

Sustainable Copper Vision

The JX Nippon Mining & Metals Vision for Sustainable Copper

Why is copper required?

Copper is an essential material for achieving carbon neutrality, thereby 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 towards renewable energy sources such as wind and solar power



4x Renewable energy requires about four times more copper per MW of generating capacity than fossil fuels

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

Mid-stream Expanded transmission and distribution

Power supply through centralized transmission and distribution systems of electricity

Transmission to decentralized transmission and distribution systems



2x Decentralized network requires about twice as much copper as the conventional supply grid

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

Downstream Shift in electricity usage

Vehicle design and supply chain creation using internal combustion engines as the energy source

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



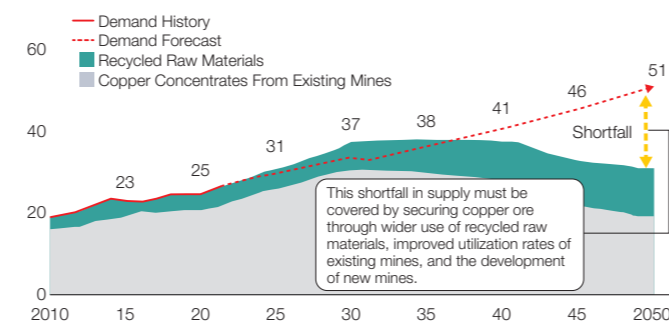
4x Electric Vehicles incorporate and use about four times more copper than internal combustion engine vehicles

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

What is Sustainable Copper?

Meeting increasing demand for copper requires an increased supply of copper ore and recycled raw materials

Projected Future Demand by Source (Refined Copper, Units: Millions of tons)



*Compiled by JX Nippon Mining & Metals based on IHS Global Insights, MineSpans

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.

Green Hybrid Smelting for Sustainable Copper that fulfills two missions

Achieving Two Missions in Parallel

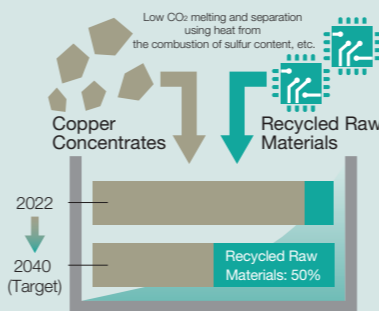
Offer a Stable Supply System to Support Growing Demand

Conduct ESG-Oriented Production and Supply (Decarbonized, Circular Economy, Etc.)

- **Stable Supply Capacity**
Ensure stable supply capacity to meet growing copper demand by a hybrid combination of copper concentrates and scrap raw materials
- **Reduce Carbon Footprint (CFP)**
Maximize the utilization of heat from the combustion of sulfur content, etc. contained in copper concentrates and use renewable energy in mines and smelters, etc.
- **Increase Percentage of Recycled Raw Materials**
Increase the percentage of recycled raw materials (input ratio of raw materials or content ratio in products) to 50% or more through technological development, the establishment of a raw materials collection system, etc.
- **Promote Responsible Procurement**
Acquire the Copper Mark* (industry ESG standard), etc.
- **Make Capital Investments**
Continue to invest in facilities to increase production of high-performance copper products that support higher percentages of recycled raw materials, greater energy efficiencies, etc.

Green Hybrid Smelting

Green Hybrid Smelting Combines the Use of Copper Concentrates and Scrap



JX Nippon Mining & Metals Copper Products

We supply copper products through 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.

What Measures Will We Take?

We will pursue four measures to evolve and gain wider use of 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.



*Copper Mark
In March 2022, the Saganoseki Smelter & Refinery and Hitachi Works of JX Metals Smelting Co., Ltd. began procedures to obtain Copper Mark certification. Copper Mark is an international accreditation for responsible copper production. This is the first attempt by a company in the Japanese nonferrous metal industry to earn this accreditation.