 million m² per month. We also arranged risk hedges to ensure stable supplies and now have a sufficient production and supply system to reliably capture future increases in global demand.



An innovation in the inorganic materials market

New materials in rare metal solutions iconos™

Rare metals are used in various industrial fields, such as smartphones, automobiles, batteries, and semiconductor devices, and are essential materials in our daily lives. Rare metals such as Ta and Nb are difficult to handle, and are mainly used in powders because they do not solve easily (or are insoluble), and only dissolve in strong acids. We have cleared the hurdle of insolubility with our proprietary dissolution technology and succeeded in making compound solutions without using strong acids and developing solutions with the following elements:

Ta Nb Hf Ti Zr Mo W

Tantalum, Niobium, Hafnium, Titanium, Zirconium, Molybdenum, Tungsten

Because our iconos™ is a liquid, it is easy to handle in mixing and dispensing, and is highly reactive, which allows for shorter processing and manufacturing time using less energy. For example, by applying iconos™ to the surface of substrates and particles, films of various elements can be formed without using halogen. Using iconos™ in the sol-gel method (a material synthesis process), composite compounds can be synthesized by just mixing, and it can also be used as an alternative to metal alkoxide raw materials. Its high stability also allows for long-term storage (over six months) in a solution state. We are considering various applications for iconos™, leveraging on its unique properties. As an unprecedented engineered material, it will enable new applications that could not be achieved with powders, and contribute to reducing environmental impact by saving energy and reducing processes for our customers.



iconos™

Create synergies between the engineered powders business and NIPPON YTTRIUM

Becoming a wholly-owned subsidiary

NIPPON YTTRIUM CO., LTD. is a comprehensive manufacturer of rare earths, and it handles a wide range of such materials. It was previously a consolidated subsidiary in which the Company held 70% of the shares, and was part of the Engineered Materials Sector. On March 1, 2024, it became our wholly-owned subsidiary. NIPPON YTTRIUM manufactures, develops, and markets high-value-added rare earth, supplying the materials to various markets, including semiconductor manufacturing equipment, electronic materials such as multilayer ceramic capacitors (MLCC), high-performance battery materials, and the medical field. The company is also working with the Japan Organization for Metals and Energy Security (JOGMEC) to develop a solvent extraction technology for advanced separation and purification to build a recycling supply chain for rare earth.

In the Engineered Materials Sector, NIPPON YTTRIUM's business, along with the copper foil and engineered powders businesses, is categorized as a Value Expansion business. We will pursue synergies in the advanced materials field through two businesses: NIPPON YTTRIUM, which has a broad market for rare earths in general, and our engineered powders and rare metals business, which has an adjacent light rare earth market and supplies materials for applications such as high-purity tantalum oxide for surface acoustic wave (SAW) filters and cerium-based abrasives.

Engineered Powders Div.

Customer Markets
Electronics
Electronic components, batteries
Energy

Technology Domains
Powder manufacturing technologies
Solvent Extraction/Solution Technology

Main Products
Rare metals
Various metal powders

NIPPON YTTRIUM

Customer Markets
Semiconductor manufacturing equipment
Electronic components, batteries
Medical

Technology Domains
Solvent extraction/solution technology
Ultra-high purification

Main Products
Rare earths
Yttrium Compounds

Metals Mining and smelting

[Metals Sector]

Exploitation

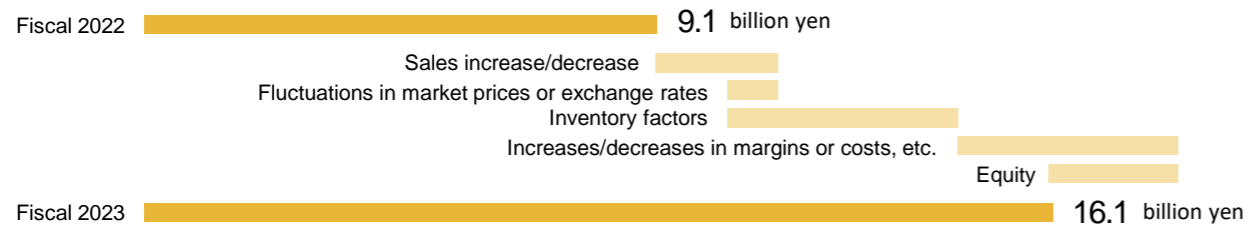
Value Reinforcement/Optimization

Vision for 2030 (What we should be in 2030)

We are essential in efforts to build a sustainable world.

We strive to further enhance recycling network underpinned by distinctive characteristics, and we continue to explore new mineral resources and utilization of low-carbon energy.

Difference Analysis of Ordinary income



We have worked to advance our recycling and smelting businesses over the years. To meet growing needs as we transition to a recycling-oriented society, the mission of the Metals Sector is to propose and provide solutions that help build a sustainable world.

Focused on our Vision for 2030, we will pursue a more sophisticated recycling network, explore new mining opportunities, reduce CO2 emissions to create a decarbonized society, explore renewable energy solutions, and improve digital infrastructures for digital transformation (DX) under the current medium-term management plan.

In FY2023, Hibi Kyodo Smelting Co., Ltd. returned to our Group's smelting network. By utilizing its abilities in copper smelting and handling impurities, we obtained positive results, including in-house processing of smelting intermediates, which had previously been conducted outside the Group.

Regarding efforts to achieve carbon neutrality, demonstration tests at Miike Smelting confirmed that up to 70% of the coal and coke used in the smelting process can be replaced by biomass-derived fuels.

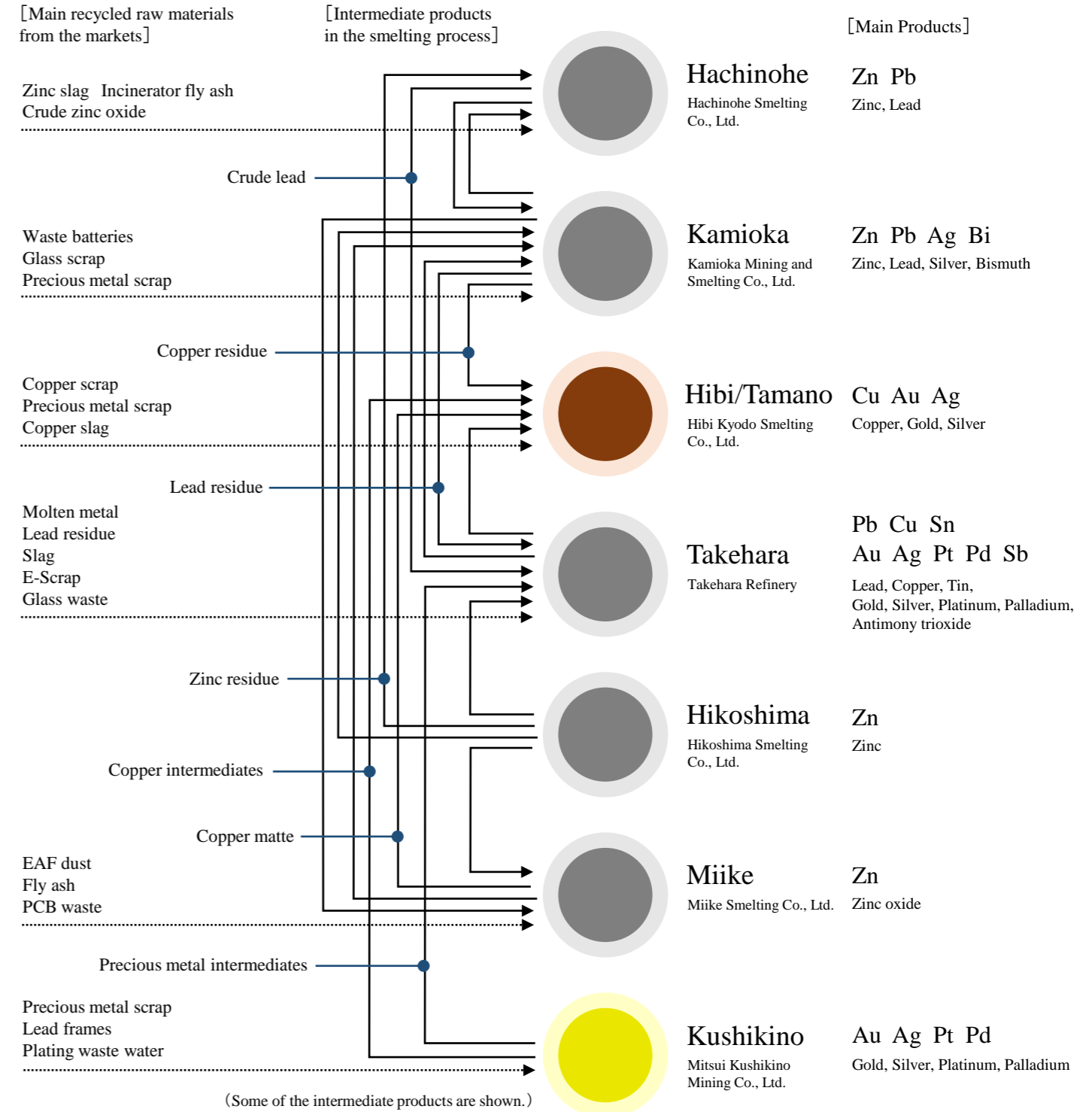
We are also developing a technology to separate and recover CO2 from the exhaust gas of Hachinohe Smelting using a CO2 adsorbent developed by the Company. In a bench test using emission gas from a smelting furnace, we confirmed a recovery rate of approximately 90%, almost the same as in laboratory tests. In the future, we will test it at a pilot plant on an expanded scale.

DX initiatives are also in progress to improve productivity and evolve manufacturing at each smelter. Hachinohe Smelting introduced a system that centrally manages data, such as smelter operation metrics, raw material component analysis values, and operating conditions, stores data, and visualizes operations. The system enables the rapid sharing of information and the accumulation and analysis of huge volumes of data. We will continue to improve productivity using the system, expanding it to other smelters.

We will continue to provide value that only we can provide by making the best use of our zinc, lead, and copper smelting and refining network with our Group's diverse processes, mining resources, and renewable energy.

Senior Executive Officer,
Senior General Manager of Metals Sector

SAITO Osamu



Network of our smelters

For example, valuable metals such as lead, copper, tin, and silver that are recovered at Hachinohe Smelting—which can simultaneously smelt zinc and lead—are combined with tin, antimony, and other metals recovered at Kamioka Mining & Smelting. They are then processed into finished products at our Takehara Refinery Plant. Fly ash from Miike Smelting's electric furnaces and refuse incinerators contains zinc and copper. The zinc is sent to a zinc smelter and the copper is sent to Hibi Kyodo Smelting to be processed into finished products.

We can process complex, diverse recycled raw materials by utilizing the smelting network of seven smelters with diverse processes in Japan. Going forward, we will continue to enhance our technical capabilities and processing capacity for recycled raw materials at our smelters and refineries to meet larger and more complex recycling needs.



Mobility

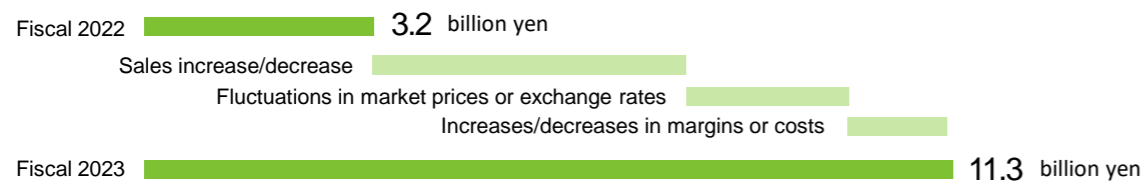
[Mobility Sector]

Vision for 2030 (What we should be in 2030)

We act as a pioneer of mobility, always making sure of and always creating the best values to be chosen.

New products account for more than 50% of sales, ordinary income trends at ¥20 billion, and there are no product recalls.

Difference Analysis of Ordinary income



The Mobility Sector recognizes major changes and evolutions in the automotive industry, including CASE, MaaS, and carbon neutrality, as new needs. We provide value that serves our customers and contribute to the development of a mobility society.

We set targets for 2030 to increase the percentage of new products in net sales, significantly increase profit, and ensure no product recalls. To achieve these targets, we pursue exploitation in technology, manufacturing, and sales, forge new businesses, and pursue synergies over short-, medium-, and long-term cycles.

In FY2023, the sales volume of automotive door latches, our main product in the mobility business, increased in Japan due to a recovery in production at automobile manufacturers. While sales volumes decreased in the Chinese market because Japanese automobile manufacturers reduced production, the total overseas sales volume increased as demand remained strong in the Western market.

The Catalyst Division's sales volume expanded, supported by the increased sales of exhaust gas cleaning catalysts for motorcycles due to strong demand in India, and the increased sales volume of exhaust gas cleaning catalysts for automobiles due to the recovery of production at automobile manufacturers and full-scale mass production that was

started in response to orders for new models. On the other hand, the Division's total sales decreased from the previous year due to lower prices of rhodium and other raw materials for catalysts.

Currently, we are enthusiastically working on expanding sales of higher value-added electric door system products for automobiles to increase their sales ratio and continue to strengthen cooperation between development and sales divisions to accelerate the development of new electric door systems.

In the catalyst business, we strive to maintain and expand the market share of products for motorcycles and automobiles, closely monitoring regulatory movements in each country. Aligning with the significant global movement toward carbon neutrality, the Mobility Sector works with the Business Creation Sector to create new businesses that contribute to decarbonization over the long term by utilizing our catalyst technology.

With the three keywords of enthusiastically taking on "challenges," the "persistence" to make it to the end without giving up, and "speed" of action, we aim to be a mobility pioneer that identifies future value and continues to create it.

Senior Executive Officer,
Senior General Manager of Mobility Sector

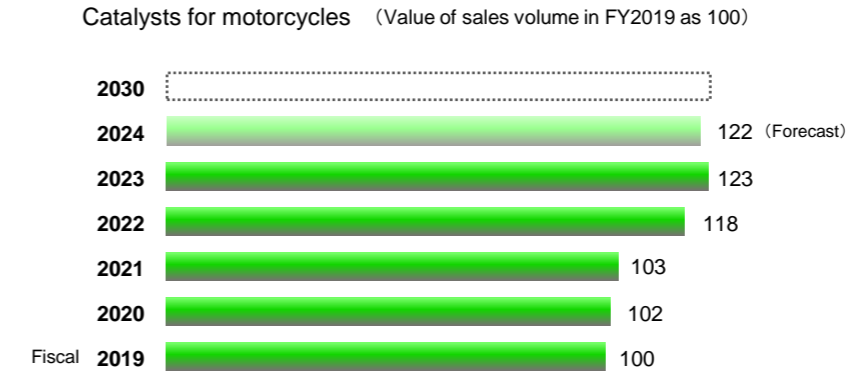
IGATA Hiroshi



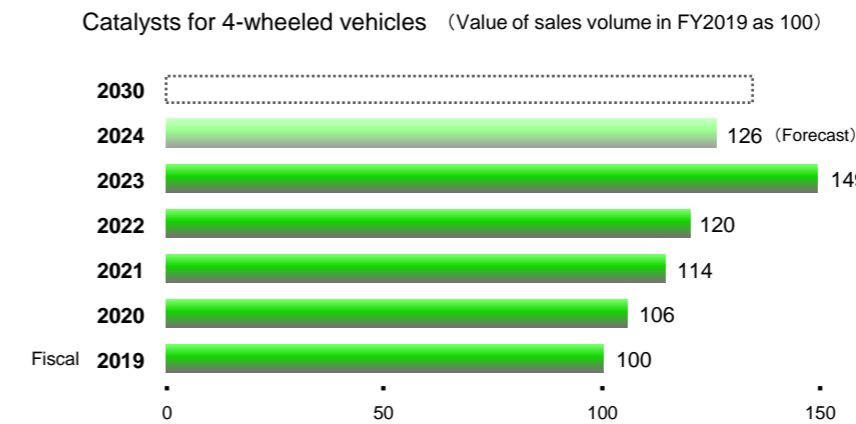
Exploitation

Value Reinforcement/Optimization

Trends in catalysts sales volume



In FY2023, sales volume increased in the Indian and Southeast Asian markets, compared to the previous year. In FY2024, competition from other manufacturers will intensify in India and China, but we expect to secure the same sales volume as last year. Going forward, we will strive to maintain a 50% global market share and expand it by closely monitoring new movements in emissions regulations in each country and implementing measures to conserve precious metals.



In FY2023, we faced a challenge in the Chinese market. However, sales in the U.S. and Indian markets remained strong, resulting in a 24% year-on-year increase. In FY2024, sales are expected to fall further in the Chinese market as automakers reduce production. Although demand is expected to shrink in the medium to long term due to the spread of electric vehicles in the global market as a whole, we will seek to increase sales in emerging markets. We will continue to closely monitor movements in emissions regulations in each country, develop technologies to address precious metals conservation, and coordinate and collaborate with the Business Creation Sector to create new businesses that contribute to a decarbonized society.

Mitsui Kinzoku ACT Corporation Main Products and Sales Composition

We will firmly grasp the trend of expanding electrification and automation of automobile doors and increase the sales ratio of value-added electric door system products.

