MMC's Challenge

Key Initiatives **1** **Expanding Resource Recycling**

Being a Leader in Resource Recycling

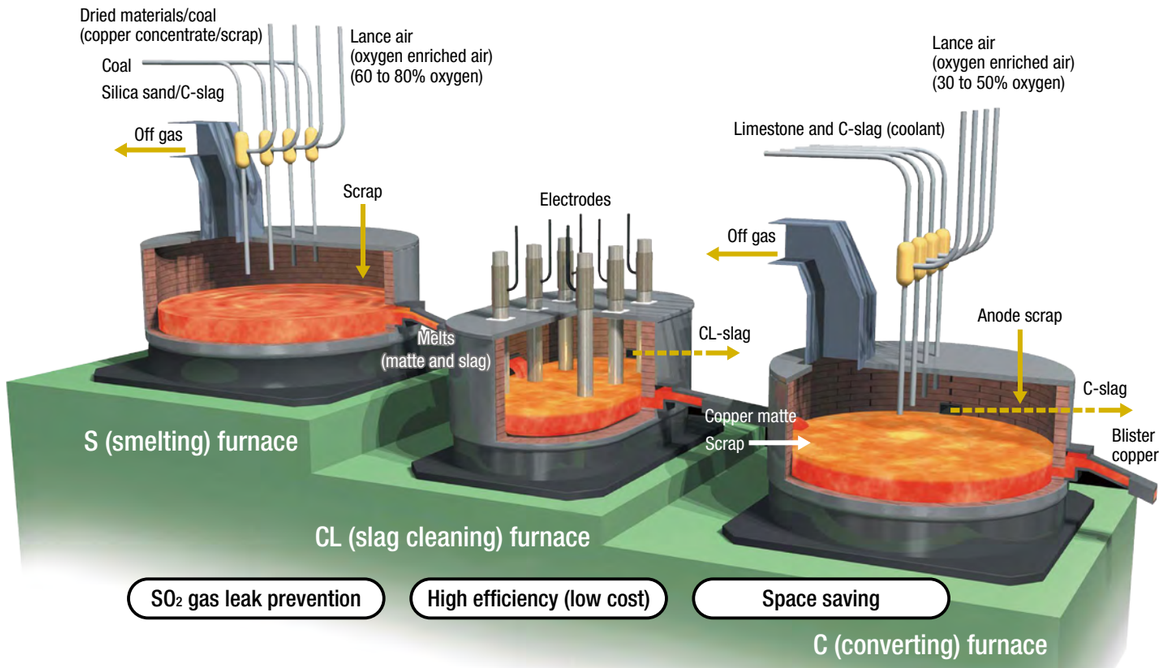
Mitsubishi Materials Group supports the development of industry and society by supplying non-ferrous metal materials such as copper, gold, silver, lead, tin, platinum and palladium. Using our proprietary Mitsubishi Process for continuous copper smelting, we have established processes for recycling metal resources by recycling materials such as E-Scrap* and are firmly on the path to realizing Our Commitment as a leader in resource recycling.

*Discarded circuit boards of electronic devices containing high concentrations of gold, silver, copper, platinum, palladium, and other valuable metals

High-efficiency E-Scrap Processing through the Mitsubishi Process

Conventional copper smelting around the world is batch based and employs three types of furnaces: flash furnaces, converting furnaces, and refining furnaces. The furnaces are not connected, and molten metal at temperatures typically over 1,200°C is transferred between them using a large ladle and transported by crane. With the Mitsubishi Process for continuous copper smelting, which was developed by the Company in 1974, furnaces are connected by launders. This enables continuous, stable copper smelting without the need for ladles to transport molten metal. The launders connecting the furnaces are also enclosed, preventing the leakage of harmful SO_2 gas and enabling the creation of pollution-free systems while also supporting energy and cost saving. Through unique high-efficiency E-Scrap processing, we have also achieved one of the world's highest E-Scrap processing capacities, at approximately 160,000 tons annually. The global E-Scrap market is expected to continue to grow, and we plan to further increase our processing capacity to approximately 240,000 tons annually by the fiscal year ending March 2031.

The Mitsubishi Process for Continuous Copper Smelting



*Copper concentrate: Concentrate of copper obtained by refining ore obtained from mines in order to upgrade copper content.
Matte: A molten intermediary copper product.
Slag: A molten product resulting from oxidation of iron produced during copper smelting. CL furnace slag can be used for applications such as raw materials for the cement industry.

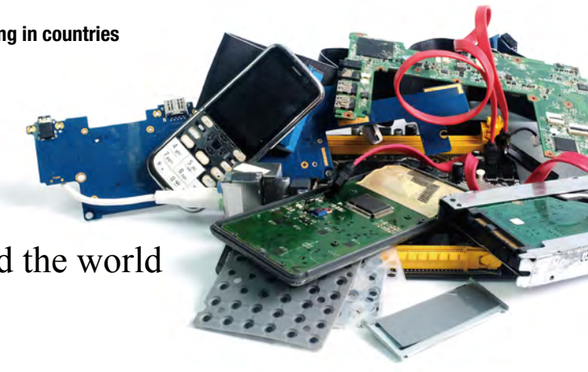
Production volume of major products (results for FYE March 2024) Copper cathode: **413,000** t Gold: **26** t Silver: **235** t

Moving to a New Era of "Mining" for Resource Collection

E-Scrap and other raw materials for recycling are resources that emerge from so-called urban mines, a new type of "mine" for a new era.
The Group is building a global network to collect raw materials for recycling in countries around the world and is advancing the recycling of metal resources.

E-Scrap

Building a global collection network and processing E-Scrap from countries around the world

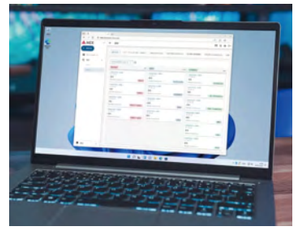


The E-Scrap that the Group processes mainly comprises discarded circuit boards from electronic devices such as home appliances, computers and smartphones. These items contain high concentrations of gold, silver, copper, platinum, palladium, and other valuable metals, and are gaining prominence as a new source of valuable raw material for smelting. In addition, the amount of E-Scrap generated is expected to continue growing as the recycling rate of used home appliances and other items rises with greater environmental awareness in countries around the world.

E-Scrap is recycled through a process comprising collection, sampling/analysis and processing (smelting). In many cases, in addition to processing technology and capabilities, recycling E-Scrap also requires the building of a network to collect it. The Group has established E-Scrap collection systems both in Japan and in countries around the world. In Europe, in particular, we have established MM Metal Recycling B.V. in the Netherlands and we conduct the entire process of sampling, analysis, purchase price determination, and payment in a fair, impartial, and speedy manner. We build relationships of trust with our business partners as we work to maintain and expand our collection network.

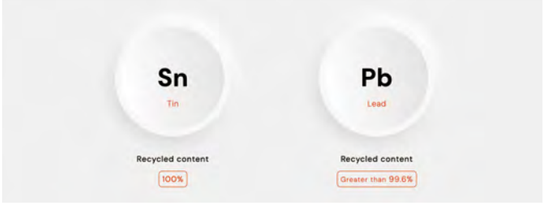
MEX (Online E-Scrap Trading System)

The Group's online E-Scrap trading system MEX (Mitsubishi Materials E-Scrap EXchange) offers everything from booking of E-Scrap deliveries to purchase price confirmation 24 hours a day through an easy-to-use system. Users can even check the status of E-Scrap deliveries after arrival at the smelter in real time. High-level security is also ensured through compliance with major information security management system standards, such as ISO27001. We are continuing to further expand the system's functions in our efforts to enhance convenience for our business partners.



Japan's First Recycled Metal Brand REMINE

The Company has launched "REMINE," the first recycled metal brand in Japan. The first products are tin with 100% recycled content and lead with at least 99.6% recycled content. The recycled content is calculated in accordance with the international standard ISO14021 (JIS Q14021) and verified by a third-party organization (SGS Japan Inc.) to ensure a higher level of reliability. The lineup of products will continue to expand moving forward.



MMC's Challenge

Key Initiatives **2** **Enhancing the Supply of High-performance Materials and Products**

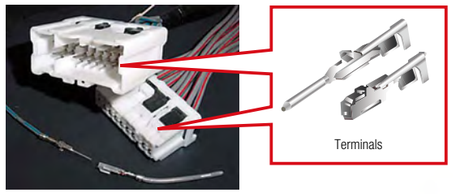
Accelerating Next-generation Evolution with Advanced Products

As xEVs and electronic devices continue their remarkable evolution, the need for high-performance, high-precision parts is growing. Increasingly advanced semiconductors are also leading to the accelerated evolution of the equipment used to manufacture them. By enhancing the supply of high-performance materials and products, MMC Group is supporting these evolutions across industries from automobiles to semiconductors and aerospace.

xEVs

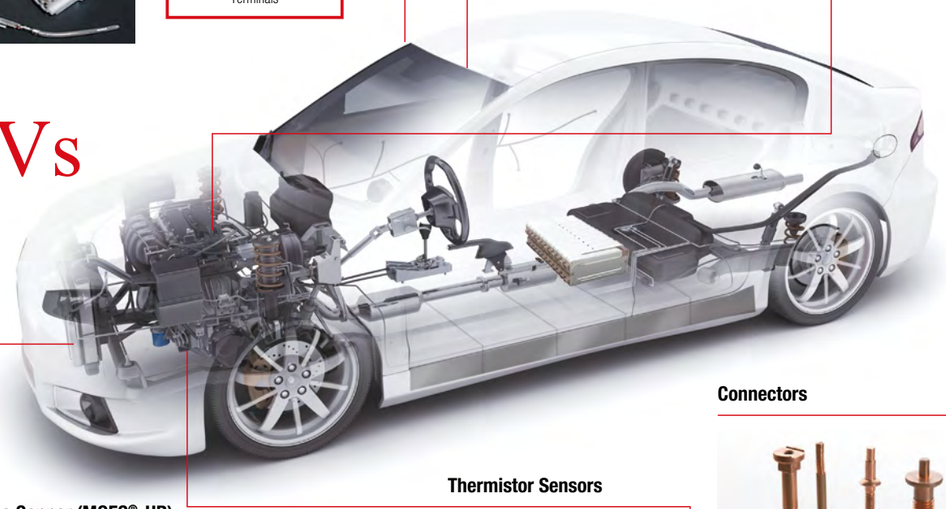
Copper Strips for Automotive Terminals and Busbars (MSP Series)

The MSP series, widely used for automotive terminals and busbars, are copper alloys that offer both superior electrical conductivity and strength. The materials are suitable for a wide range of applications in xEVs that incorporate many electronic devices. MSP5, which contains the highest magnesium content among the alloys in the series, excels in strength, heat resistance and bendability while meeting the need for compactness and lightness.



Solar Heat-ray Shielding Paint

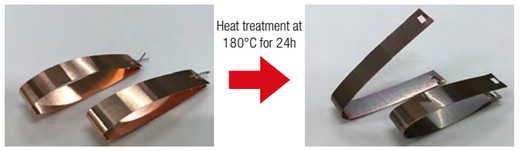
Solar heat-ray shielding paint applied to glass sections of automobiles absorbs and blocks near-infrared rays. Not only does this prevent a rise in the interior temperature of automobiles, it also lowers the load on air conditioners.
As the shift to xEVs progresses, reducing electricity consumption leads to an increase in driving ranges. As a result, there is a growing need for higher-performance solar heat-ray shielding paint.



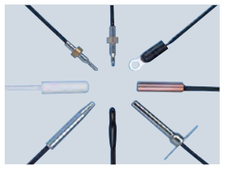
Oxygen-free Copper (MOFC®-HR)

Automotive components for xEVs require materials that can withstand higher current flow and heat dissipation than those for vehicles with engines. This is where MOFC®-HR, an innovative oxygen-free copper with world-class strength and heat resistance developed by MMC, comes into play. This material achieves strength and heat resistance on par with copper alloys while retaining the excellent electrical and heat conductivity of conventional oxygen-free copper. The material is expected to be used for components such as automotive high-voltage terminals and busbar modules, which need to support high current flow, dissipate heat effectively, and meet compact and thin size requirements.

MOFC®-HR (rear) with improved stress relaxation resistance properties



Thermistor Sensors



xEVs and electronic devices that use semiconductors are incorporating more electronic components to improve product performance. Managing the heat emitted by these components has become essential in order to maintain functionality. Our thermistor sensors provide high-speed responsiveness and high reliability in temperature sensing.

Connectors

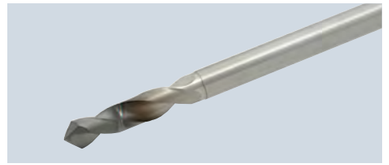
With the advancement of automobile electrification, there is a growing need for high-performance, lightweight, compact connectors. Luvata Group is part of MMC Group and leverages technical capabilities relating to the development and production of oxygen-free copper and copper alloys as its core competencies to provide a variety of high-performance connector products for xEVs, including charging port pin connectors, battery relay contact connectors and signal connectors.

Aerospace

CVD-coated Carbide Inserts for Steel Turning

Automobile parts are diversifying, and the tools used to machine them need to be resistant to both wear and chipping. The MC6100 Series features coating using world-class crystal growth technology and special impact-resistant cemented carbide. This makes it resistant to both wear and chipping, increasing productivity by improving machining speed and stability.

Drills for CFRP Machining

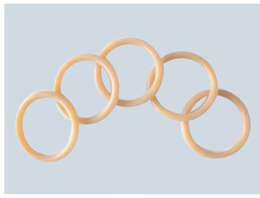


CFRP is a strong, lightweight laminated carbon fiber material. With these qualities, it is used in a variety of applications, including in the aircraft and automobile industries and in wind turbine blades. However, CFRP machining requires tools with performance characteristics distinct from metal working tools, including reducing curling and burrs, which occur due to the laminated structure.
Our drills for CFRP machining feature shapes optimized for each application and unique diamond coating technology, achieving stable machining and long lifespans.

Semiconductors

Sealing Products for Semiconductor Manufacturing Equipment

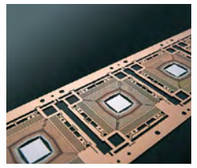
Sealing products such as O-rings are used to maintain vacuums inside semiconductor manufacturing equipment. These products must also be able to withstand the plasma environments that can occur inside semiconductor manufacturing equipment. In addition to plasma resistance, MMC Group company Mitsubishi Cable Industries, Ltd. provides sealing products with anti-static properties, wear resistance, and features that reduce the intrusion of dust and dirt, which negatively impact equipment.



Solder Materials with Low Alpha-ray Emissions

Solder material bonds a silicon chip and substrate, which form the circuitry of semiconductor components, and serves as the electrode between them. Conventional solder materials emit alpha rays, which could cause software errors that overwrite stored data. Based on our unique technology, we provide solder materials with extremely low alpha-ray emissions.

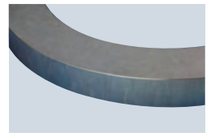
Copper Alloys for Lead Frames



Lead frames are components that act as connection terminals when fixing integrated circuit (IC) chips in place and mounting them to printed circuit boards. Created using precision rolling technology cultivated over many years, our world-class copper alloys for lead frames boast an excellent balance of strength and conductivity, heat resistance, and ease of pressing and bending. These characteristics mean they are widely used as a material for lead frames.

Processed Silicon Products

Processed silicon products play an active role as part of semiconductor manufacturing equipment. There is a need to reduce impurities in semiconductor manufacturing equipment, and we provide components made by precisely processing high-purity silicon, the same material used in semiconductors, into plates and rings.



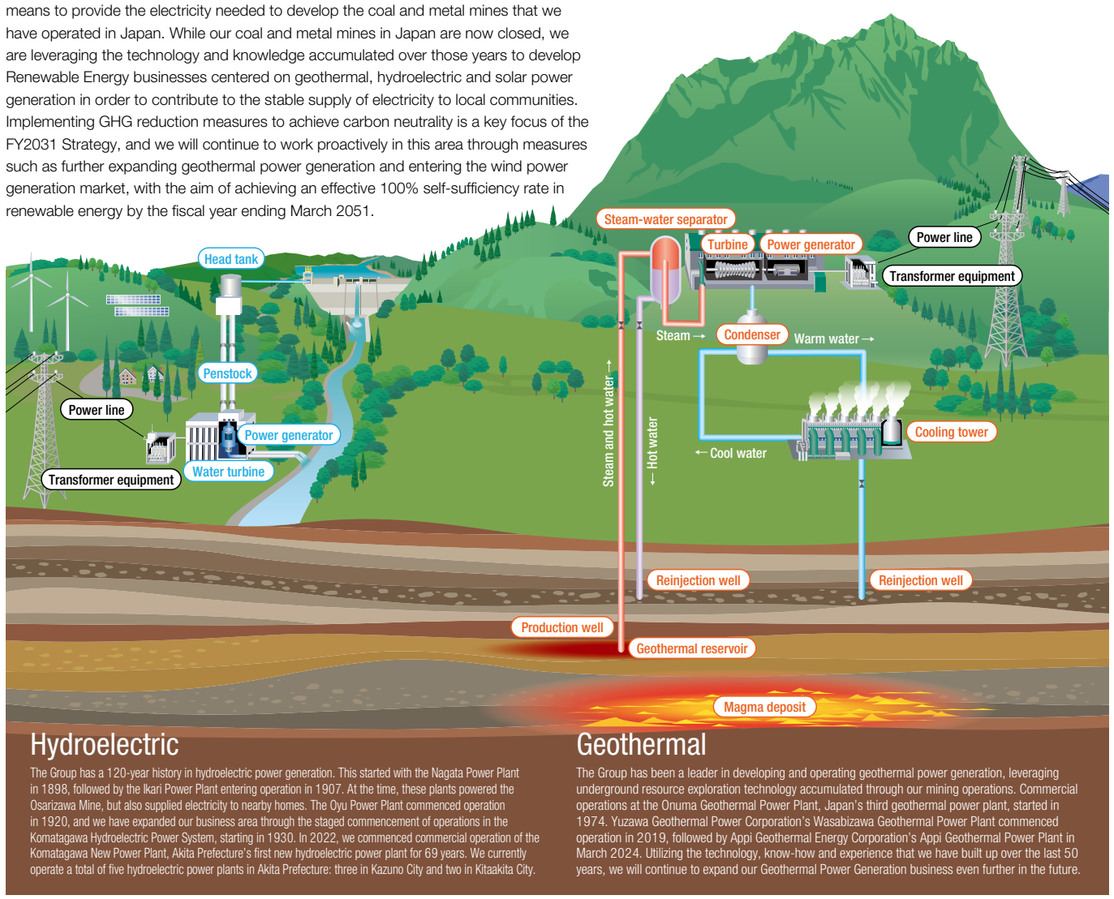
MMC's Challenge

Key Initiatives **3** **Achieving Carbon Neutrality**

Taking on the Challenge of Achieving an Effective 100% Renewable Energy Self-sufficiency Rate

Amidst growing consciousness of environmental issues, use of renewable energy and reducing the environmental impact of manufacturing are becoming ever more important.
The Group has worked in renewable energy power generation for over a century, and we are currently endeavoring to expand our Renewable Energy business even further with the aim of reaching an effective 100% self-sufficiency rate in renewable energy by the fiscal year ending March 2051, including by expanding geothermal power generation and entering the wind power generation field.

The Group has a long history of involvement in the Renewable Energy business as a means to provide the electricity needed to develop the coal and metal mines that we have operated in Japan. While our coal and metal mines in Japan are now closed, we are leveraging the technology and knowledge accumulated over those years to develop Renewable Energy businesses centered on geothermal, hydroelectric and solar power generation in order to contribute to the stable supply of electricity to local communities. Implementing GHG reduction measures to achieve carbon neutrality is a key focus of the FY2031 Strategy, and we will continue to work proactively in this area through measures such as further expanding geothermal power generation and entering the wind power generation market, with the aim of achieving an effective 100% self-sufficiency rate in renewable energy by the fiscal year ending March 2051.



Hydroelectric

The Group has a 120-year history in hydroelectric power generation. This started with the Nagata Power Plant in 1898, followed by the Ikari Power Plant entering operation in 1907. At the time, these plants powered the Osarizawa Mine, but also supplied electricity to nearby homes. The Oyu Power Plant commenced operation in 1920, and we have expanded our business area through the staged commencement of operations in the Komatagawa Hydroelectric Power System, starting in 1930. In 2022, we commenced commercial operation of the Komatagawa New Power Plant, Akita Prefecture's first new hydroelectric power plant for 69 years. We currently operate a total of five hydroelectric power plants in Akita Prefecture: three in Kazuno City and two in Kitaakita City.

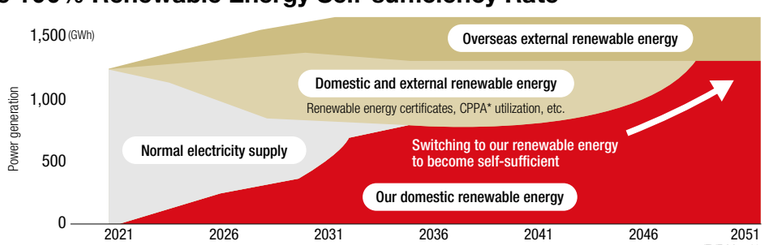
Geothermal

The Group has been a leader in developing and operating geothermal power generation, leveraging underground resource exploration technology accumulated through our mining operations. Commercial operations at the Onuma Geothermal Power Plant, Japan's third geothermal power plant, started in 1974. Yuzawa Geothermal Power Corporation's Wasabizawa Geothermal Power Plant commenced operation in 2019, followed by Appi Geothermal Energy Corporation's Appi Geothermal Power Plant in March 2024. Utilizing the technology, know-how and experience that we have built up over the last 50 years, we will continue to expand our Geothermal Power Generation business even further in the future.

Roadmap Toward an Effective 100% Renewable Energy Self-sufficiency Rate

Switch 100% of the Group's effective electricity use to renewable energy-derived electricity
by FYE March 2036

Achieve renewable energy power equivalent to our power consumption by FYE March 2051, **achieving an effective 100% self-sufficiency rate in renewable energy**



*CPPA: Corporate Power Purchase Agreement *Power generation values for FYE March 2021 do not include Cement business, Aluminum business or Polycrystalline Silicon business

The Materials' Forests

Aiming for beautiful forests needed by society by making the most of natural resources and maximizing function and utilization

We are one of the largest forest owners in Japan, managing over 13,000 ha across the country, with a primary focus in Hokkaido. Historically, these forests were used to supply lumber for our metal and coal mines. With the cessation of domestic mining activities, our current forest management goals have shifted to include not only the production of renewable timber resources but also the enhancement of ecosystem services, such as water and soil conservation, prevention of global warming through CO_2 control, biodiversity conservation and provision of spaces for public recreation.

In our company-owned forests, the Materials' Forests, we have established meticulous forest management zones tailored to topographical conditions, working with businesses entrusted with maintenance, aiming for "beautiful forests needed by society by making the most of natural resources and maximizing function and utilization" for the next 100 years.

We established conservation zones to promote environmentally conscious development, and monitor forests using digital tools to conserve biodiversity and protect rare species. The timber produced through our forest management practices is also efficiently utilized, with some being used as construction materials for local elementary schools. Through these efforts, we are creating forests that can withstand natural disasters.

Furthermore, in order to instill a love of the Materials' Forests among local residents, we utilize part of these Company-owned forests as fields for nature-related outdoor activities through events where elementary school students can learn and plant trees.

Protecting beautiful forests for the next 100 years

Preserving biodiversity and protecting rare species

Utilizing forests as a venue for the local community to interact with nature

Working towards forests beloved by the local community

Aiming to create sustainable and diverse forests

Based in Sapporo, Hokkaido, I engage in small-scale forestry business, known as self-supporting or environmentally conscious forestry, with the aim of achieving sustainable forestry business that is small-scale and does not burden nature, finding the balance between economic and environmental considerations.

I work at Teine Forest, where Mitsubishi Materials Corporation, the owner for the forest, is taking the lead on creating a forest that can be used to produce materials while also serving the public, which I feel is a very valuable endeavor.

My daily involvement with Mitsubishi Materials Corporation has taught me about how to approach tree selection as well as on-site safety management.

Moving forward, I look forward to continuing our collaborative efforts to create sustainable and diverse forests.

Yuzuru Hiraoka,
Yamanowasha, LLC
CEO