

**IR-Day 2024**

# **Briefing for Medium-Term Targets and roadmap to achieve Carbon Neutrality**

**April 10, 2024**



I'm Okamoto of Technology Division, thank you for joining us today.

I will explain about Medium-Term Targets and roadmap to achieve Carbon Neutrality, officially announced on Dec. 26, 2023.

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Today, the four points as you see them will be explained.

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First, I will explain about Sustainability of SMM Group.

# Sustainability of SMM Group

Through our Corporate Philosophy of “co-existence with the global environment and society” and “respect for all individuals, ” which are based on Sumitomo Business Spirit, placing value on social trust and mutual relationships, we seek to balance the sustainable development of society with sustainable growth of our company.

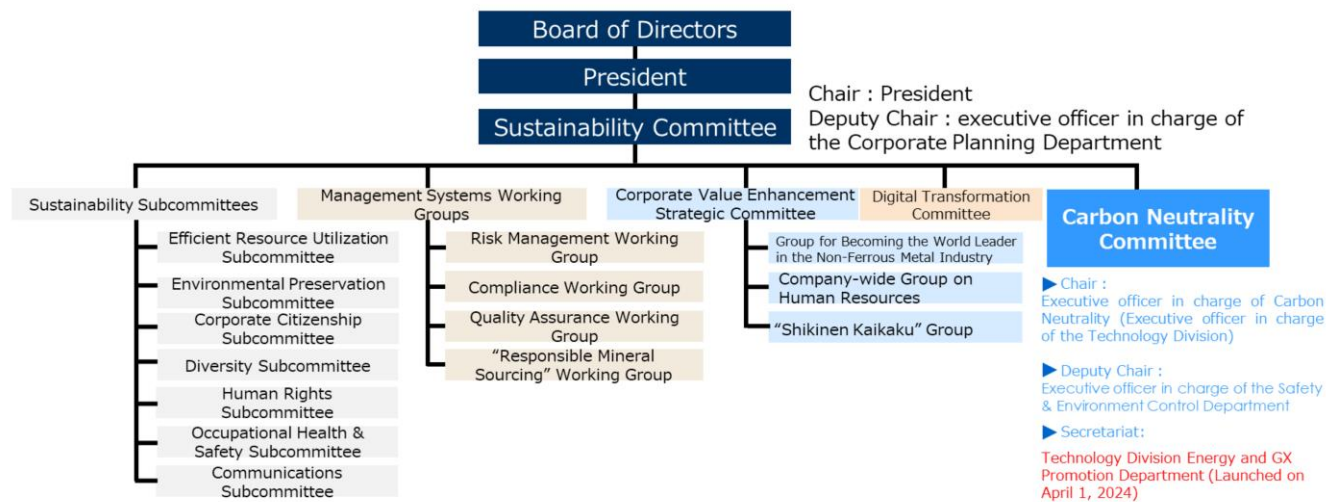


Under our Business Spirit and Management Philosophy, the management principles, "Coexistence with the global environment and society" and "Respect for all individuals" take place and we have organized our 11 key sustainability issues by the areas of "Global Environment," "Society," and "Individual."

Climate change, which is the subject of today's presentation and is shown on the left side of the diagram, is one of the key sustainability issues.

# Sustainability Promotion Structure

- Promote sustainability activities centered on the Sustainability Committee chaired by the President
- The Board of Directors exercises oversight by receiving and discussing regular reports on sustainability activities.



The Company's Sustainability Committee, chaired by the President, is the core of the Company's company-wide sustainability activities, and has five subordinate organizations under its umbrella, including the Carbon Neutrality Committee.

The Carbon Neutrality Committee was established in April 2022 for the purpose of clarifying policies for achieving carbon neutrality and strongly promoting activities through company-wide business activities.

The Board of Directors receives regular reports from the Sustainability Committee and functions to oversee its activities.

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Next, roadmap to achieve Carbon neutrality in 2050 will be explained.

# Vision and Targets for 2030 against Climate Change

Material  
Issues

Climate Change

## Vision for 2030

A company that actively undertakes climate change countermeasures, by reducing emissions and stably supplying products contributing to a low-carbon society, a future with zero greenhouse gases (GHGs)

### •Revise of KPI targets

Reduce GHG emissions by 38% or more compared to FY2015  
(More than 50% in Japan, 24% out of Japan),

Promote various measures to achieve “Net Zero GHG Emissions by 2050”

Underline the areas to be revised in December 2023

SMM has established a vision for 2030 for each material issues.

"Climate Change," one of the material issues for the vision for 2030, is working toward a goal "A company that actively undertakes climate change countermeasures, by reducing emissions and stably supplying products contributing to a low-carbon society, a future with zero greenhouse gases (GHGs)."

We have revised our KPI target to reduce GHG emissions by 38% or more from the base year of FY2015, in line with the roadmap to become carbon neutral by 2050, which was formulated in December last year.

■ **Substantial increase of the target in the Paris Agreement on Climate Change, from 2°C target to 1.5°C target (COP26)**

26% reduction in 2030 ► **45% reduction in 2030, Net Zero in 2050**

**Stricter Emission Reduction Regulations**

- Raise the Japanese government's 2030 target (46% reduction by 2030)
- Establishment of GX League (join in April 2024)
- GX Promotion Act (emissions trading system, fossil fuel levy)
- European Battery Regulation (mandatory calculation of CFP, prohibition of products with high CFP on the market)
- European carbon border adjustment measures (carbon levy)

**Stricter disclosure regulations**

- Recommendations of TCFD
- Revision of Corporate Governance Code
- Mandatory disclosure of climate-related information in Annual Securities Reports
- ISSB/IFRS climate-related information disclosure requirements

Since the 2030 climate change target established in March 2020, social conditions have changed dramatically, and the Paris Agreement on Climate Change target was raised from 2°C to 1.5°C at COP26.

As a result, a 45% reduction in GHG emissions by 2030 and a net-zero by 2050 have become common global goals, climate change measures are being accelerated and regulations are being tightened on companies.

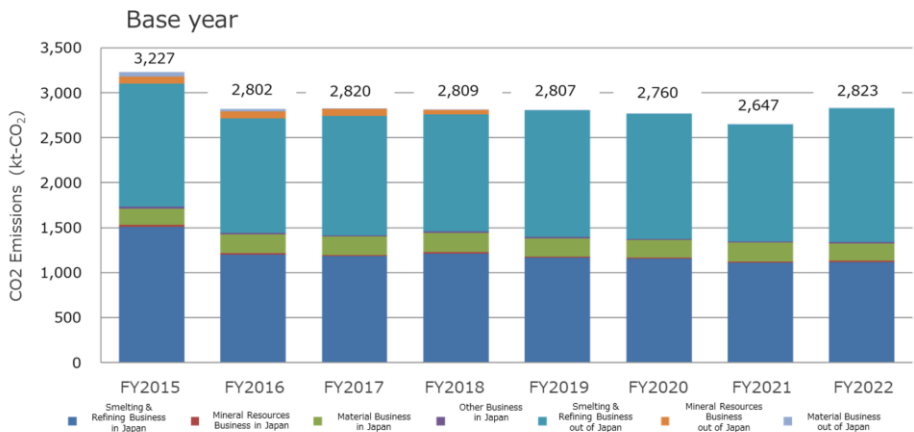
These changes have affected the business environment of the SMM Group, and we have decided to review our roadmap formulation and 2030 targets.



# GHG emissions (scope1+2) remain flat

## ■ GHG emission for FY2022 was 2,823k tons-CO<sub>2</sub>, Smelting business accounts for 90%

- In smelting, a decline in the grade of raw ore, and deterioration in energy emissions intensity due to increased impurities, are offsetting improvement by energy conservation ➡ Difficult to achieve reduction targets by conventional extension



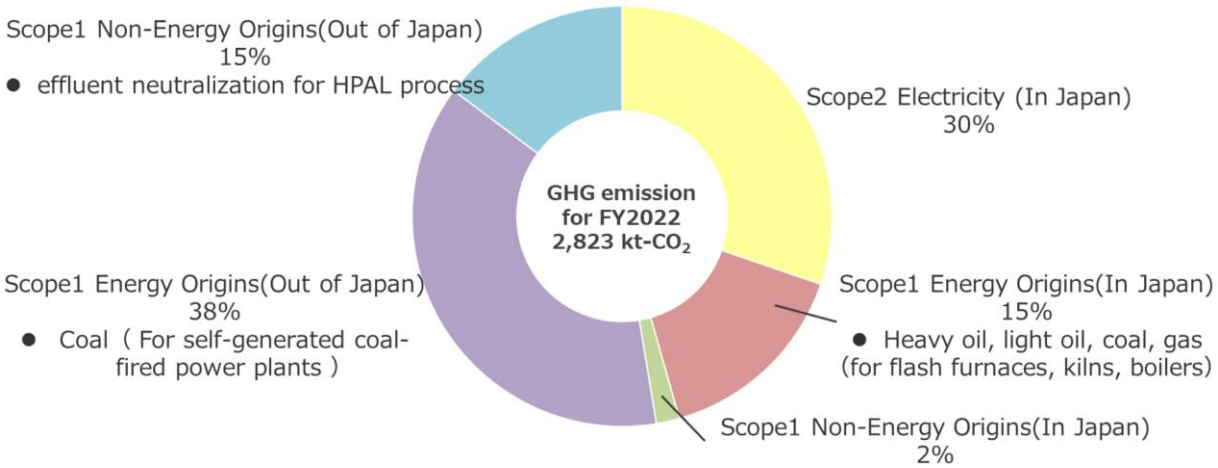
The total GHG emissions of the SMM Group were 2,823k tons in FY2022, with the smelting business accounting for 90% of the total emissions.

Although the smelting business has been promoting energy conservation and higher efficiency, the decline in the grade of raw ore and the increase in impurities require more energy to maintain the quantity and quality of products, and as a result, GHG emissions have continued to remain flat.

For these reasons, it is difficult to achieve the mid-term target I have just explained through conventional energy conservation efforts alone.

# [Reference] Breakdown of GHG emissions (scope1+2)

Scope1(Energy Origins) ; GHG emissions by businesses themselves(Fuel combustion)  
Scope1(Non-Energy Origins) ; GHG emissions by businesses themselves(Chemical reactions in production processes)  
Scope2 ; Indirect GHG emissions generated through the use of electricity, heat, and steam supplied by other companies



A breakdown of GHG emissions in FY2022 shows that 30% of emissions come from electricity in Japan, 15% from fuel oil and coal, 38% from coal-fired power generation at a nickel smelting plant in the Philippines, and 15% from chemical reactions to neutralize acidic liquid waste from the smelting process.

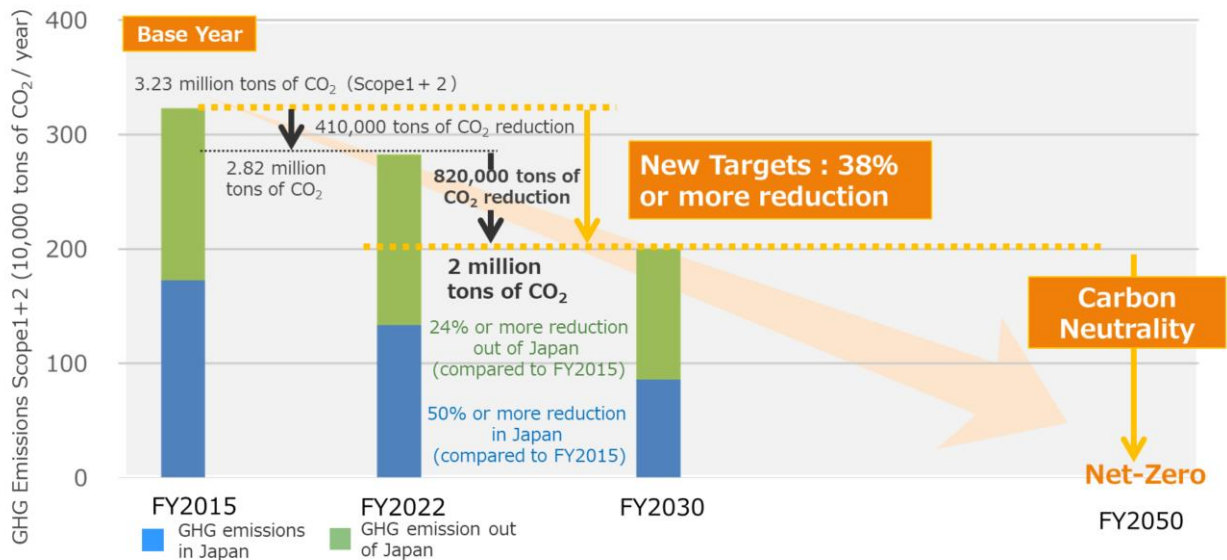
To reduce GHG emissions, it is important to identify these sources and promote appropriate measures for each.

Later in the presentation of individual case studies, we will explain our measures for each source.

Roadmap to achieve Carbon Neutrality in 2050

Official announcement  
December 26, 2023

■ Reduction target for FY2030 : 38% or more reduction compared to FY2015 (More than 50% in Japan, 24% out of Japan)



This chart summarizes the roadmap announced in December for the SMM Group to achieve carbon neutrality by 2050.

GHG emissions under Scope 1 and Scope 2 in FY2022 were 2,820k tons, and a mid-term target of reducing GHG emissions by 38% or more from the FY2015 level by FY2030 have set, specifically to 2,000k tons or less.

Breaking down this FY2030 reduction target into Japan and out of Japan, we are aiming for a reduction of at least 50% in Japan and at least 24% out of Japan.

# Initiatives to achieve Carbon Neutrality in 2050

Official announcement  
December 26, 2023

Initiatives to FY2022		Initiatives for FY2030	Initiatives for FY2050
Process Improvement	<ul style="list-style-type: none"> <li>Energy saving and higher efficiency</li> <li>Restructuring of production system (Harima Refinery·Hyuga Smelting Co., Ltd and others)</li> </ul>	<b>Maximize use of available technology</b> <ul style="list-style-type: none"> <li>Thorough energy saving and higher efficiency</li> </ul>	Introduction of case studies
Energy Conversion	<ul style="list-style-type: none"> <li>Transition from heavy oil to LNG (Isoura Plant·Nickel Refinery)</li> <li>Introduction of solar and geothermal binary power generation (Hishikari Mine·Ome District Div. and others)</li> </ul>	<ul style="list-style-type: none"> <li>Expand conversion from heavy oil and coal to LNG and woody biomass fuel</li> <li>Electrification of heat-using equipment</li> <li>Expand introduction of renewable energy generation</li> <li>Use of carbon credits</li> </ul>	Ongoing Initiatives
Improvement in modulated power discharge coefficient	<ul style="list-style-type: none"> <li>Switching to renewable electricity (Harima Refinery·Hishikari Mine)</li> </ul>	<ul style="list-style-type: none"> <li>Expand use of renewable electricity</li> <li>Use of Renewable Energy Certificates</li> </ul>	Introduction of new technology
Technology Development	<ul style="list-style-type: none"> <li>Exploration and Basic Research</li> </ul>	<ul style="list-style-type: none"> <li>Pilot and Demonstration Tests</li> </ul>	<ul style="list-style-type: none"> <li>Demonstration and commercialization of our unique innovative smelting process</li> </ul>
Use of External Technology		<ul style="list-style-type: none"> <li>Study and preparation for application of new technology</li> </ul>	<ul style="list-style-type: none"> <li>Use of green hydrogen, green ammonia, and synthetic methane</li> <li>Use of CO2 separation, recovery, and immobilization technologies (CCUS)</li> </ul>

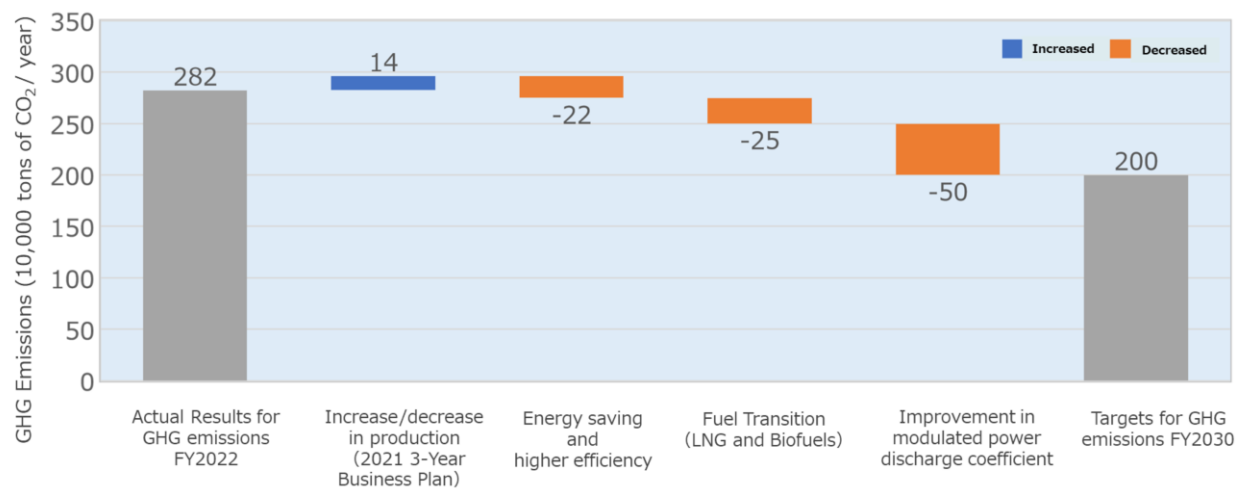
Toward the target of 2030, the Group will thoroughly pursue energy conservation and higher efficiency, and maximize the use of existing technologies, such as switching from heavy oil and coal to LNG and wood biomass fuels, expanding the installation of in-house power generation facilities for solar power and other renewable energy sources, and using renewable energy menus.

To achieve carbon neutrality by 2050, we will continue these efforts and, on the premise of innovation and social implementation of decarbonization technologies, take on the challenge of developing innovative technologies for smelting processes that are currently difficult to reduce and utilize new technologies such as green hydrogen, green ammonia, and synthetic methane.

Details of the technologies hatched in yellow will be explained in more detail later.

■ **Concept of Initiatives**

Maximize use of available existing technologies and develop low-GHG manufacturing process technologies as thorough energy conservation and efficiency improvement at plants, fuel conversion to LNG and woody biomass, conversion of procured electricity to renewable energy, etc.



Next, to explain the projected GHG reductions due to major initiatives to achieve the FY2030 reduction target.

Based on 3-year business plan formulated in FY2021, the projected increase or decrease in GHG emissions due to changes in business operations shows that GHG emissions will increase by 140k tons due to business expansion.

On the other hand, through the GHG reduction efforts described on the previous page, we expect to reduce GHG emissions by 220k tons through energy conservation and higher efficiency, 250k tons through conversion to LNG and wood biomass fuels, and 500k tons through reduction of emission factors by electric power companies, for a total reduction of 820k tons by FY2030, or 38% of the FY2015 level.

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Now, let us introduce some case studies of initiatives to reduce GHG emissions in our group.

## ■ Decided to introduce the ICP system in September, 2020

### Operation starts from FY2021 budget

- ICP Price:

**JPY20,000/t-CO<sub>2</sub> (Increased from JPY5,000 in FY2022)**

- ICP Subject:

After evaluating their profitability, projects that contribute to the enhancement of our group's technological capabilities and corporate value through GHG reductions

**Applies not only to capital investment but also to the cost of introducing renewable energy**

- Application Examples:

LNG fuel conversion , Biofuel co-firing , Fan efficiency improvement , Solar power generation , Steam reduction , Exhaust heat recovery , Boiler feed water quality improvement, etc.

The SMM introduced the Internal Carbon Pricing System in September 2020 and began operating the system in the FY2021 budget.

This system aims to raise decarbonization awareness and reduce GHG emissions, and the price will be reviewed based on market trends and the effectiveness of the system.

The price was 5,000 yen at the time of introduction, but was raised to 20,000 yen in FY2022, based on climate scenarios published by the International Energy Agency (IEA).

Internal Carbon Pricing is applied not only to capital investment but also to the cost of introducing renewable energy, contributing to the improvement of technology and corporate value.



### ■ Nickel Refinery (Nickel)・Isoura Plant (Battery Materials)

- Transit fuel used in boilers at Nickel Refinery and Isoura Plants from heavy oil to LNG in stages from FY2022 to FY2023
- GHG emissions reduction(year) : About 13,000 t-CO<sub>2</sub>

### ■ Toyo Smelter & Refinery (Copper)

- LNG conversion of drying facilities, steam superheating facilities, etc. is underway from FY2023 to FY2025

\*Reduces heavy oil-derived CO2 emissions by approximately 20 to 30%



LNG Boiler Facilities  
(Nickel Refinery)

From here, our case studies to reduce greenhouse gas emissions will be explained.

In Niihama City, Ehime Prefecture, our production base, there are three major plants: the Toyo Smelter & Refinery for copper smelting, the Nickel Refinery for nickel smelting, and the Isoura Plant for producing cathode materials.

With the completion of the LNG terminal in Niihama City in March 2022 and its supply infrastructure, these three plants are currently undergoing refurbishment to convert fuel for boilers from heavy oil to LNG, which emits less CO2.

When all conversions are completed, we expect to reduce emissions by about 13,000 tons per year.



■ CBNC, THPAL

- Started woody biomass co-firing test for coal-fired power plant (in-house power generation) in FY2023
- Aiming for a gradual increase in the ratio of co-firing



Wood pellets  
(source : wood pellets- Wikipedia)

■ Hyuga Smelting Co., Ltd., Shisaka Smelting Co., Ltd., etc.

- Study on co-firing coal (used as fuel and reductant in rotary kilns) with woody biomass



CBNC

Issues

- Confirmation of stability of boiler and kiln operation when increasing the proportion of wood pellets
- Procurement of required quantity of wood pellets

Our efforts to replace coal with woody biomass fuels would be explained.

Our two overseas smelters, CBNC and THPAL, extract nickel and cobalt from low-grade nickel oxide ore to produce intermediate materials for electrolytic nickel and battery materials.

These two plants secure their own electricity and steam through on-site coal-fired power generation, which accounts for a large proportion of their GHG emissions.

Thus, starting in 2023, we are conducting a trial of mixed combustion by replacing part of the coal with woody biomass fuel.

The Hyuga and the Shisaka Smeltings, smelters in Japan, are currently studying trials to convert part of the coal they use as fuel and reductant for their kilns to woody biomass fuel.

In these trials, we will gradually increase the percentage of woody biomass fuel in the mixing ratio and check the impact on the facilities and operations.

In addition, stable procurement of woody biomass fuel is also being considered.

■ Use of power company's renewable energy menus

- Our Group's GHG emissions from electric power generation (in Japan) account for 30% of the total (FY2022 results) , Sequentially switch to renewable energy menu for Harima Refinery, Hishikari Mine, Hyuga Smelting, Head office building, etc.



Harima Refinery



Hishikari Mine



Hyuga Smelting Co., Ltd.



Head office building

■ Collaboration with offshore wind farm operators

- Establishing collaborative relationship with Sumitomo Corporation and TEPCO Renewable Power, Inc. after being selected as offshore wind farm operator in Ejima, Saikai City, Nagasaki Prefecture, Considering using green power from wind power generation

Issue

- Reduction of CO2 emission factor for electric power companies

I would like to explain about the conversion of electricity the SMM procure from electric power companies to renewable energy.

The SMM Group's GHG emissions from electric power in Japan account for 30% of its total emissions.

We are gradually reducing GHG emissions by using the renewable energy menus of electric power companies.

In addition, the SMM established a cooperative relationship with Sumitomo Corporation and TEPCO Renewable Power, Inc. in December last year for the offshore wind power generation project they are planning and executing, and are now considering the use of green power generated by wind power.

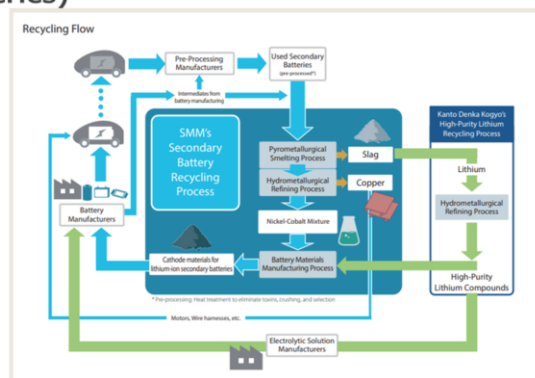
We are considering of issue how emission factors of electric power companies to be reduced in the future.

### ■ Development and demonstration of high-performance cathode materials for next-generation storage batteries (Research and development of high-performance storage batteries and materials)

- Developing **high-performance cathode materials and low-cost, low-GHG-emission mass production processes** that will enable the commercialization of high-performance lithium-ion batteries, including all-solid-state batteries, by 2028

### ■ Development and demonstration of storage battery recycling process (Development of technologies related to the recycling of storage batteries)

- Create and expand a business that recovers copper, nickel, cobalt, and lithium from used lithium-ion batteries and other rechargeable batteries and recycles them horizontally, using our nonferrous metal smelting technology and lithium recovery technologies of KANTO DENKA KOGYO CO.,LTD
- Plant construction is scheduled to start in FY2024 and to be completed in June 2026



To achieve carbon neutrality by 2050 on a global scale, existing technologies alone will not be sufficient.

We will explain about our participation in the Green Innovation Project of the New Energy and Industrial Technology Development Organization (NEDO) and the technological developments we are pursuing.

In the area of "Development of Next-Generation Storage Batteries and Motors," the SMM was selected for two themes: "Research and development of high-performance storage batteries and materials" and "Development of technologies related to the recycling of storage batteries."

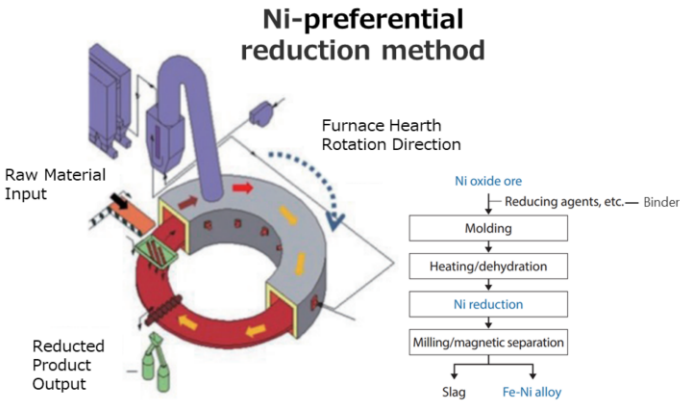
The first is "Development and demonstration of high-performance cathode materials for next-generation storage batteries."

We are developing high-performance cathode materials that enable the commercialization of high-performance lithium-ion batteries, including all-solid-state batteries and a low-cost, low-GHG emission mass production process with the aim of commercialization in 2028.

The second is "Development and demonstration of storage battery recycling process," which involves the creation and expansion of a business that recovers copper, nickel, cobalt, and lithium from used lithium-ion batteries and other rechargeable batteries using our nonferrous metal smelting technology and Kanto Denka Kogyo's lithium recovery technology, and recycles them horizontally.

Construction of the demonstration plant is scheduled to start in fiscal 2024 and be completed in June 2026.

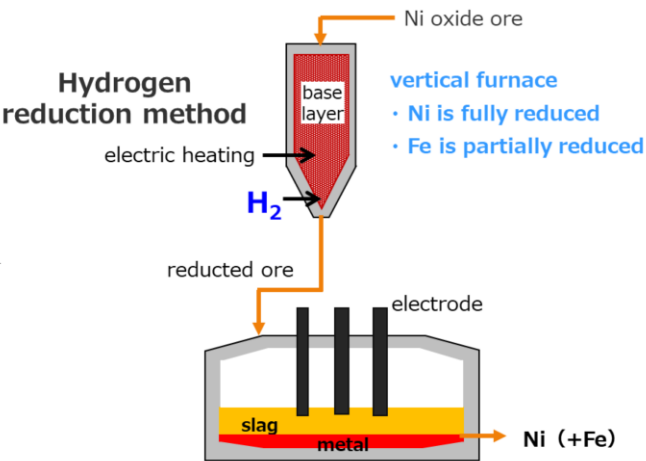
■ New CN Nickel Smelting Process



Can be processed at **lower temperatures for short periods of time**

- ⇒ **Significant reduction in GHG emissions and energy use**  
**Zero GHG emissions by using biomass-reductant + green electricity for heat source**

**Target : Commercial operations starts by 2050**



Reduction by hydrogen only

- ⇒ **Zero GHG emissions and fully carbon neutral**  
... **Target nickel recovery ratio demonstrated experimentally**

**Target for near future :  
Pilot testing to start in 2030**

We will explain the new pyrochemical smelting process to become carbon neutral.

The figure on the left shows a process that uses a reaction device called a rotary hearth furnace to efficiently reduce nickel.

This process allows for lower temperatures and shorter processing times than conventional methods, and is expected to significantly reduce GHG emissions and energy use.

Also, by using bio-based materials as reductants and green electricity as the heat source, GHG emissions can be reduced to zero.

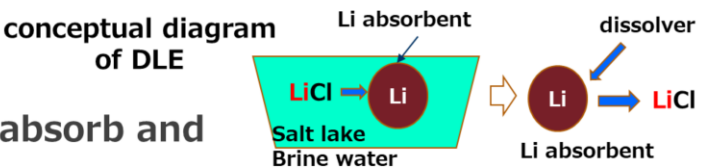
The figure on the right shows how hydrogen can be used to recover nickel-reduced metal from nickel oxide ores, a process that was previously considered difficult.

The feasibility study through basic testing has allowed us to achieve our recovery targets for nickel-reduced metal.

Currently, we are working on the development of the entire process, including consideration of the equipment that will make this possible, with the aim of starting pilot tests by 2030.

### ■ Demonstration test to recover lithium from a salt lake (direct lithium extraction method)

- Developed a process for selective adsorption and recovery of lithium (DLE) that uses as little CO2-generating chemicals as possible in the manufacturing process
- Currently, the process reliability is being verified at the pilot plant scale, the adsorbent is being improved, and the target salt lakes for lithium recovery are being narrowed down, with the aim of completing the process by 2030



### ■ Development of technology to absorb and fix CO2 using waste ore

- Magnesium ore accompanying nickel oxide ore has a high CO2 absorption capacity, thus promoting joint research with universities to realize high-speed and large-volume CO2 fixation
- Due to the large volume of ore to be handled, a realistic CO2 absorption method will be studied and demonstrated, aiming to complete the process by 2050

Next, I will explain two technologies that are in the basic study stage.

First, regarding the new lithium recovery technology, lithium is a very important metal as a battery material as you may know.

Lithium resources can be divided into two main categories: ore-based and salt lake-based, both of which generate enormous GHG emissions for generation into lithium chemical products.

Although lithium recovery from salt lake brine generates relatively less GHGs than ore, it still used large amounts of slaked lime and other agents that generate large amounts of CO2.

We have developed a technology called DLE, which selectively recovers lithium using an adsorbent, and have begun demonstration tests at a pilot plant in South America.

This will allow us to test salt lake brines in various regions on a pilot scale, with the goal of technological perfection within the next few years.

We have also begun development of a technology that uses waste ore to absorb and fix CO2.

We are using HPAL technology to recover nickel from low-grade nickel oxide ores, which have large amounts of magnesium-bearing ores around and beneath them.

Since magnesium has a high capacity to absorb CO2, we are conducting joint research with the University of Tokyo to investigate a technology to immobilize CO2 in combustion exhaust gas from thermal power generation onto magnesium ore.

Although it's not easy to make it economically feasible due to the large amount of ore and exhaust gas to be handled, we are studying a realistic CO2 absorption method and conducting demonstration tests, with the aim of commercializing this method by 2050.



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Finally, here are some of our other initiatives.

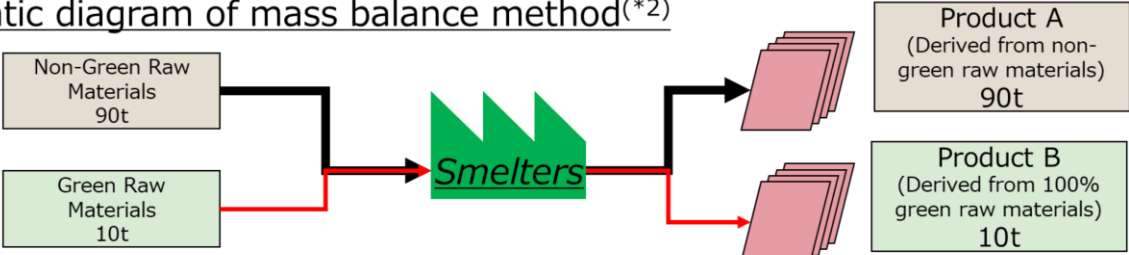
# SMM green metal concept using mass balance method

## ■ Embodying the SMM Green Metal Initiative to provide low GHG emission products

- For electrolytic copper, obtained limited assurance from a third-party organization on the carbon footprint (CFP) calculation and the Chain of Custody(CoC) process in April 2024 and planning to provide low GHG emission electrolytic copper (green copper) using mass balance method (\*1)

\*1: a method of assigning a characteristic to a portion of the product to be produced according to the input ratio of the raw material with a certain characteristic when raw materials with different characteristics are mixed

### schematic diagram of mass balance method(\*2)



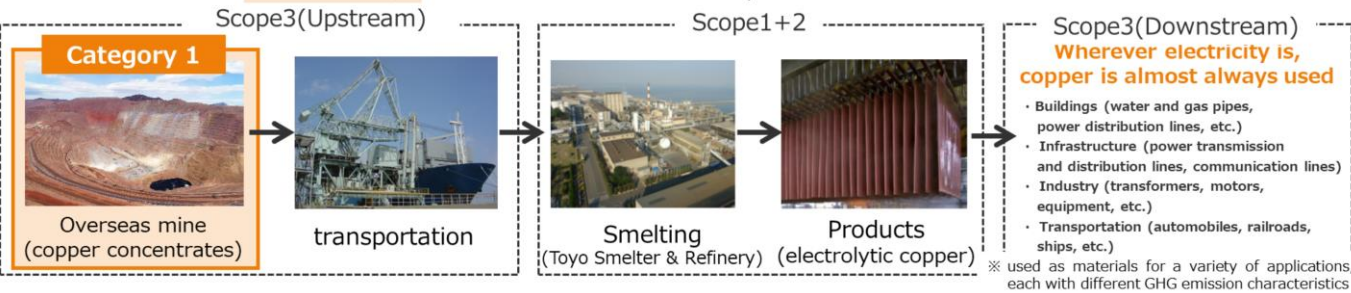
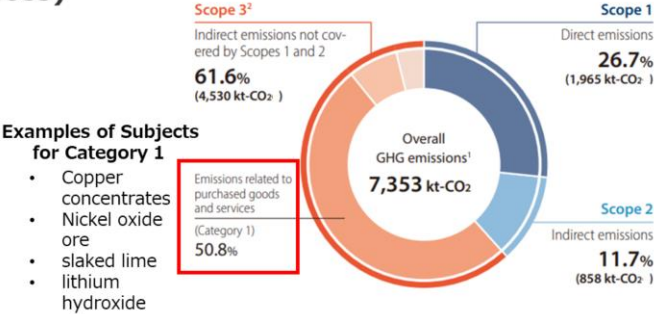
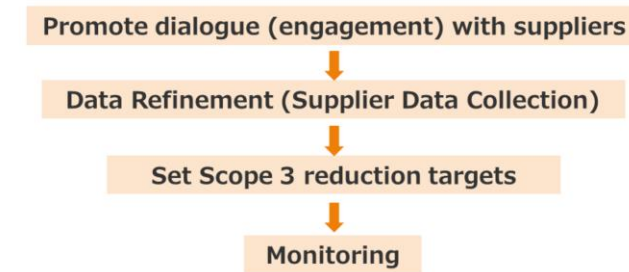
\*2: Schematic diagram created with reference to the following source  
Ellen MacArthur Foundation "Enabling a Circular Economy For Chemicals With the Mass Balance Approach",

**consider obtaining limited assurance for CFP and CoC by third-party organizations for other metals in FY2024**

We are considering supplying SMM green metal using the mass balance method. Currently, we have been working towards providing electrolytic copper with low-GHG using a mass-balancing method. we have received assurance from a third-party organization regarding the carbon footprint of our electrolytic copper and the adequacy of our processing and distribution processes, and we plan to obtain certification shortly. These efforts will be studied for metals other than electrolytic copper in the future.

# Initiatives to reduce Scope 3

## Category 1 (purchased products and services) is the hot spot



I will explain the initiatives to calculate and reduce Scope 3, which is often talked about these days.

We calculate mainly upstream Scope 3 emissions, based on the basic guidelines of the Ministry of the Environment and the Ministry of Economy, Trade and Industry, and disclose the results in our Sustainability Report.

Scope 3 emissions total 4,530k tons, or about 60% of total Scope 1, 2, and 3 emissions.

Particularly, Scope 3 Category 1 areas related to the purchase of products and services account for approximately 80% of Scope 3 emissions.

Copper concentrates and nickel oxide ores account for a large portion of this total.

Through dialogue with these suppliers, we will gather information on their initiatives to reduce GHG emissions, refine the Category 1 data, and set reduction targets.

The downstream Scope 3, such as processing and use of our products, is difficult to calculate because our products are made of nonferrous metals such as copper and nickel and functional materials, which are used in various applications after the point of sale, and each application has different GHG emission characteristics.

We will continue to study the scope and method of downstream Scope 3 calculation.



Development of Low-Carbon Contribution Products and Business Development

■ Target for FY2030: Expansion of GHG reduction contribution of low-carbon contribution products more than 600kt-CO<sub>2</sub>

- Battery cathode materials for use in automobiles
- Near-infrared absorbing materials (for automotive glass)



Actual results for FY2022  
540kt-CO<sub>2</sub>/year

Increased production capacity of battery cathode materials

- Construction of New Niihama Refinery (Nickel-based)
- Development of new process technology for LFP (lithium iron phosphate) cathode materials

Development and sales expansion of high-functional materials

- Launch of 「SOLAMENT®」, a material technology brand for CWO®(Near-infrared absorbing materials) → Entering the apparel and building materials industries, promoting collaboration
- Expansion of SiC(silicon carbide) substrate production
- Development and deployment of materials related to hydrogen production

Examples of low-carbon contribution products

	Contribution of SMM materials within the final product		→ Large
in process for mass-produced	<div>Ni powder</div> <div>magnet</div> <div>Copper poly</div>	<div>CWO</div>	<div>Battery cathode materials</div>
			Low-carbon contribution product (current)
preparing for mass production		<div>SiC</div> <div>Low-carbon contribution product (candidate)</div>	<div>LFP</div>
Research and development stage			<div>Related Hydrogen production</div> <div>· Nickel Oxide</div> <div>· Scandium</div> <div>· Photocatalyst</div>

Finally, our low-carbon contribution products will be explained.

We place importance on contributing to the reduction of GHG in society as a whole through the development and business deployment of products that contribute to low carbon emissions.

Currently, the goal is to achieve a reduction contribution of at least 600k tons from low-carbon contributing products by 2030.

In FY2022, the total reduction contribution from automotive battery cathode materials and near-infrared absorbing materials amounted to 540k tons.

Currently, silicon carbide (SiC), battery cathode materials of lithium iron phosphate, and materials related to hydrogen production are in the research and development stage, but we will continue to develop and commercialize these products as low-carbon contributing products that will also contribute to reducing GHG in society.

Once we have an estimate of the amount of reduction contribution from these new areas, we plan to revise our current target of more than 600k tons.

That is all for my explanation.

Thank you very much for your attention.

## Disclaimer

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