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Sustainable Copper Vision

JX Metals Vision for Sustainable Copper

In August 2022, the JX Metals Group formulated our Sustainable Copper Vision.

This vision reflects our recognition that copper is an essential material for achieving carbon neutrality and describes our policy for the supply and ongoing evolution of sustainable copper.

We will continue pursuing Green Enabling Partnerships, which are collaborations and cooperation with partners involved in the supply and use of copper, for the development and wider dissemination of this vision.

Green Hybrid Smelting Initiatives

Copper is an essential material for achieving carbon neutrality; therefore, copper suppliers and users are regarded as Green Enablers.

Upstream Changes in power generation mix

Power generation mix reliant mainly on fossil fuels such as coal and gas

Emergence and expansion toward renewable energy sources such as wind and solar power

4x

Renewable energy requires about four times more copper than fossil fuels per MW of power generation capacity

- Fossil fuels: **Up to 1 ton/MW**
- Renewable energy: **Up to 4 tons/MW**

Mid-stream Expansion of electricity transmission and distribution

Power supply through centralized transmission and distribution systems of electricity

Transition to decentralized transmission and distribution systems

2x

Decentralized network requires about twice as much copper as compared to the conventional supply grid

- Centralized: **Up to 10 tons/km**
- Decentralized: **Up to 20 tons/km**

Downstream Transformations in electric power usage

Vehicles and supply chains designed based on using internal combustion engines as an energy source

Conversion of energy sources in connection with the spread of environmental friendly vehicles (EVs, FCVs*, etc.)

4x

Electric vehicles incorporate and use about four times more copper than internal combustion vehicles

- Internal combustion engine vehicles: **24 kg/vehicle**
- Electric vehicles: **94 kg/vehicle**

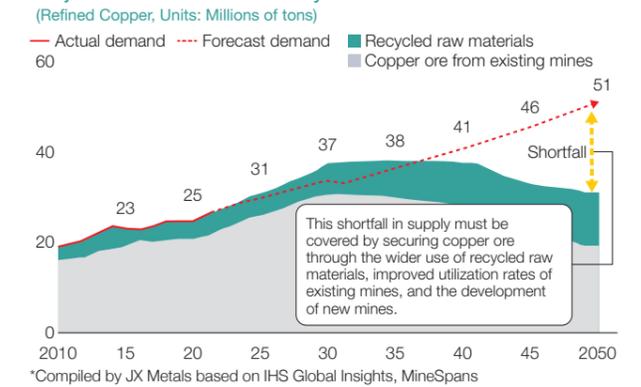
*Fuel cell vehicles

What is Sustainable Copper?

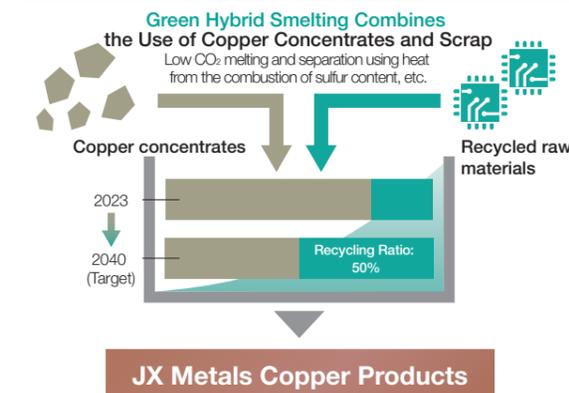
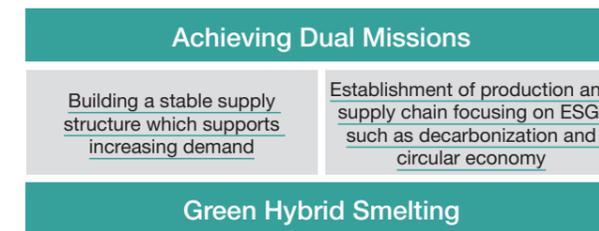
Meeting increasing demand for copper requires a stable supply of copper ore and recycled raw materials.

While demand for copper will continue to grow over the long term, the supply of copper ore and recycled raw materials from existing mines is limited, and the supply-demand balance for copper is likely to be very unstable. This delicate balance is why copper ore and recycled raw materials will be essential in meeting the demand for copper, without which the world cannot achieve decarbonization.

Projected Future Demand by Source



Green Hybrid Smelting Achieves Dual Missions



We offer copper products using Green Hybrid Smelting. Both copper concentrates and scrap can be used as raw materials. The heat generated by the copper concentrates itself can be used to melt recycled materials, making fossil fuels virtually unnecessary.

Green Hybrid Smelting has been selected as one of the 26 most noteworthy examples of Japan's circular economy initiatives in Case Studies (2022) published by the Japan Partnership for Circular Economy, which was established by the Ministry of the Environment, the Ministry of Economy, Trade and Industry, and Keidanren.

Four Key Initiatives to Develop and Popularize Sustainable Copper

1

Reduce CFP

Reduce CFP in Copper concentrates mining and the transportation value chain

- Convert construction equipment used in mines to electric power
- Use electricity derived from renewable sources
- Improve efficiencies and optimize transportation, etc.

2

Increase Recycling Ratios

Develop technologies to increase the ratio of recycled raw materials for copper products and bolster raw materials collection systems

- Develop technologies to increase the ratio of recycled raw materials
- Expand facility capacity to increase recycled raw materials collection, etc.

3

Promote Responsible Procurement and Other Measures

Engage in a wide range of ESG measures, including sustainable sourcing, and certification acquisition

- Pursue measures that consider and encourage global environmental conservation, human rights, and contributions to local communities
- Acquire Copper Mark and other certifications that meet ESG standards set by the International Copper Association (ICA)

4

Form Green Enabling Partnerships

Evolve and gain wider use of sustainable copper

- Form partnerships with companies that work together to promote sustainable copper, and accelerate the transition to decarbonized and circular economies
- Engage in product and scrap collection, raw materials reuse, and joint technology development with partners, etc.

Four Key Initiatives to Develop and Disseminate Sustainable Copper

1 Reduce CFP

Third-Party Assurance for Electrolytic Copper CFP

The JX Metals Group calculates electrolytic copper CFP produced at each of our facilities. We became the first copper smelter in Japan to obtain third-party assurance for the results of our calculations.

Under this initiative, we calculated the cradle to gate greenhouse gas emissions (raw materials procurement to product shipment) per kilogram of electrolytic copper produced at the Saganoseki Smelter & Refinery and Hitachi Works in fiscal 2021. Our calculations were in accordance with the GHG Protocol, which is an international calculation and reporting standard. Our results were certified by DNV Business Assurance Japan K.K., a third-party certification organization.

We plan to disclose the calculation results to our electrolytic copper customers in the future. We plan to discuss the results of our calculations with companies participating in the Green Enabling Partnership, addressing the low CFP (calculated using the mass balance method*), the high recycling ratio, and other significant environmental values associated with the supply of electrolytic copper.

*Mass balance method: A method in which a portion of a product is considered to possess properties derived from those of the raw material, depending on the input ratio of raw materials with said properties.

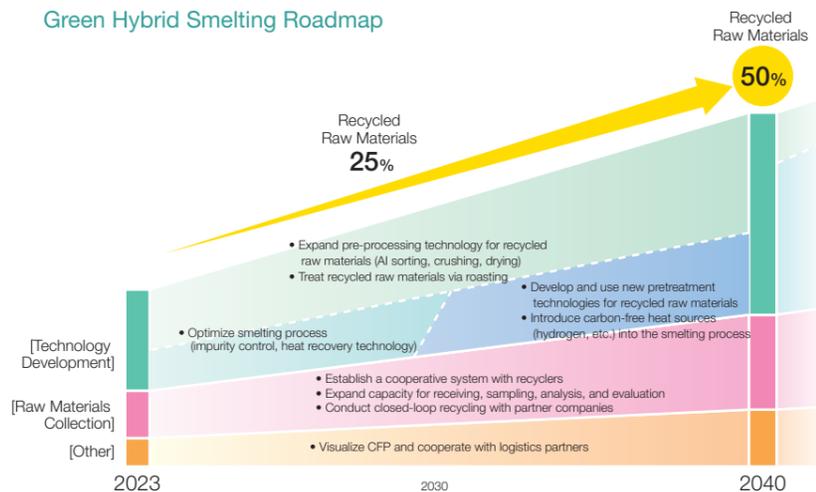


Third-party certification

2 Increase Recycling Ratios

Our flash smelting furnace process not only uses the reaction heat of the raw copper concentrates efficiently to dissolve raw materials, but also uses the excess reaction heat to melt the recycled raw material, eliminating the need for fossil fuels or other resources. We pursue the optimal combination of copper ore and recycled materials through our Green Hybrid Smelting to achieve sustainable production of copper. Here, we aim to evolve Green Hybrid Smelting that uses 50% or more recycled raw materials (input ratio of raw materials or content ratio in products) by 2040. The table on the right shows specific issues and measures.

Green Hybrid Smelting Roadmap



3 Promote Responsible Procurement and Other Measures

Acquisition of The Copper Mark

The Saganoseki Smelter & Refinery and Hitachi Works are engaged in responsible production activities. These facilities were the first in Japan to receive The Copper Mark, a highly credible assurance framework that demonstrates the copper industry's



Saganoseki Smelter & Refinery, JX Metals Smelting Co., Ltd.



The Copper Mark Certification

commitment to the green energy transition.

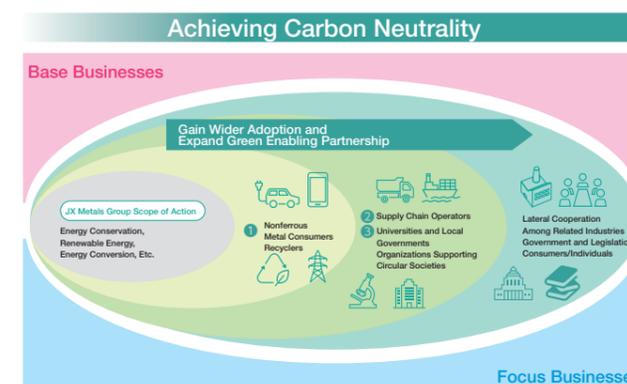
The Copper Mark is a certification program established in 2019 requiring compliance with 32 standards, including standards for the environment, human rights, community, and governance. Both of the business sites will continue to undergo evaluations based on the various standards established under The Copper Mark.

In January 2023, the Caserones Copper Mine (Chile), in which we hold a partial interest, began the process for obtaining The Copper Mark. As international demands for ESG initiatives increase, we will continue efforts to strengthen the competitiveness of sustainable businesses.

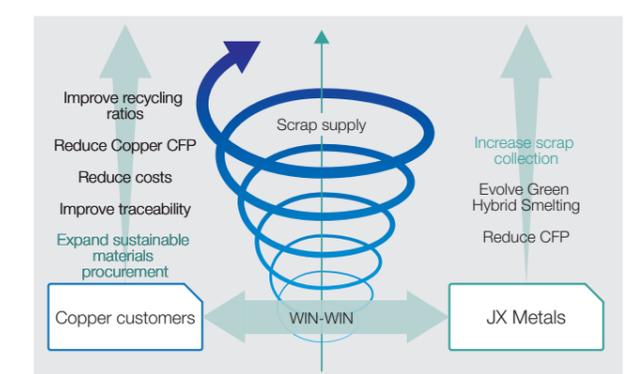
4 Form Green Enabling Partnerships

We form Green Enabling Partnerships with companies who work together to promote sustainable copper. Through these partnerships, we accelerate the transition to decarbonized, circular economies as well as engage in product and scrap collection, raw materials reuse, and joint technology development.

Green Enabling Partnerships Concept



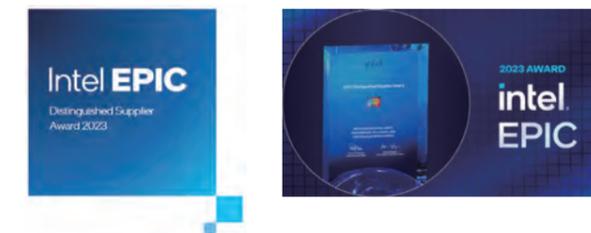
Spiral Model With Partner Companies



1 Partnership With Intel

In August 2023, we established a Green Enabling Partnership with Intel Corporation, a leading company in the semiconductor industry and an advanced company in sustainability. We supply products to Intel, receiving the 2023 EPIC Distinguished Supplier Award. With this new partnership, our relationship with Intel has become even stronger. Under the partnership, we will continue to work toward the evolution and dissemination of sustainable copper.

In terms of increasing recycling ratios, we work with Intel to ensure the effective use of copper resources. Now, we plan to explore the potential of recycling other copper-related materials used in the manufacture of semiconductors. In terms of promoting responsible procurement and other initiatives, our two companies intend to continue efforts to build a responsible and sustainable copper supply chain.



The EPIC Distinguished Supplier Award recognizes suppliers that demonstrate outstanding performance across all evaluation criteria. To be eligible for the award, suppliers must achieve high goals that meet expectations and score 80% or higher in performance evaluations throughout the year.

2 Partnership With BHP

In July 2023, we formed a Green Enabling Partnership with BHP, a leading global resources company. Under this partnership, we will continue to develop a responsible copper supply chain by strengthening traceability and certification of origin for raw materials, pursuing ongoing efforts to develop a responsible copper supply chain. We will work with BHP to reduce GHG emissions from the marine transportation of copper concentrates and sulfuric acid and share knowledge regarding the calculation of electrolytic copper CFP.



3 Partnership With Waseda University

In January 2023, we signed an agreement with Waseda University to establish an endowed chair program* that contributes to carbon neutrality, the circular economy, and our Sustainable Copper Vision, in particular. Waseda University published a carbon neutrality declaration in 2021 and the university aims to achieve net zero CO₂ emissions at each of its campuses by 2032, which is the 150th anniversary of its founding. Under the terms of the agreement, JX Metals and Waseda University will collaborate in the development of highly specialized human resources and the pursuit of basic research related to sustainable copper smelting technology.

*Endowed chair program: A program under which an endowment fund is established using new donations from outside a university, with the funds used to hire faculty members.

