



# Nippon Steel Sustainability Report 2021

Nippon Steel Corporation Sustainability Report 2021 (April 2020 to March 2021)



Printed in Japan



**NIPPON STEEL CORPORATION**

# Make Our Earth Green



Nippon Steel adopts our own new initiative “Nippon Steel Carbon Neutral Vision 2050 — A Challenge of Zero-Carbon Steel”, as a part of our widespread efforts toward achieving a decarbonized society. we will consider and implement various measures as a top priority management issue in order to continue to lead the world’s steel industry.

## Corporate Philosophy

Nippon Steel Corporation Group will pursue world-leading technologies and manufacturing capabilities, and contribute to society by providing excellent products and services.

### Management Principles

- 1** We continue to emphasize the importance of integrity and reliability in our actions.
- 2** We provide products and services that benefit society, and grow in partnership with our customers.
- 3** We pursue world-leading technologies and manufacturing capabilities.
- 4** We continually anticipate and address future changes, innovate from within, and pursue unending progress.
- 5** We develop and bring out the best in our people to make our Group rich with energy and enthusiasm.

### Editorial policy

This Sustainability Report is the 24th since the former Nippon Steel Corporation issued what is the first sustainability report by a Japanese steel manufacturer, in 1998. We believe it is extremely important to promote business activities that contribute to the realization of a sustainable society. We are therefore committed to diverse initiatives based on this idea.

In this report, in order to clearly express our approach toward helping realize a sustainable society, we present our Environment, Social, and Governance (ESG) initiatives, which we consider to form the basis for supporting our sustainable growth. To augment the details, we added representative examples. Please use the link to the relevant website URL on each page to see more details.

### Period covered

The period covered in the report is fiscal 2020 (from April 2020 to March 2021). For some activities, the period from April 2021 to June 2021 is included.

### Boundary of report

- Environmental and social aspects: Activities of Nippon Steel and its group companies in Japan and overseas
- Economic aspects: The Integrated Report 2021 of Nippon Steel (issued in August 2021) also covers the contents of the economic report.

### Reference for guidelines

- GRI (Global Reporting Initiative) Standards
- “Environmental Reporting Guidelines 2018” by the Ministry of the Environment
- Final Report: Recommendations of the Task Force on Climate-related Financial Disclosures (TCFD), established by the Financial Stability Board

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# Message from the President



## Towards the Realization of a Sustainable Society, and the SDGs

**Eiji Hashimoto**  
Representative Director and President

I would like to thank our shareholders and all other stakeholders for your understanding and support to the Nippon Steel Group.

In March of this year, we announced a new medium- to long-term management plan, with the aim of continuing to grow to “become the best steelmaker with world-leading capabilities,” that supports Japan’s industrial competitiveness. One affirmative policy in the plan is our approach to the “Challenge to Zero-Carbon Steel.” We have identified the challenge as being to radically reduce CO<sub>2</sub> emissions through the development of breakthrough technologies and believe this to be our greatest priority issue. Our basic approach is to win the development competition with other countries and continue to lead the world’s steel industry. Through these efforts, we are committed to establishing a virtuous cycle of environmental sustainability and corporate growth and improving corporate value.

In this Sustainability Report 2021 we are pleased to present to you a description of our “Challenge toward Zero-Carbon Steel” and other wide-ranging initiatives in regard to the Environment, Social, and Governance (ESG) issues we face as we advance toward realizing a sustainable society.

### Environmental initiatives

Having positioned environmental matters as priority issues that underlie our corporate management as stated in our Basic Environmental Policy, we have pledged to contribute to the creation of a society oriented toward environmental preservation and with low environmental impact. We continue to proactively undertake diverse environmental issues concerning wide-ranging areas of concern, from local communities to the entire planet,

including climate change issues, creation of a circular economy, and maintenance and enhancement of a favorable living environment.

While we are advancing initiatives for the Sustainable Development Goals (SDGs) adopted by the United Nations, we recognize climate change issues as a priority problem that may threaten survival of the human race.

The Challenge to Zero-Carbon Steel has two aspects. The first aspect is our action to contribute widely to the realization of a green society through providing users with our technology and products in Japan and overseas. This also a business opportunity for us. As an upfront investment in this effort, we have decided to make investment in improving the capacity and quality of electrical steel sheets, and in building a next-generation hot-rolling mill at the Nagoya Works.

The second aspect is a challenge to develop a new production process aimed at radically reducing CO<sub>2</sub> emissions in the manufacturing process. This requires a challenging advanced technical development, including in unexplored areas. This is by far the most difficult challenge in the history of the steel industry. We are taking this dramatic change in the business environment as a great opportunity to reestablish our overwhelming superiority in the world steel industry, and we are determined to actively address it as a top management issue. By taking advantage of our world’s best technology development capabilities, we will take on the challenge to develop a zero-carbon steel manufacturing process ahead of other countries and start actual use of it by 2050. Further, we intend to provide zero-carbon steel and thereby contribute to our customers’ reduction of CO<sub>2</sub> emissions.

Through the development and practical implementation of breakthrough technologies ahead of other countries, we aim to reduce CO<sub>2</sub> emissions by

30% compared to 2013 in 2030 and achieve carbon neutrality in 2050. Zero-carbon steel, however, cannot be achieved by the challenge of the steel industry alone. It is indispensable for the entire society to make efforts toward carbon neutrality. In addition to the steel industry’s efforts on R&D and equipment installation concerning zero-carbon steel, the society’s efforts at the establishment of an infrastructure capable of supplying abundant, inexpensive hydrogen as well as the realization of a low-cost, stable carbon-free power supply are needed. We also need a system for society as a whole to bear the enormous costs associated with these efforts toward decarbonization. Various difficulties and issues will be ahead of us but, in collaboration with the government, this including the utilization of the Green Innovation Fund, we will boldly take up the challenge toward the realization of zero-carbon steel.

From the viewpoint of promoting economic growth while building a sustainable society, the right response to the imperatives of a circular economy is essential. Steel is a material which can be easily taken out of a present use and endlessly recycled without causing deterioration in quality. Steel can be described as a perfect embodiment of a circular economy. Nippon Steel is also actively engaged in use of by-product generated in steelmaking for achieving zero emission. We also recycle 100% of plastic containers and packaging generated in society and collected by us. In addition, in accordance with the Law for Promoting the Recycling of Plastic Resources enacted this year, we are considering to expand the amount of plastic waste processing we do, by including general waste plastics. We are committed to contributing to the realization of a circular economy by means of further technological innovations.

Concerning maintenance and improvement of the living environment in our communities, what we focus on is environmental risk management, including prevention of accidents and undesirable conditions or events. This is our priority issue for continuing business, along with safety and disaster prevention. In addition to compliance with laws and regulations, we strictly adhere to the ordinances and standards of municipalities, and give due consideration to the conditions of each base of operations, thoroughly taking measures from both hard and soft aspects to reduce environmental burden.

With regard to biodiversity preservation, we have long been involved in the “Creation of a Hometown Forest” at each steelworks, and “blue carbon” activities designed to create seaweed beds and absorb CO<sub>2</sub> in coastal waters. We have developed various initiatives that harmonize nature protection and production activities. Also, we formally expressed our support to Keidanren’s Declaration of Biodiversity and Action Policy and are promoting its activities in accordance with our policy of action based on this. As initiatives to establish a society co-existing with nature are both regional and global issues, we intend to incorporate them in our business activities and to execute environmentally integrated management, with the aim of realizing a sustainable society.

### Social initiatives

We declare in our Corporate Philosophy to pursue world-leading technologies and manufacturing capabilities, and contribute to society by providing excellent products and services. This resonates with the concept of the United Nations’ Sustainable Development Goals (SDGs). Our Eco Products initiatives can be regarded as representative examples. We are eager to continue to prevail as a company that helps solve diverse social issues through its business activities.

In this report, we are presenting our engagement with various stakeholders as well as our response to social issues. Specific themes include the safety, disaster prevention, and quality, respect for human rights, diversity and inclusion, supply chain management, and coexistence with the community and society. Compared to the report of last year, we have enhanced the introduction of business activities that respect diverse values and human rights issues, and of diversity and inclusion.

In order to live up to our Corporate Philosophy of contributing to the development of society and to be continually trusted by everyone, we are committed to fulfilling our social responsibility.

### Towards enhancement of governance and sustainable growth of the company

We have developed a corporate governance system suitable for the Group’s business in order to promote sound and sustainable growth and to improve medium- to long-term corporate value. Since 2020, we have changed our corporate structure to that of a Company with an Audit & Supervisory Committee, etc. and have been working to speed up management decision-making and strengthen the supervisory function of the Board of Directors.

ESG initiatives are considered as one of our priority management issues, which form the base that supports sustainable corporate growth. We have identified key ESG challenges (materiality) that should be addressed in a focused manner, with due consideration to our corporate principles, values, stakeholders’ expectation, and our growth strategy. We intend to steadily promote its execution and follow-up by checking Key Performance Indicators to assess outcomes.

We hope that you take a look of this report and let us know your feedback.





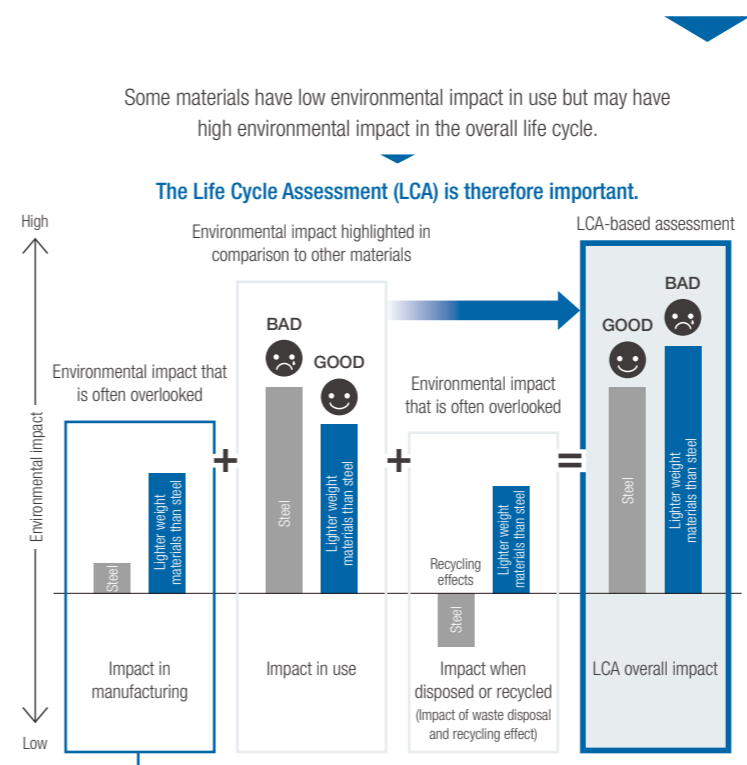
# Attractiveness of Steel

Steel is one of the most familiar materials and is indispensable for our daily lives. Thanks to its diverse properties and infinite potential, steel will continually contribute to a sustainable society.

## Steel is an abundant, sustainable material that can be reborn endlessly



## Steel is an outstanding material from the Life Cycle Assessment (LCA) perspective



### Let's consider the overall life cycle

The Life Cycle Assessment method (LCA) is a way of thinking to evaluate environmental impact of a product over its entire life cycle. While many aspects of environmental impact cannot be seen, the LCA is an attempt to visualize the impact over the life cycle of a product, from production of its raw material to use, disposal and recycling of the end product.

From the LCA perspective, steel's environmental impact can be said to be very low relative to other materials. In order to continue to supply steel as a sustainable material, while taking advantage of its excellent LCA characteristics, we aim to realize zero-carbon steel.

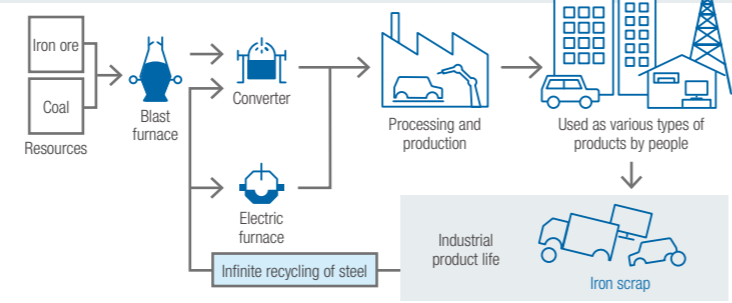
### Environmental impacts of steel made via the BF and EAF routes, using an LCA approach

The blast furnace (BF) route to reduce iron ore to make steel may appear to generate a higher environmental impact than the method that melts steel scrap in an electric arc furnace (EAF) to make steel. However, the BF route creates steel products that generate scrap that, through recycling, has an effect of CO<sub>2</sub> emission reduction. As that scrap recycling effect offsets the CO<sub>2</sub> emissions in the BF process, environmental impacts of the BF and EAF routes in total terms are the same as steel is repeatedly recycled.

This approach is recognized in the ISO 20915 and the JIS Q 20915 and is becoming a global standard.

## Steel is a sustainable material to be reborn in new steel products endlessly

Steel is easily sorted from a mixture with other materials and can be endlessly recycled without causing deterioration in quality — quite a unique characteristic. Steel is a perfect material for recycling as it can be recycled endlessly into all kinds of steel products after the end of its product life.



### Diverse properties and a wide range of applications

Due to diverse advantages such as strength and easiness to work, steel has been used in a wide range of applications and deserves recognition as the most outstanding material for the infrastructure of society, a material that supports people's lives and overall economic development.

Steel is close to us and we cannot live without steel products. Steel is for here for all of us now and will be with us in the future.

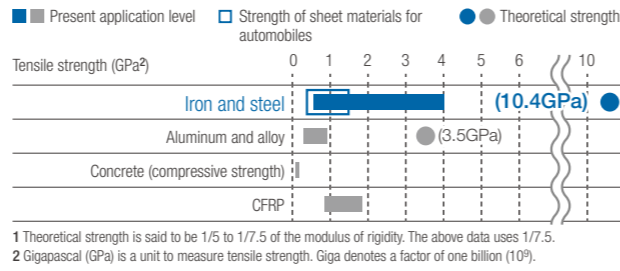
Strength	Weldability	Heat resistance
Toughness	Paintability	Cold resistance
Robustness	Magnetism	
Workability	Corrosion resistance	Weather resistance

### Infinite potential

Steel is a material with great potential due, in part, to its having a much higher theoretical strength than other materials.

In addition to adjusting carbon and other content to give a certain steel product specific desired characteristics, steel's properties can be finely controlled to meet function and performance requirements, including requirements that did not exist in the past. We do this by controlling the combination of its temperature and rolling at the manufacturing stage or by adding alloys. Further development in steel and its usage will push the potential horizon further outward.

#### Potential capacity and present application level of material strength



### Comparison of CO<sub>2</sub> emission in producing an automotive part that has the same strength as conventional steel (kg-CO<sub>2</sub>)

	Conventional steel materials	High-tensile steel	Aluminum	Carbon fiber reinforced plastics
Functional equivalent weight (kg)	100	75	67	45
CO <sub>2</sub> emissions per unit (kg, CO <sub>2</sub> /kg)	2.3	2.3	16.5	22.0

Based on the public data of WorldAutoSteel

**Steel's environmental impact in production is extremely lower than other materials, some of which are lighter than steel.**

Note: Moreover, high-tensile steel is about 25% lighter than conventional steel and has a lower environmental impact.

**Going forward, with the aim to further reduce environmental impact on climate change, Nippon Steel will make development toward carbon neutrality in steelmaking process.**

### Acquisition of the "Eco-Leaf" environmental label

Nippon Steel has obtained the 'Eco-Leaf' — an ecolabel certified by the Sustainable Management Promotion Organization (SuMPO), in compliance with the ISO 14025 international standards, for 15 of its products.

The Eco-Leaf is an EPD<sup>3</sup> certification program in use in Japan to disclose quantitative environmental information about the entire life cycle of a product, from resource mining and manufacturing to disposal and recycling. This allows customers to assess the environmental impact of the products they use.

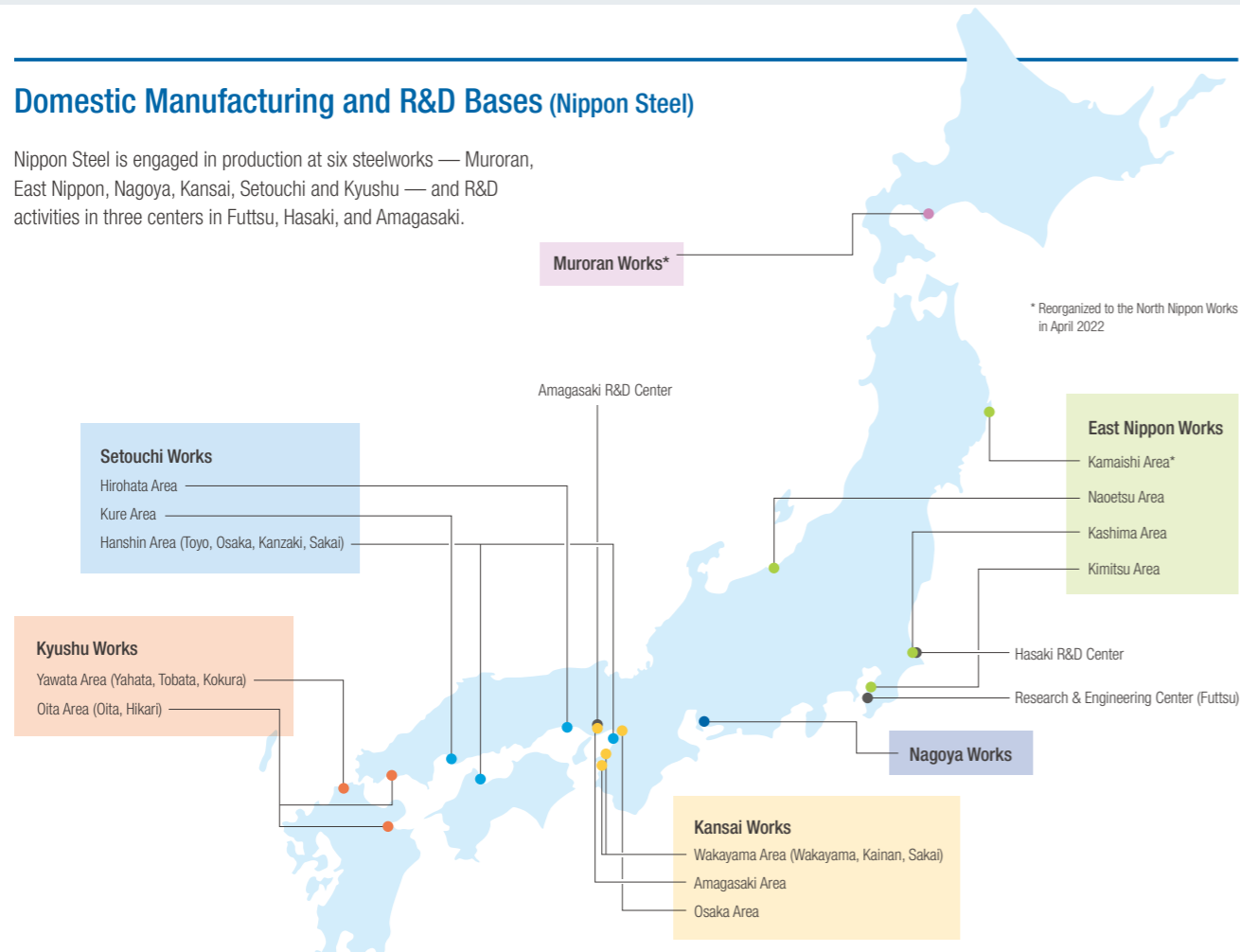


<sup>3</sup> EPD (Environment Product Declaration): The type III environmental label specified in the ISO 14025 international standard, which is designed to disclose quantitative environmental data certified by a third-party organization.

# Nippon Steel Group's Businesses

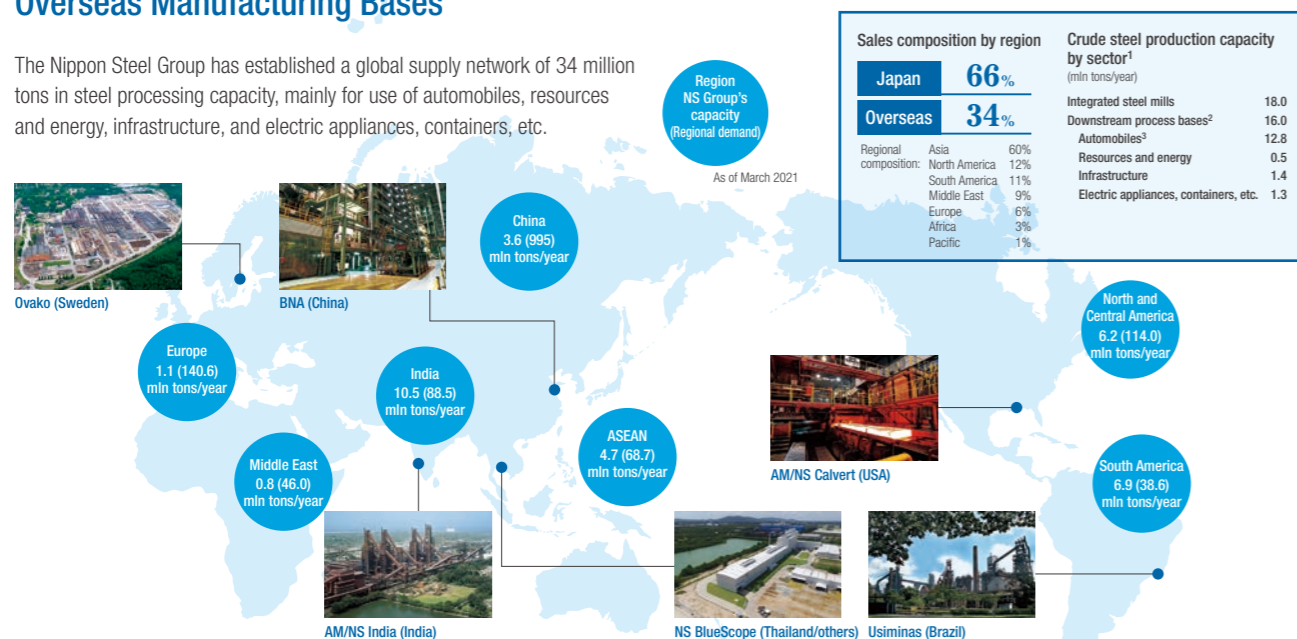
## Domestic Manufacturing and R&D Bases (Nippon Steel)

Nippon Steel is engaged in production at six steelworks — Murooran, East Nippon, Nagoya, Kansai, Setouchi and Kyushu — and R&D activities in three centers in Futtsu, Hasaki, and Amagasaki.



## Overseas Manufacturing Bases

The Nippon Steel Group has established a global supply network of 34 million tons in steel processing capacity, mainly for use of automobiles, resources and energy, infrastructure, and electric appliances, containers, etc.

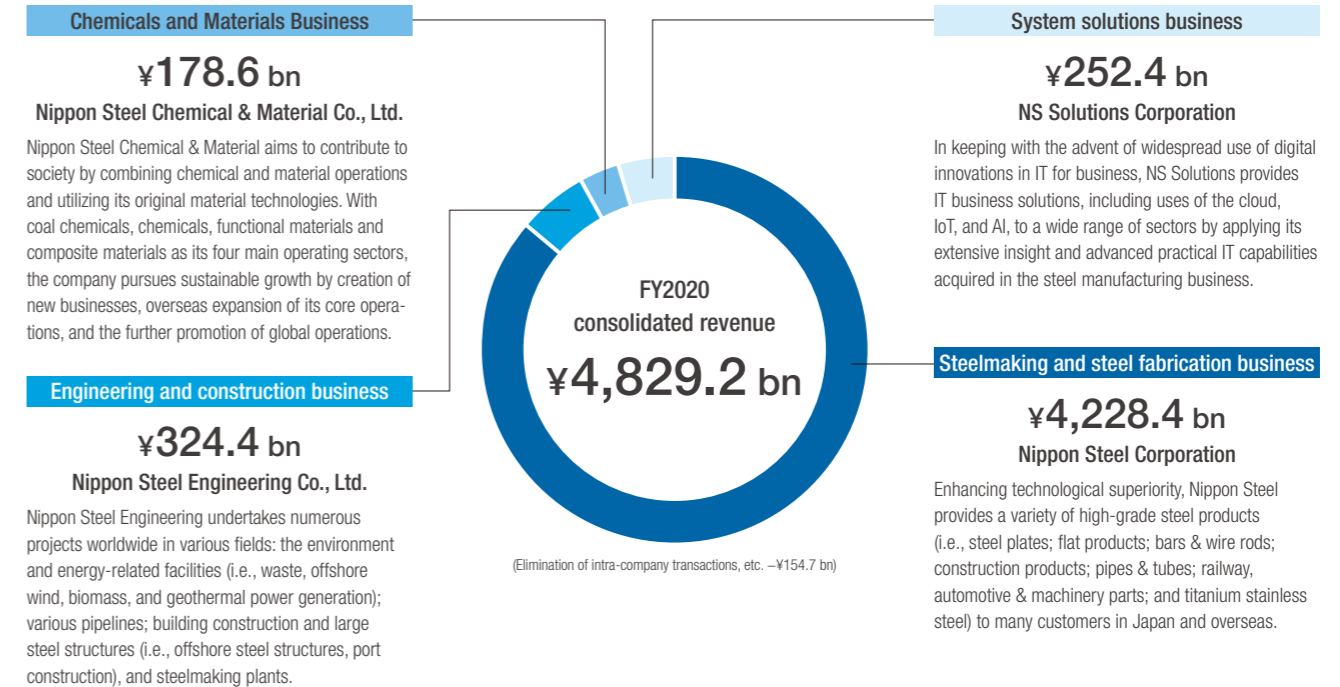


1 In addition to companies with an equity stake of 30% or higher (including USIMINAS), which are included in crude steel production data compiled by the World Steel Association, the capacity of our equity-method affiliates with an equity stake of less than 30% in which Nippon Steel plays a significant role in the supply of materials, as well as the capacity of a company whose products are sold by Nippon Steel (AGIS) are fully included.  
 2 Excluding overlap with the integrated steel mills (Mahindra Sanyo, Standard Steel, and Ovako) and with a company (STP) which receives raw sheet supplies from other operating companies  
 3 Steel conversion value (converted to per-ton of crude steel)

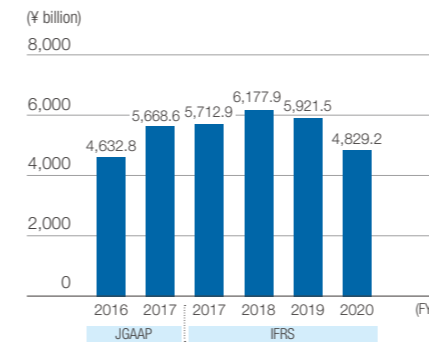
The Nippon Steel Group's main business is in steelmaking with annual crude steel production capacity of approximately 54 million in Japan and 16 million tons overseas, and overseas annual steel processing capacity of 34 million. The Group is promoting business in four segments, including steelmaking.

## Business segments

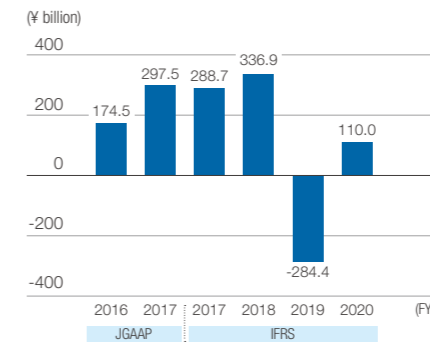
Based on the long accumulation of technology through steelmaking, the Nippon Steel Group operates businesses in four areas: steelmaking and fabrication, engineering and construction, chemicals and materials, and system solutions, with the core business being steelmaking.



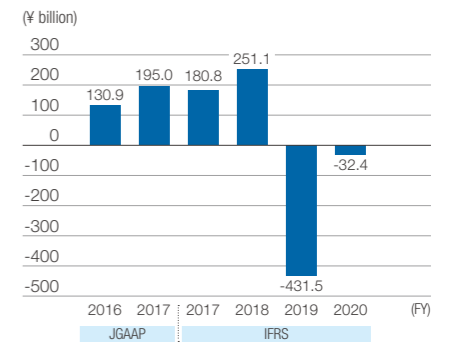
### Net sales/Revenue (consolidated basis)



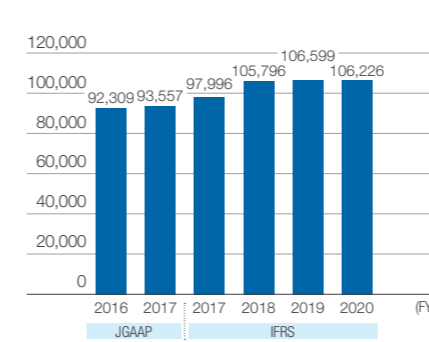
### Ordinary profit/Business profit (consolidated basis)



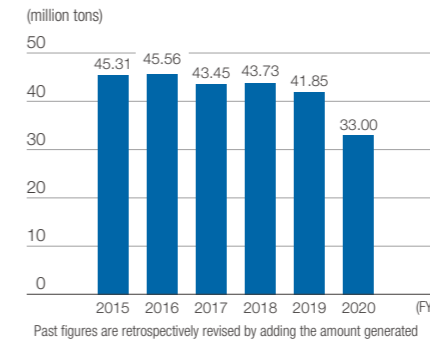
### Net income/Profit attributable to owners of the parent (consolidated basis)



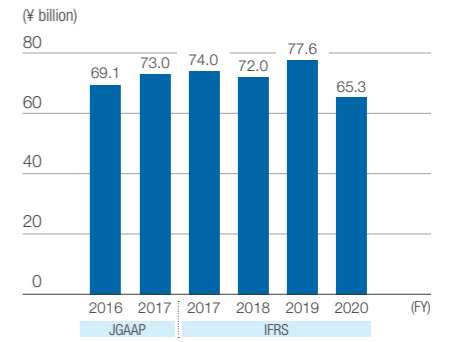
### Number of employees (consolidated basis)



### Crude steel production volume (non-consolidated basis)



### R&D expenditures (consolidated basis)



Past figures are retrospectively revised by adding the amount generated by Nippon Steel Nisshin, which was absorbed in April 2020.



# Nippon Steel Group's Contribution to SDGs



Steel contributes to make our life more convenient and pleasant, by being used everywhere in our life and society, and as an indispensable part of resilient infrastructure against natural disasters caused by earthquakes, abnormal weather driven by climate change, and other factors. Steel is also an indispensable material element for achieving SDGs, as it helps reduce environmental impact due to its weight reduction, extension of its product life, etc. on top of being abundantly available and able to be recycled. As a supplier of steel, we strive to implement our Three Ecos and innovative technologies as measures against climate change. We also promote sustainable measures so as to not waste resources. These measures include use of by-product gas generated in steelmaking, reuse of recycled water, and recycling of by-products and waste generated in and out of the company.

## Examples of specific initiatives

<p><b>1 NO POVERTY</b></p> <ul style="list-style-type: none"> <li>Job creation through establishment of operating companies in emerging countries <a href="#">p. 7</a></li> <li>Reduction of vulnerability to disaster based on use of Nonframe method (construction method to stabilize slopes without damaging the natural environment)</li> </ul>	<p><b>10 REDUCED INEQUALITIES</b></p> <ul style="list-style-type: none"> <li>Thorough compliance training, such as for the Anti-Monopoly Act</li> <li>Eliminating unfair discrimination, based on the respect on human rights <a href="#">pp. 47-48</a></li> <li>Expanded hiring of women and non-Japanese <a href="#">pp. 47, 50</a></li> </ul>
<p><b>2 ZERO HUNGER</b></p> <ul style="list-style-type: none"> <li>Use of converter slag fertilizer, a by-product of steelmaking, to improve farming productivity and salt damage in farmland <a href="#">p. 40</a></li> <li>Provision of titanium and stainless steel, which have excellent seawater corrosion resistance, for seawater desalination plants, securing agriculture water</li> </ul>	<p><b>11 SUSTAINABLE CITIES AND COMMUNITIES</b></p> <ul style="list-style-type: none"> <li>Provision of various indispensable Eco Products for daily lives <a href="#">p. 31</a></li> <li>Provision of earthquake-resistance steel products <a href="#">p. 29</a></li> <li>Development of Nonframe method, which protects houses from disaster while maintaining views of nature</li> </ul>
<p><b>3 GOOD HEALTH AND WELL-BEING</b></p> <ul style="list-style-type: none"> <li>Promotion of air, water, soil risk management and chemical substance management <a href="#">pp. 35-38</a></li> <li>Development and provision of steel products that contain no substances of concern, such as lead and hexavalent chromium</li> </ul>	<p><b>12 RESPONSIBLE CONSUMPTION AND PRODUCTION</b></p> <ul style="list-style-type: none"> <li>Promotion of air, water, soil risk management and chemical substance management <a href="#">pp. 35-38</a></li> <li>Full recycling of by-products, including slag, dust, and sludge <a href="#">pp. 33-34</a></li> <li>Promotion of recycling of waste plastics <a href="#">p. 34</a></li> </ul>
<p><b>4 QUALITY EDUCATION</b></p> <ul style="list-style-type: none"> <li>Promotion of employee training to raise skills (i.e., OJT, Off-JT, sending trainees to Junior College for Industrial Technology), hosting technology triathlon <a href="#">p. 55</a></li> <li>Study sessions for teachers, internship for students <a href="#">p. 60</a></li> </ul>	<p><b>13 CLIMATE ACTION</b></p> <ul style="list-style-type: none"> <li>Promotion of measures against climate change by implementing the Carbon Neutral Vision <a href="#">pp. 15-23</a></li> <li>Development and provision of Eco Products, such as high-tensile, light-weighted, energy-efficient steel sheets and light-weight railway wheels and axles for high-speed railways <a href="#">p. 31</a></li> </ul>
<p><b>5 GENDER EQUALITY</b></p> <ul style="list-style-type: none"> <li>Improvement of working environment for women, support for career formation and work-life balance <a href="#">pp. 49-50</a></li> <li>Increase in female employment and the number of female employees in management <a href="#">p. 50</a></li> <li>Prevention of harassment <a href="#">p. 54</a></li> </ul>	<p><b>14 LIFE BELOW WATER</b></p> <ul style="list-style-type: none"> <li>Regeneration of seaweed beds with the use of steel slag <a href="#">pp. 10, 24, 39</a></li> <li>Promotion of sea area environmental improvement with the use of steel slag <a href="#">p. 33</a></li> <li>Voluntary clean-up activities at seashore nearby steelworks <a href="#">p. 59</a></li> <li>Collaboration with an NPO, "Mori wa Umi no Koibito" (participation in treeplanting, etc.) <a href="#">p. 59</a></li> </ul>
<p><b>6 CLEAN WATER AND SANITATION</b></p> <ul style="list-style-type: none"> <li>Recycling and reuse of limited water resources <a href="#">pp. 38, 43</a></li> <li>Promotion of water quality risk management <a href="#">p. 35</a></li> <li>Provision of titanium and stainless steel for seawater desalination plants</li> <li>Provision of lining steel pipes for delivery of clean water</li> </ul>	<p><b>15 LIFE ON LAND</b></p> <ul style="list-style-type: none"> <li>Promotion of air, water, soil risk management and chemical substance management <a href="#">pp. 35-38</a></li> <li>"Creation of Hometown Forests" to promote greenery within steelworks <a href="#">pp. 39-40</a></li> <li>Site cleaning activities around steelworks <a href="#">p. 59</a></li> </ul>
<p><b>7 AFFORDABLE AND CLEAN ENERGY</b></p> <ul style="list-style-type: none"> <li>Efficient use of energy, such as 100% use of by-product gas <a href="#">pp. 30, 43</a></li> <li>Provision of materials for fuel cells that produce energy from hydrogen</li> <li>Development and provision of steel materials for high-pressure hydrogen to support a hydrogen-oriented society <a href="#">p. 31</a></li> </ul>	<p><b>16 PEACE, JUSTICE AND STRONG INSTITUTIONS</b></p> <ul style="list-style-type: none"> <li>Bribery prevention guidelines to be established and made well known <a href="#">p. 59</a></li> <li>Elimination of antisocial forces</li> <li>Thorough confirmation of no use of conflict material <a href="#">p. 57</a></li> <li>Thorough management of security export control</li> </ul>
<p><b>8 DECENT WORK AND ECONOMIC GROWTH</b></p> <ul style="list-style-type: none"> <li>Promotion of Diversity &amp; Inclusion (i.e., female empowerment, how to work and how to take time off from work, health promotion, and employment of the elderly and the disabled) <a href="#">pp. 49-54</a></li> <li>Promotion of DX to improve workstyle, productivity, worker safety management, etc. <a href="#">pp. 10, 58</a></li> </ul>	<p><b>17 PARTNERSHIPS FOR THE GOALS</b></p> <ul style="list-style-type: none"> <li>Eco solutions to transfer and spread environmental, energy-saving technologies to emerging markets <a href="#">p. 32</a></li> <li>Japan-India and Japan-ASEAN regular exchanges among public and private steel-related parties <a href="#">p. 32</a></li> <li>Support for human resources development to build an energy management system in emerging countries</li> </ul>
<p><b>9 INDUSTRY, INNOVATION AND INFRASTRUCTURE</b></p> <ul style="list-style-type: none"> <li>Pursuit of Eco Processes to help raise resource/energy efficiency and reduce environmental impacts <a href="#">pp. 30, 43</a></li> <li>Introduction of advanced technologies through bilateral cooperation (India, ASEAN, etc.) <a href="#">p. 32</a></li> <li>Use of steel slag in road materials and materials for civil engineering <a href="#">p. 33</a></li> </ul>	

The Nippon Steel Group is committed to SDGs through continually supplying steel, a basic element supporting society, in various parts of the world by using its world-leading manufacturing capability.

## PICKUP 2020

### 1 Full-scale launch of the "Creation of Sea Forest," a project for regeneration of seaweed beds by use of steel slag in fertilizer for sea areas, in Tomari, Hokkaido [August 2020](#)


The regeneration of seaweed using Vivary™ units for sea areas was confirmed in Tomari, Hokkaido. This means another step forward in the village's promotion of fisheries by creating rich ocean.



Installation of Vivary™ units

### 2 Launch of an application verification of the owned wireless network base station in view of local 5G to promote DX in the steelmaking site [August 2020](#)


Nippon Steel and NS Solutions Corporation have jointly started application verification of its own wireless network base station at the steelmaking site in the Murooran Works. The initial objective is the remote operation of a diesel locomotive that runs in the work site.



The radio survey status of the own wireless network base station

### 3 Investments for capacity and quality improvement of high-grade electrical steel sheets, which contribute to the realization of a global carbon neutral society [November 2020](#)

In response to the growing demand for CO<sub>2</sub> emission reduction worldwide, demand for high-grade electrical steel sheets with low energy loss, used for electrical transformers and motors, is expected to increase. Nippon Steel has therefore decided to invest in improving the quality of electrical steel sheets and increasing its production capacity (by approximately 40% compared to the current level, in the first half of fiscal 2023).



Transformer

### 4 Adoption of Nippon Steel's titanium foil sheet to strengthen the earthquake resistance of a structure, listed as Japan's first World Heritage Site and designated as national treasure [December 2020](#)


Nippon Steel's titanium foil sheet was adopted to strengthen the earthquake resistance of the West Cocoon Plant of the Tomioka Silk Mill, which is listed as a UNESCO World Heritage Site and designated as a National Treasure. This product has been promoted by Nippon Steel and Nippon Steel Anti-Corrosion Co., Ltd. for the expanded application to cultural assets, from the viewpoint of reducing life cycle costs and extending life expectancy of social infrastructure.



West Cocoon Plant of the Tomioka Silk Mill

### 5 Installation of in-house childcare centers in the East Nippon Works Kashima Area and the Murooran Works, as part of efforts to establish more [October 2020](#) [February 2021](#)


With the aim of improving the working environment for diverse employees to make them be more empowered, Nippon Steel has been establishing in-house childcare centers that accommodate the needs of its shift workers at its steelworks nationwide. The centers are scheduled to open in the East Nippon Works Kashima Area and the Murooran Works within fiscal 2021.



Rendering of a childcare center (Murooran Works)

### 6 Signing of an MOU with a world-leading mineral resources company Rio Tinto [December 2020](#)

Nippon Steel and Rio Tinto signed a memorandum of understanding (MOU) to jointly explore, develop, and demonstrate technologies to strengthen their existing partnerships and to significantly reduce carbon emissions in the iron value chain.



Signing of the MOU

# Nippon Steel's ESG Materiality and KPIs

Concerning initiatives in ESG materiality, Nippon Steel steadily promotes their execution and follow-up by checking the Key Performance Indicators (KPI) to assess outcome, and strives to contribute to sustainable social development, as well as maintenance and improvement of our corporate value.

## Process to identify materiality



Materiality KPIs and status of major initiatives

Materiality	Key Performance Indicator (KPI)	Major Initiatives and Achievements in FY2020 (including some results in FY2019)	Page	
<b>1. Safety, environment, and disaster prevention</b>				
(1) Safety and health	<ul style="list-style-type: none"> <li>Accident frequency rate of 0.10 or less</li> <li>Zero fatal accident</li> </ul>	<ul style="list-style-type: none"> <li>Prevention and risk reduction of accidents, based on safety risk evaluation</li> <li>Promotion of disaster prevention aimed at prevention of repeated disasters (thorough adherence to the six company-wide compliance requirements and promotion of greater machine safety)</li> <li>Acquisition of ISO45001 for management systems of occupational health and safety (OH&amp;S) to enhance safety level</li> </ul>	<ul style="list-style-type: none"> <li>Accident frequency rate: 0.09</li> <li>Number of fatal accidents: 0</li> </ul> <p>p. 45</p>	
(2) Environment	<ul style="list-style-type: none"> <li>Promotion of the Carbon Neutral Vision 2050 (CO<sub>2</sub> emission reduction)</li> </ul>	<ul style="list-style-type: none"> <li>Target in 2030: 30% reduction</li> <li>Vision for 2050: Carbon neutral</li> </ul>	<ul style="list-style-type: none"> <li>March 2021: Announced the Nippon Steel Carbon Neutral Vision 2050, based on the results of the Zero-Carbon Steel Commission's review, and specific roadmap and technical issues were disclosed.</li> <li>April 2021: A "Zero-Carbon Steel Project" was established to promote the vision.</li> </ul> <p>pp. 15–23</p>	
	1) Promotion of climate control measures	Contribution by "Three Ecos"	<ul style="list-style-type: none"> <li>Implementation of "Eco Process"</li> </ul>	<ul style="list-style-type: none"> <li>JISF's Commitment to a Low-Carbon Society's CO<sub>2</sub> emission reduction target (down 3mn tons-CO<sub>2</sub> from Business As Usual (BAU) in FY2020 vs. 2005)</li> <li>Promotion of Eco Process (enhancement of energy efficiency)</li> </ul> <p>p. 25</p>
			<ul style="list-style-type: none"> <li>Maintaining high-level effective use of energy</li> </ul>	<ul style="list-style-type: none"> <li>Effective use of byproduct gas (coke oven gas, blast furnace gas etc.) and waste gas</li> </ul> <p>pp. 30, 43, 44</p>
			<ul style="list-style-type: none"> <li>Promotion of adopting advanced energy-saving technology</li> </ul>	<ul style="list-style-type: none"> <li>Adoption of high-efficiency power generation equipment and oxygen plant; regeneration burner in reheating furnace</li> </ul> <p>p. 42</p>
			<ul style="list-style-type: none"> <li>Enhancement of "Eco Products"</li> </ul>	<ul style="list-style-type: none"> <li>In the proposal of the next-generation vehicle structure concept "NSafe™-AutoConcept" (a body design solution that achieved a weight reduction of approximately 30%), the solution concept in the field of electrification vehicles and next-generation mobility was added, and the lineup was strengthened.</li> <li>Acquired the "Eco-Leaf" environmental labels for three products: tin, tin-free steel and laminate steel</li> </ul> <p>pp. 29, 31</p>
<ul style="list-style-type: none"> <li>Contribute with "Eco Solutions"</li> </ul>	<ul style="list-style-type: none"> <li>Transfer and dissemination of the world-leading energy-saving technology to help CO<sub>2</sub> emission reduction globally</li> </ul> <p>p. 32</p>			
2) Contribution to construction of a circular economy	<ul style="list-style-type: none"> <li>Realization of zero emissions within the company</li> <li>Recycling of waste generated in society</li> </ul>	<ul style="list-style-type: none"> <li>Reduction in final disposal amount: 263,000 tons (FY2025 target)</li> <li>Establishment of a waste plastics recycling system to expand its collection volume</li> </ul> <p>p. 33</p>		
3) Promotion of environmental risk management	<ul style="list-style-type: none"> <li>Air environment preservation</li> <li>Water environment preservation</li> </ul>	<ul style="list-style-type: none"> <li>NO<sub>x</sub> and SO<sub>x</sub>; Keep low-level emissions</li> </ul>	<ul style="list-style-type: none"> <li>Installation of equipment that reduces SO<sub>x</sub> and NO<sub>x</sub> emissions; shifting to low-sulfur fuel; adoption of low NO<sub>x</sub> regenerating burners</li> </ul> <p>p. 35</p>	
		<ul style="list-style-type: none"> <li>Maintaining of lower discharge levels than voluntary targets in chemical substances VOC (volatile organic compounds): 1,106 tons/year (down 30% vs. FY2000)</li> <li>Benzene: 172 tons/year (voluntary target, along with the government target)</li> </ul>	<ul style="list-style-type: none"> <li>Continual efforts based on the voluntary reduction plan</li> </ul> <p>p. 37</p>	
		<ul style="list-style-type: none"> <li>Recycling of water; high-level stable use of recycled water</li> </ul>	<ul style="list-style-type: none"> <li>Water treatment, recycling and reuse of freshwater used by the company</li> </ul> <p>p. 35</p>	
(3) Disaster prevention	1) Elimination of disaster risks and group-wide sharing of effective measures	<ul style="list-style-type: none"> <li>Zero serious disaster-related accident</li> </ul>	<ul style="list-style-type: none"> <li>Prevention of recurrence via corporate-wide implementation of measures against risks emerged from the accidents</li> <li>Risk assessment to detect new disaster risks; execution of measures from hard/soft aspects to reduce risk and control residual risk</li> <li>Self-monitoring (auditing) by those in charge of disaster prevention in steelworks; and management by the head office management through interviews</li> </ul> <ul style="list-style-type: none"> <li>Serious disaster-related accidents: 0</li> </ul> <p>pp. 45–46</p>	
<b>2. Quality</b>				
(1) Quality control and guarantee	<ul style="list-style-type: none"> <li>Systemization and automation aimed at more credibility in testing and inspection</li> </ul>	<ul style="list-style-type: none"> <li>Automatic input of inspection results from testing/analytical devices and measurement devices</li> </ul> <p>p. 46</p>		
(2) R&D and intellectual property management	<ul style="list-style-type: none"> <li>Strategic R&amp;D, aimed at sustainable growth</li> <li>Protection and use of intellectual property</li> </ul>	<ul style="list-style-type: none"> <li>Creation of the Digital Innovation Division as a planning division to tackle company-wide issues of utilization of information telecommunication technologies (ICT) (April 2020)</li> <li>The ninth consecutive year of being named as one of the world's most innovative companies in the Top 100 Global Innovator 2021; award in intellectual property and patent areas</li> </ul>	<ul style="list-style-type: none"> <li>R&amp;D expenditures: ¥65.3bn (consolidated)</li> <li>Number of patents: app. 32,000 (14,000 in Japan and 18,000 overseas)</li> </ul> <p>Integrated Report pp. 51–54</p>	
(3) Solution that result in customer satisfaction	<ul style="list-style-type: none"> <li>Number of awards from customers, government, and institutions</li> </ul>	<ul style="list-style-type: none"> <li>Received the 53rd Ichimura Prize Industry for Distinguished Achievement; the 2019 MEXT Minister's Award "Prize for Science and Technology (Development Division)"; the 47th Iwatani Naoki Memorial Award</li> </ul>	<ul style="list-style-type: none"> <li>Number of awards from customers, government, and institutions: 9</li> </ul> <p>pp. 31, 64</p>	
<b>3. Production</b>				
(1) Stable production and supply	<ul style="list-style-type: none"> <li>Initiatives for more stable production and supply (hardware and software)</li> </ul>	<ul style="list-style-type: none"> <li>Relining of the #2 blast furnace of the Muroran Works; operation of #6 CGL of the East Nippon Works Kimitsu Area</li> <li>Standardization of operational skills of veteran workers and active use of experts</li> </ul> <p>pp. 30, 58</p>		
<b>4. Human resources, and diversity &amp; inclusion</b>				
(1) Respect for human rights			pp. 47, 48	
(2) Diversity & inclusion	<ul style="list-style-type: none"> <li>The number of female employees in management positions: at least 2 times, (vs. 36 in FY2020), and 3 times as target in 2025; at least 4 times, and 7 times as target by 2030</li> <li>The ratio of paid holidays taken: 75% or higher</li> <li>Health management with the aim of maximizing employees' performance up to 65 years of age</li> </ul>	"Human Resources, Diversity & Inclusion"  pp. 47–54	<ul style="list-style-type: none"> <li>Number of women in managerial positions: 45 (in-house employment in FY2021)</li> <li>Ratio of women in hiring: 31% of office staff; 12% of operators; 17% in overall (FY2019-2021 average)</li> <li>The ratio of paid holidays taken: 60% (FY2020)</li> </ul> <p>pp. 49–54</p>	
(3) Human resource development	<ul style="list-style-type: none"> <li>Promotion of measures to develop human resources</li> </ul>		<ul style="list-style-type: none"> <li>Hours of training and education: 780,000 hours/year (27 hours/person, year)</li> </ul> <p>pp. 55–56</p>	
<b>5. Harmony with local communities and society</b>				
(1) Environmental preservation/creation activities in communities	<ul style="list-style-type: none"> <li>Green space development to contribute to the local environment</li> </ul>	<ul style="list-style-type: none"> <li>Tree planting activities by new employees in steelworks</li> <li>Funding for green space development and maintenance</li> </ul>	<ul style="list-style-type: none"> <li>Greenery space: 830ha</li> <li>Expenses for green space development and maintenance: ¥2.6bn</li> </ul> <p>pp. 39, 42</p>	
(2) Activities mainly in the support of education, sports, and arts	<ul style="list-style-type: none"> <li>Ongoing promotion of hosting plant visits</li> </ul>	<ul style="list-style-type: none"> <li>Proactively accepting plant visits by shareholders, investors, and junior high/elementary school students</li> </ul>	<ul style="list-style-type: none"> <li>Number of plant visitors: app. 130,000 (FY2019 results; almost no implementation in FY2020 due to the COVID-19 pandemic)</li> </ul> <p>p. 60</p>	
	<ul style="list-style-type: none"> <li>Continual execution of corporate philanthropy in the support of music via Nippon Steel Arts Foundation</li> </ul>	<ul style="list-style-type: none"> <li>Support of music activities via presentation of Nippon Steel Music Awards and operation of the Kioi Hall</li> </ul>	<p>p. 60</p>	
<b>6. Corporate value enhancement and profit distribution</b>				
(1) Securing of profit and enhancement of corporate value	<ul style="list-style-type: none"> <li>ROS of 10% (FY2025 plan target)</li> <li>ROE of 10% (FY2025 plan target)</li> </ul>	"Management of cash flow and balance sheet"  Integrated Report pp. 61–64	<ul style="list-style-type: none"> <li>ROS of 2.3%</li> <li>ROE of -1.2%</li> <li>Base bonus amount: ¥1.05mn</li> <li>Tax payment (consol.): ¥ 26.7bn</li> <li>Dividend per share: ¥10/year</li> </ul> <p>Integrated Report pp. 61–64 pp. 83–88 pp. 103–104 Fact Book "Wages and Bonuses" section</p>	
(2) Profit distribution	1) Payment of salary to employees of the company and related/subcontracting companies	<ul style="list-style-type: none"> <li>Bonus payment amount</li> <li>Revised amount of salary (Revision in the personnel management system in April 2021 in line with an extension of the retirement age to 65 years; plan to disclose the actual results from FY 2022)</li> </ul>	"Operating and financial performance"  Integrated Report pp. 83–88	
	2) Appropriate tax payment	<ul style="list-style-type: none"> <li>Tax payment (consol.)</li> </ul>		
	3) Dividend payment to shareholders	<ul style="list-style-type: none"> <li>Dividend payment according to the dividend policy of about 30% in consolidated payout ratio (FY2025 plan target)</li> </ul>		
<b>Thorough implementation of compliance</b>				
Adhering to laws and regulations as a base of all activities		"Corporate Governance"  Integrated Report pp. 89–102	Integrated Report pp. 89–102	

# Nippon Steel's Environmental Management

## Basic Environmental Policy

Under the principle of "Ecological Management," Nippon Steel is committed to contributing to the creation of an environmental-preservation oriented society with lower environmental impact. For this purpose, the company will conduct business activities based on the viewpoint of environmental preservation in local communities, which includes the maintenance and improvement of good living environments and the promotion of reduction and recycling of waste. The company will also address challenges on a global scale including response to issues of global warming as well as the maintenance and improvement of biological diversity.

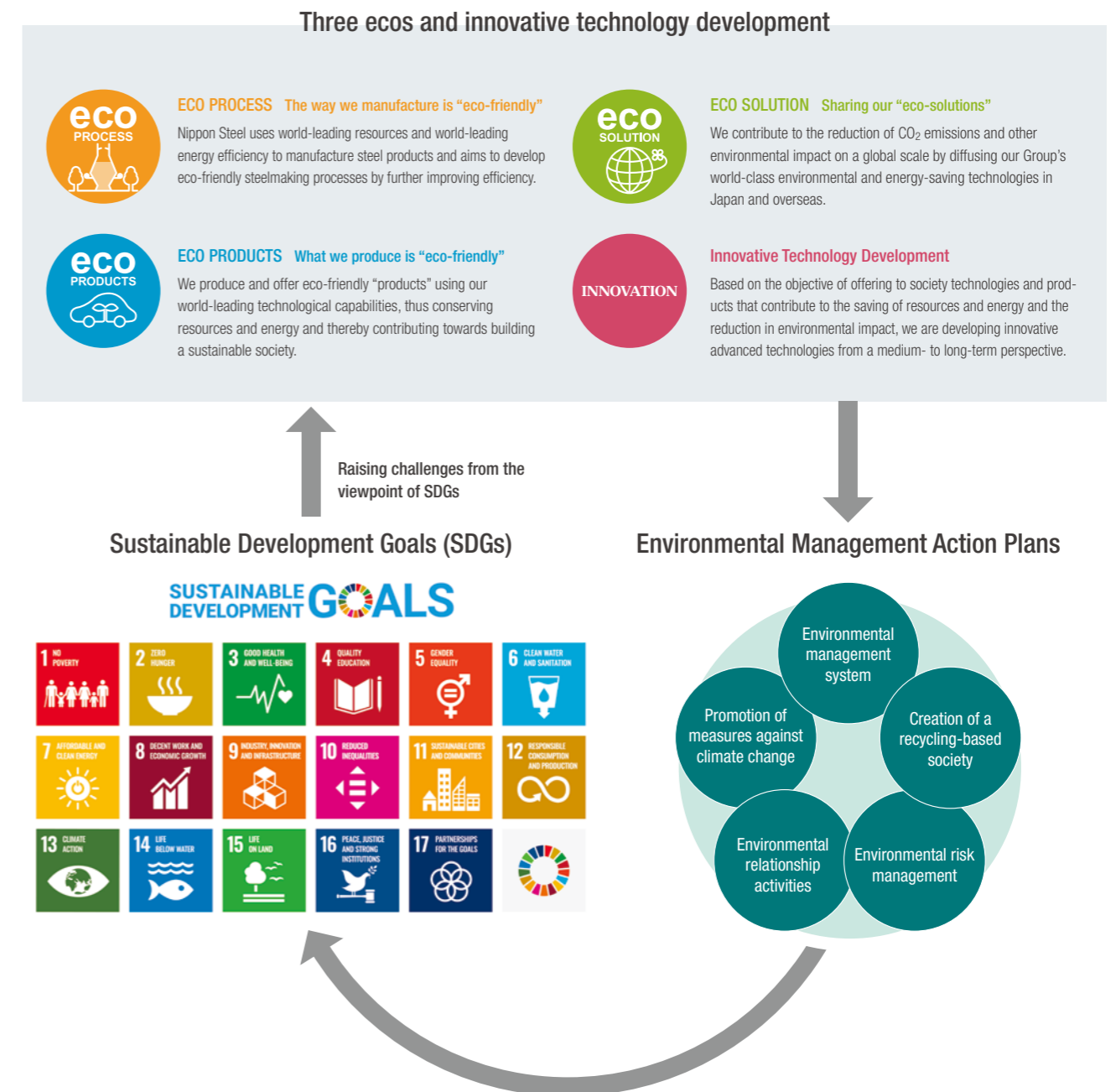
- 1 Reducing environmental impacts at every stage of operations (Eco Process)
- 2 Offering of environment-oriented products (Eco Products)
- 3 Proposing environmental preservation solutions from a global perspective (Eco Solution)
- 4 Development of innovative technologies
- 5 Development of a rich environment
- 6 Promotion of environmental relations activities

Nippon Steel is a corporation whose business activities exert a large influence on the environment. This is borne out by the fact that we consume approximately 5% of the total energy used throughout Japan. For this reason, we see comprehensive "environmental management" throughout the group companies as an integral part of our mission. We are dedicated to managing the company so as to reduce and minimize impact on the environment at all stages, from technological development work to the purchase of raw materials and equipment, manufacturing processes, transportation of products, and onward to their use, recycling and disposal.

## Three ecos and innovative technology development to contribute to SDGs

Nippon Steel is promoting environmental management centered around the four basic orientation of the three ecos and the company's innovative technology development, as stipulated in the Basic Environmental Policy. We aim at achieving Sustainable Development Goals (SDGs) by promoting the Environmental Management Action Plans.

Going forward, from the perspective of SDGs, we will keep identifying and working on issues for which we can contribute through our business.



## Environmental Management Action Plans

Nippon Steel has established its Environmental Management Action Plans based on its Basic Environmental Policy and has been working on diverse environmental challenges in five priority areas.

<p><b>Promotion of measures against climate change</b></p> <ul style="list-style-type: none"> <li>Promotion of the Carbon Neutral Vision 2050, centered around the Zero-Carbon Steel Project</li> <li>Domestic and overseas collaboration in innovative technology development</li> <li>Participation in and recommendations at discussions on environmental and energy policies</li> <li>Continuing promotion of the "Voluntary Action Plan/Commitment to a Low Carbon Society" as an activity of the Japan Iron and Steel Federation</li> </ul>	<p><b>Creation of a recycling-based society</b></p> <ul style="list-style-type: none"> <li>Expand effective use of in-house generated resources; promote zero emission</li> <li>Promote recycling of outside waste (waste plastics)</li> </ul>
<p><b>Environmental risk management</b></p> <ul style="list-style-type: none"> <li>Promote companywide discussion on environmental risk issues</li> <li>Respond to new environmental regulations</li> </ul>	<p><b>Environmental relationship activities</b></p> <ul style="list-style-type: none"> <li>Communicate actively with stakeholders on environmental issues</li> <li>Appropriate and timely disclosure of environmental information and dialogue (engagement)</li> <li>Secure bio-diversity and work for harmony with nature</li> <li>Provide opportunities to study the environment to people outside the company (i.e., sending lecturers)</li> </ul>
<p><b>Environmental management system</b></p> <ul style="list-style-type: none"> <li>Enhance the environmental administrative system (i.e., environmental audits, plant audits)</li> <li>Conduct environmental management in coordination with group companies</li> <li>Promotion of the environmental education and human resource development (enhancement of environmental education tools, etc.)</li> <li>Promotion of digital transformation in the environmental field</li> </ul>	



# Coping with Climate Change

Nippon Steel recognizes climate change as a priority problem that threatens survival of the human race. Adverse climate change would also severely affect our business environment and earnings. To this end, in addition to efforts to reduce CO<sub>2</sub> emissions through energy conservation and energy efficiency improvements in the entire supply chain, we are committed to addressing climate change as the greatest priority management issue with the “Nippon Steel Carbon Neutral Vision 2050” as our own new measures.

## Nippon Steel Carbon Neutral Vision 2050 Challenge of Zero-Carbon Steel

Adopting the “Nippon Steel Carbon Neutral Vision 2050 — The Challenge of Zero-Carbon Steel,” as our own new initiative to contribute to global efforts to control and adapt to climate change, a critical issue affecting human beings, we will strive to achieve carbon neutrality by 2050 as our top priority management issue.

In order to make concerted efforts to tackle these extremely difficult issues, we have established a new “Key Phrase” to summarize our environmental management and an “Activity Logo” to represent our activities as our “Environmental Brand Mark”.

Key Phrase



Activity Logo



### ► Our CO<sub>2</sub> emissions reduction scenario

We have developed a CO<sub>2</sub> emissions reduction scenario with a target in 2030 for 30% or more reduction in total CO<sub>2</sub> emission vs. 2013, and an aim to become carbon neutral in 2050. We started group-wide efforts toward realizing them.

**2030 Target**  
30% or more reduction in total CO<sub>2</sub> emissions vs. 2013

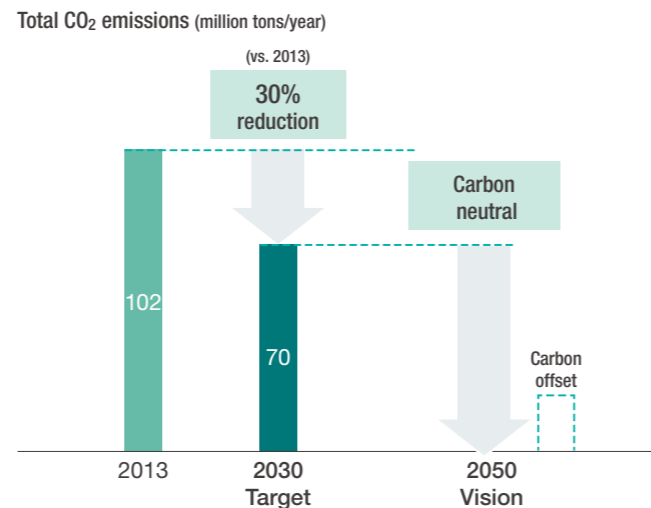
30% reduction in total CO<sub>2</sub> emissions vs. 2013 by actually implementing the COURSE50<sup>1</sup> in the existing BF and BOF process, reducing CO<sub>2</sub> emissions in existing processes, and establishing an efficient production framework.

<sup>1</sup> COURSE50: Abbreviation for CO<sub>2</sub> Ultimate Reduction System for cool Earth 50

**Vision 2050**  
Aim to become carbon neutral

Aim to become carbon neutral by taking up the challenge to mass produce high-grade steel in large size EAFs and to realize hydrogen reduction steelmaking (i.e., Super-COURSE50 use of BFs; direct reduction of 100% hydrogen), and with multi-aspect approach, including CCUS<sup>2</sup> and other carbon offset measures.

<sup>2</sup> Carbon Capture, Utilization and Storage



[Scope of scenario]  
Domestic  
SCOPE 1+2 (Receipt of raw materials to product shipment + CO<sub>2</sub> at the time of purchase power production)

Note: Including Nippon Coke & Engineering Co., Ltd. and Sanso Center Co., Ltd.

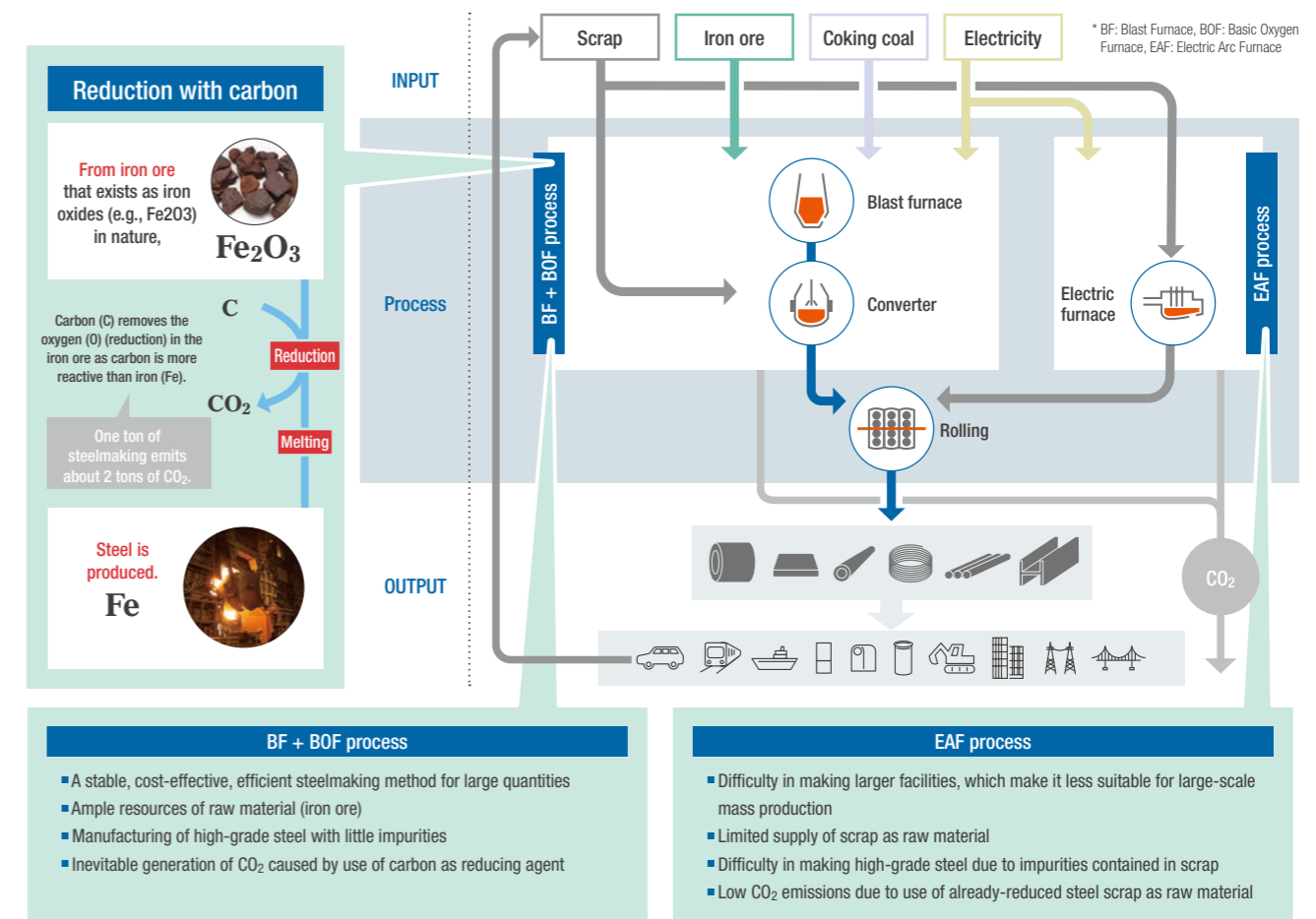
### ► Current steelmaking process: Characteristics and issues

In nature, iron exists as oxides, as iron ore. To produce steel products, oxygen must be removed (= reduced) from iron ore. Starting from *Tatara* steelmaking in the ancient times of Japan, the process using the blast furnace (BF) and the basic oxygen furnace (BOF), which removes oxygen from iron oxide by carbon (charcoal, coal), has been used. Within a gigantic BF, a chemical reaction called reduction occurs, and steel is continually and efficiently produced from iron ore.

At present, the use of carbon (coal) is the best, stable, cost-effective method for reducing iron ore in large quantities. The reaction, however, emits CO<sub>2</sub> as carbon removes the oxygen in the iron ore.

As the major share of CO<sub>2</sub> emissions in the steelmaking process is derived from the iron ore reduction process in the BF, the reducing agent needs to be reconsidered in order to drastically reduce CO<sub>2</sub> emissions in steelmaking.

Steelmaking can also be done by a process using the electric arc furnace (EAF) with steel scrap as raw material. As steel scrap is already reduced, this method enables less CO<sub>2</sub> emission in steelmaking but has its own shortcomings: difficulty in making larger facilities, which make it less suitable for large-scale mass production; limited supply of scrap at present; and difficulty in making high-grade steel due to impurities contained in scrap.



## Nippon Steel is taking challenges toward achieving zero-carbon steel

We are committed to reconsidering our present, long-undertaking steelmaking process and aiming to achieve carbon neutrality by overcoming issues involving decarbonization and realizing zero-carbon steel.

Our idea of a “zero-carbon steel production process” is to combine two steelmaking routes, utilizing their respective features: the blast furnace (BF) and basic oxygen furnace (BOF) route together, and the electric arc furnace (EAF) route. Either route, however, has its own big challenges.

**Three challenges**

- 1 EAF route: Improvement in productivity by increasing the size of EAFs; technology development to remove impurities for the production of high-grade steel
- 2 BF + BOF route: Hydrogen injection into a BF (COURSE50 and Super COURSE50 projects) + practical implementation of CCUS
- 3 100% hydrogen use in direct reduction process: use of hydrogen to produce DRI, which is partially used as raw material in both routes

The EAF route uses already-reduced steel scrap, which does not generate CO<sub>2</sub> associated with reduction, thereby reducing CO<sub>2</sub> emissions. We seek to make a larger EAF, raise efficiency in production, and use carbon-free electric power, in order to further reduce CO<sub>2</sub> emissions.

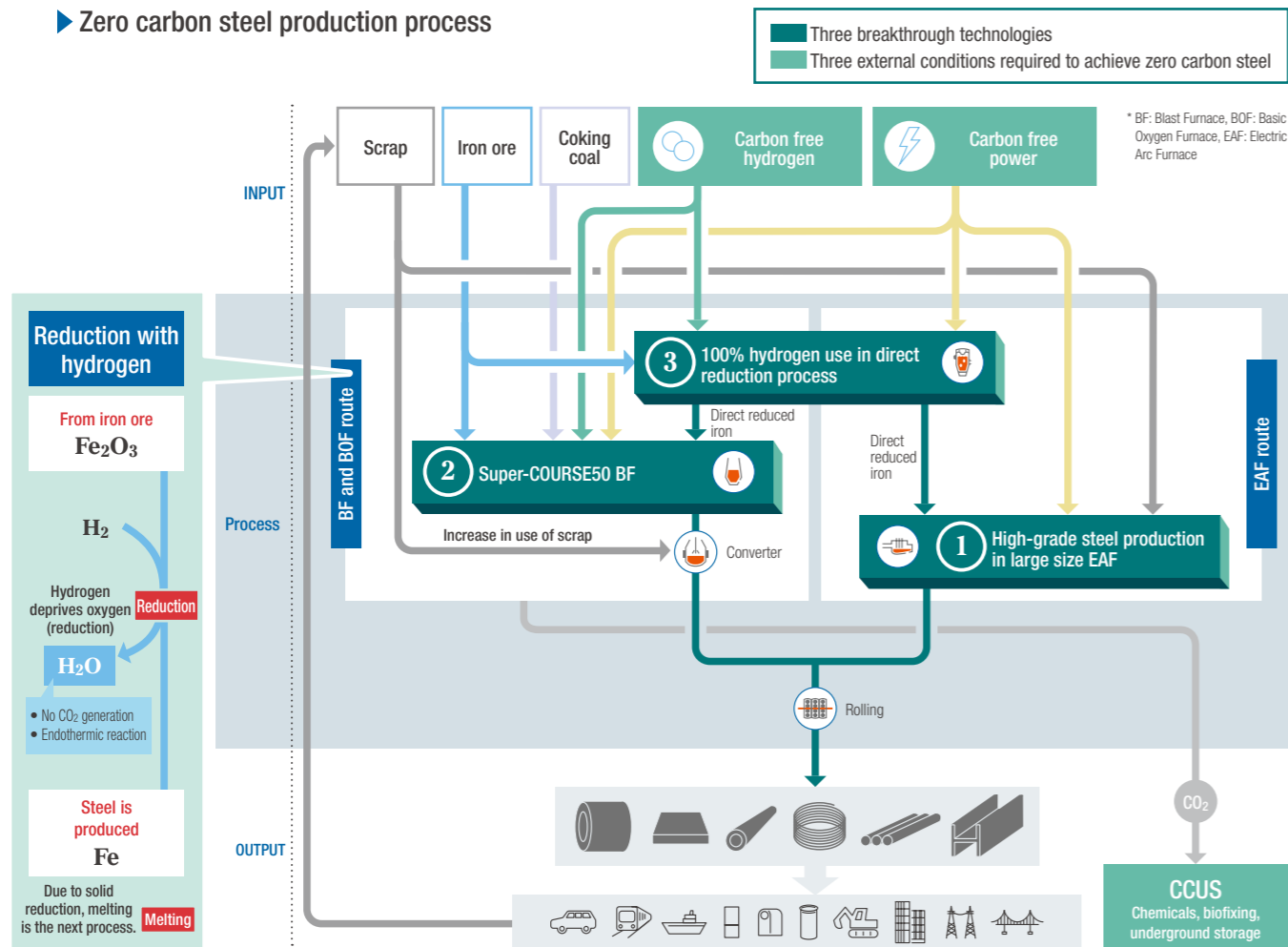
In the BF + BOF route, the existing BF is partially retrofit for the COURSE50 project and further advanced for the Super COURSE50 project. In these furnaces, the reducing agent is replaced, by some of the coking coal (coke) being substituted by hydrogen. This produces H<sub>2</sub>O and hence reduces the amount of CO<sub>2</sub> emissions.

Moreover, in either of the routes, direct-reduced iron (DRI), manufactured by the direct reduction process by 100% hydrogen, is partially used as raw material, with the aim of further CO<sub>2</sub> emission reduction.

In summary, we will thus take up three challenges to develop breakthrough technologies: 1 high-grade steel production in large-sized EAFs; 2 COURSE50 BF and Super-COURSE50 BF projects; and 3 100% hydrogen use in the direct reduction process. CO<sub>2</sub>, which is still emitted after these processes, is to be offset by CCUS to ultimately achieve carbon neutrality.

In order to realize this plan, supply of carbon-free electric power and hydrogen are indispensable.

### Zero carbon steel production process



### Challenge 1 high-grade steel production in large-sized EAFs

The EAF steelmaking uses steel scrap, which enables reduction in CO<sub>2</sub> emissions during steel production. However, there are many challenges in the production of high-grade steel by EAFs and in large-scale mass production.

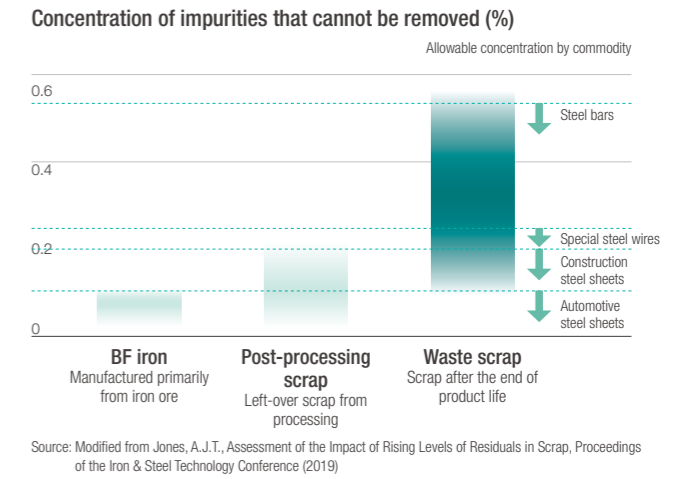
First of all, copper and other impurities in scrap and nitrogen contamination during melting affect the quality of steel, thereby limiting the product types and making it difficult to manufacture high-grade steel that satisfies user requirements for weight reduction and strength.

In addition, in the EAF route, the initial melting of scrap and other cold iron sources as well as refining with natural convection in an EAF take a long time, hence, the result is less productivity compared to the use of a BOF in which strong agitation occurs by an oxygen gas jet. This problem will be more pronounced in larger-scale EAFs.

That is why the current average annual production capacity of the EAF route is approximately 0.7 million tons per unit, far less than the BF + BOF route of approximately 4.0 million tons. Moreover, the melting of DRI is expected to decrease production efficiency due to the deterioration of heat transfer, melting time, and refining load, caused by a large amount of gangue and voids in DRI.

In summary, the production of high-grade steel, which uses a certain amount of DRI in an EAF, especially large-scale EAFs, has many challenges in terms of quality and productivity. We will take up the challenge

of establishing the technology to eliminate hazardous impurities and to improve productivity with a larger-scale, higher-efficiency EAF.



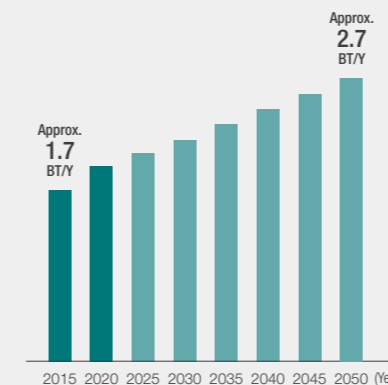
### Steel production to support the increase in demand for steel (which requires not only scrap recycling but also reduction of iron ore)

## COLUMN

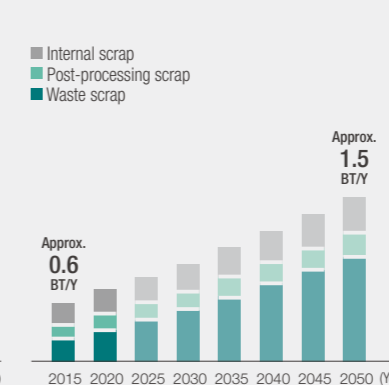
Recycling of iron scrap is one of the key measures for achieving zero-carbon steel. Nevertheless, crude steel production is expected to continue increasing in order to meet the increasing demand for steel in the world. Moreover, the recycling of the entire amount of scrap generated from past steel use will not be sufficient to meet the

annual crude steel production required every year in society, and the steelmaking from iron ore is estimated to be needed at the same level as at present. That is why we will continue to work on reducing CO<sub>2</sub> emissions in the steelmaking process using iron ore as raw material, in addition to maximizing the use of scrap.

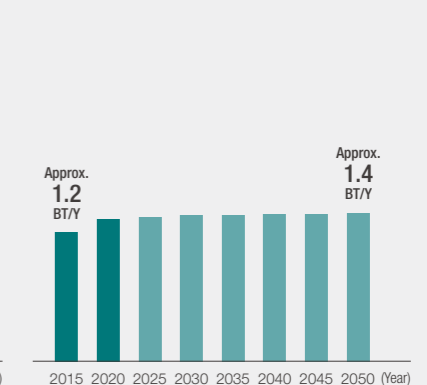
World crude steel production volume Forecasts



World scrap volume Forecasts



World pig iron production volume Forecasts

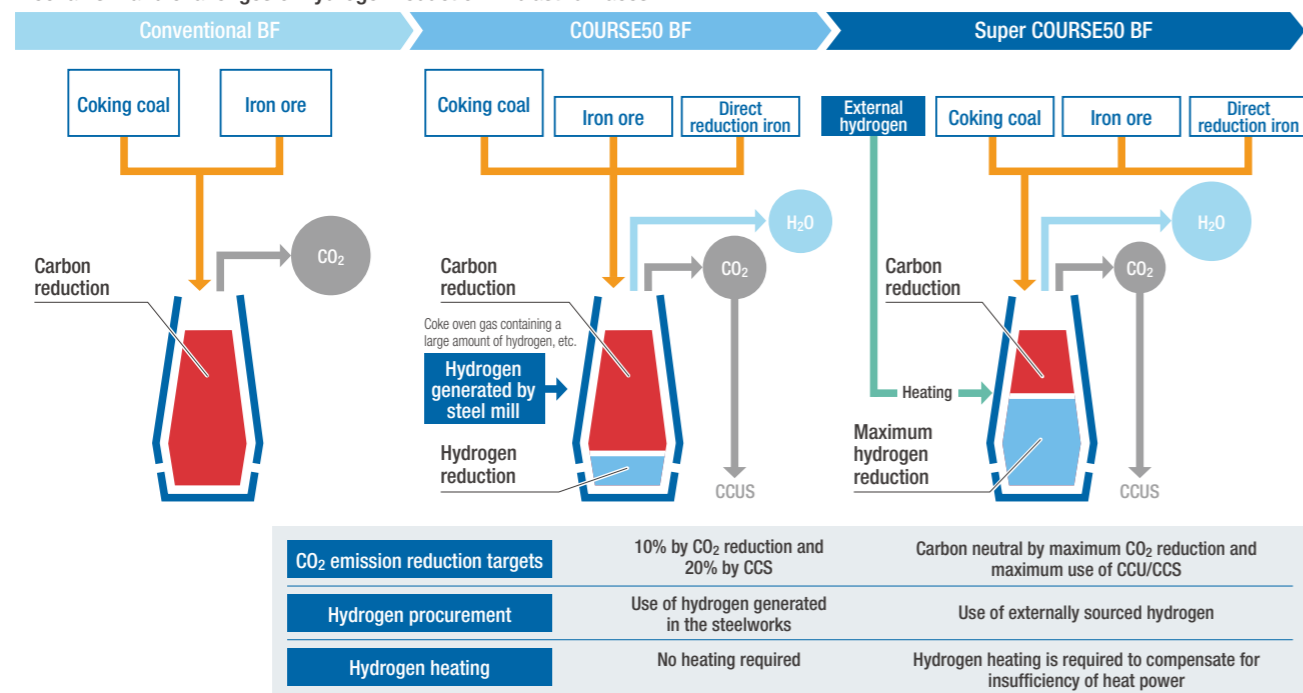


\* BT/Y: Billion tons per year

### ► Challenge 2 Hydrogen injection into BF (COURSE50 and Super COURSE50 projects)

Since hydrogen reduction is achieved by reducing iron ore by use of hydrogen rather than by conventional carbon (coal), the reduction process produces H<sub>2</sub>O with no CO<sub>2</sub> emission. We are therefore taking up the challenge of reducing CO<sub>2</sub> emission by partially replacing carbon by hydrogen as the reducing agent, and switching from iron ore to direct reduced iron (DRI). This will be enabled by retrofitting existing blast furnaces (BFs) into COURSE50 and Super-COURSE50 BFs in the zero-carbon steel production process.

#### Mechanism and challenges of hydrogen reduction in blast furnaces



As mentioned previously, a blast furnace is an ultra-large chemical reactor that continuously and efficiently produces iron from iron ore. In the process, coke is 1) a reducing agent, 2) a source of heat, and 3) plays a role to support raw materials at high temperature in a solid state while facilitating to maintain ventilation in the furnace. However, the following issues arise as the hydrogen reduction ratio in blast furnaces increases.

In response to these issues, we will mainly work on 1) the technology to ensure maximum ventilation and control stable reduction and melting when the amount of coke in the blast furnace declines, 2) the technology to blow in a large amount of hot combustible gas into the furnace, and 3) the advancement of technology to estimate actual machine reactions when scaling up from test machines to actual machines.

- Reduction with carbon is an exothermic reaction but reduction with hydrogen is an endothermic reduction, causing a temperature decrease. Pre-heating of hydrogen is thus required.
- Since the reduction agent is replaced, by changing from coke (solid) to hydrogen (gas), the ventilation of the reduction gas and the contact with iron ore become less sufficient, making reduction and melting less efficient.
- It is necessary to scale up from the current experimental COURSE50 BF to an actual BF that is hundreds of times larger.

### The COURSE50 Project (Technological Development and Innovative Steelmaking Process)<sup>1</sup>

## COLUMN

Since 2008, the COURSE50 has been developing technologies to lower CO<sub>2</sub> emissions by 30%: a 10% cut in CO<sub>2</sub> emissions from a blast furnace by adopting technologies to reduce iron ore by use of hydrogen and a 20% cut in CO<sub>2</sub> emissions by adopting technologies to capture — separate and recover — CO<sub>2</sub> contained in blast furnace gas. Concerning the former case, a 10% cut has been verified at a 12m<sup>3</sup> experimental blast furnace at the Kimitsu Area of the East Nippon Works and we also undertook simulation for the size of an actual blast furnace, moving the project closer to adoption of this innovative reduction technologies in commercial-use blast furnaces.



NEDO, JISF, and the COURSE50 Project

<sup>1</sup> Commissioned project by the New Energy and Industrial Technology Development Organization (NEDO)

### ► Challenge 3 100% hydrogen use in direct reduction process

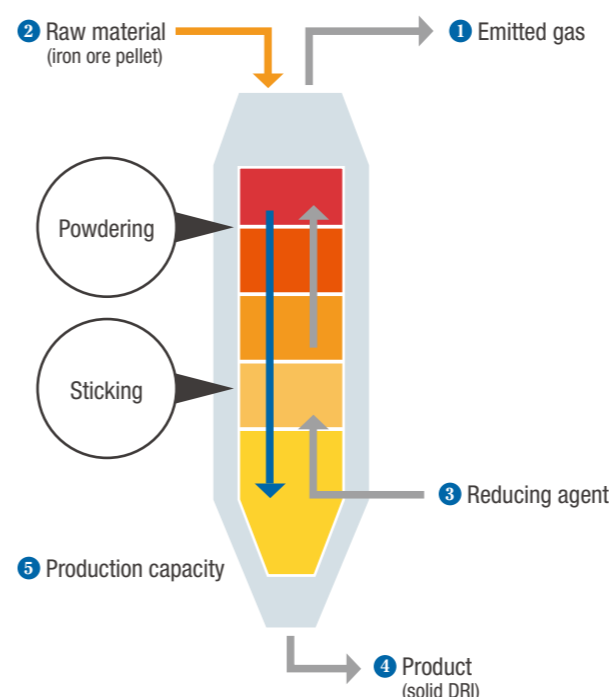
In the 100% hydrogen use in direct reduction, we target zero CO<sub>2</sub> emissions in reduction process by fully using hydrogen as the reduction agent. Since this process produces solid direct reduced iron (DRI), it is necessary to melt it in the next process such as in the blast furnace (BF) or electric arc furnace (EAF).

Most of the actual direct reduction methods currently use methane (natural gas) as the reducing agent but methane contains carbon and hence emits CO<sub>2</sub>. In contrast, the 100% hydrogen direct reduction process aims at 100% use of hydrogen as reduction agent. This method, however, has its

own high technical issues, too. Since hydrogen reduction is an endothermic reaction, it is necessary to supply heat to maintain the reduction reaction. In addition, in the case of using a shaft furnace, powdering and sticking of DRI tend to occur at low temperature.

We will therefore take up the challenges of developing technologies for the stable production of DRI by direct hydrogen reduction, and operation technologies for expanding raw material sources. We will be bold in our efforts for realizing a zero-carbon steel production process.

#### Mechanism and challenges of the direct reduction method (an example of a shaft furnace)



	Direct reduction (at present)	100% hydrogen use in direct reduction
1 Emitted gas	CO <sub>2</sub> emission CO <sub>2</sub> + H <sub>2</sub> O	Zero CO <sub>2</sub> emission Only H <sub>2</sub> O
2 Raw material (iron ore)	High-grade iron ore	Expand iron ore sources (Use of low-grade iron ore)
3 Reducing agent	Natural gas (methane) CH <sub>4</sub>	H <sub>2</sub>
4 Products	Solid iron (DRI) + gangue Need the melting by heating and the separation of gangue in the next process (BF, EAF, BOF, etc.)	
5 Production capacity	5,000 tons/day	Aim to increase it to achieve higher efficiency

#### Efforts toward stable procurement of hydrogen

## COLUMN

In order to prepare for the approaching hydrogen society, we are involved with a strong sense of anticipation and responsibility from various perspectives including the following. We may potentially become one of the largest hydrogen users in the future (assuming that the amount of hydrogen required for us to become zero carbon would exceed 7 million tons/year.) This means we need a more affordable hydrogen price to be realized than other industrial needs<sup>2</sup>. At the same time, we will be a major supplier of steel needed for hydrogen infrastructure.

We therefore participate in various hydrogen-related councils promoted by the Ministry of Economy, Trade and Industry and the Energy Agency, as well as the cross-sectional network that includes

hydrogen-related industries such as energy, automobiles, and chemicals, and various organizations. We are also mindful of working with the system design, not only for Nippon Steel but for the entire steel industry, when needed.

Concerning the overseas procurement of hydrogen, we are considering cooperation with overseas resource majors, who may potentially supply hydrogen to us. We are thus active on a wide and widening front.

<sup>2</sup> The hydrogen cost is assumed to be ¥20/Nm<sup>3</sup> or less in 2050 under the current basic hydrogen strategy, compared to the equivalent estimated cost to the coke for steelmaking at approximately ¥8/Nm<sup>3</sup>.



## Development of CCUS technology

CCUS (Carbon Capture, Utilization and Storage) is a technology that separates, captures, and stores CO<sub>2</sub> in the ground, or directly uses CO<sub>2</sub> or converts it into other materials and utilizes it. In the zero-carbon steel production process, CCUS technology is used to process CO<sub>2</sub> still generated from the steelmaking process even after it has been minimized.

Realization of this technology requires the related technology development as well as preparation of external conditions. The required technologies include development and installment of CO<sub>2</sub> separation and recovery

technology (high-performance chemical adsorption liquid) and development of CO<sub>2</sub>-based manufacturing technologies for chemicals and fuels. The necessary external conditions include the securing of the storage space needed for building the storage infrastructure for CCS, legislation, and tax incentives, the ensuring of business profitability of chemicals and fuels manufactured by CCU (Carbon Capture and Utilization), and preferential treatment of carbon recycled products.

### Nippon Steel Group's CCUS technology development efforts

## COLUMN

#### Efforts to promote the spread and increase efficiency of ESCAP™ CO<sub>2</sub> separation and recovery equipment

ESCAP™ (Energy Saving CO<sub>2</sub> Absorption Process) is a facility that has been commercialized by Nippon Steel Engineering Co., Ltd. with its own technology, based on energy-saving CO<sub>2</sub> recovery technology developed by the COURSE50 project (for development of process technology for environmentally harmonized steelmaking and hydrogen reduction). Two units have already been commercialized in Japan. The Nippon Steel Group is now working to improve energy efficiency in order to further spread it and reduce cost.

The absorption solution jointly developed by Nippon Steel and the Research Institute of Innovative Technology for the Earth (RITE) enables the separation and recovery of high-purity CO<sub>2</sub> with less energy from gas containing CO<sub>2</sub>. It reduces heat consumption by

more than 40% compared to general-purpose technology using the chemical absorption method, and can produce high-purity CO<sub>2</sub> from raw material gas with high impurities, which can be used for food and other applications.

It can also be used for a wide range of industrial applications, including chemical raw materials, CO<sub>2</sub> removal applications in chemical processes, EOR (improved petroleum recovery), and CCS (CO<sub>2</sub> underground storage).

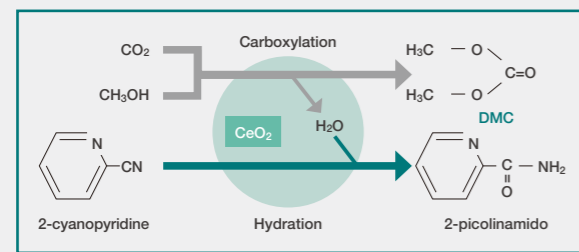


AIR WATER CARBONIC INC.

#### CCU (CO<sub>2</sub> utilization) technology development efforts

##### Research on producing raw materials for plastics from CO<sub>2</sub>

Technology to synthesize carbonate esters (shown as DMC, or dimethyl carbonate in the figure below) from CO<sub>2</sub> and alcohol. Carbonate esters are the material used to synthesize polycarbonate and other materials.

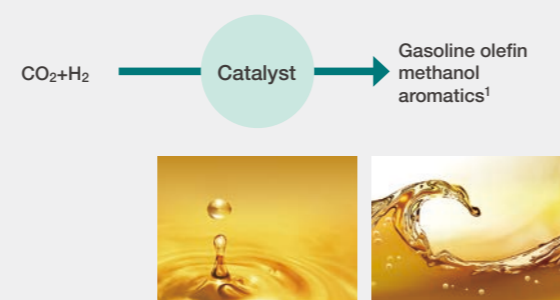


##### Efforts to develop CO<sub>2</sub> transport technology

Jointly with Japan CCS Co., Engineering Advancement Association of Japan, and ITOCHU Corporation, we have commenced the "CCUS R&D and Demonstration Related Projects; large-scale CCUS demonstration in Tomakomai; and demonstration of CO<sub>2</sub> ship transportation" which is a public-offering project business of the New Energy and Industrial Technology Development Organization (NEDO).

##### Research on producing basic chemical compounds and fuel from CO<sub>2</sub>

Technology to make basic chemical compound or fuel from CO<sub>2</sub> by using a new catalytic technology. This is to realize a process that does not use fossil fuel as raw material.

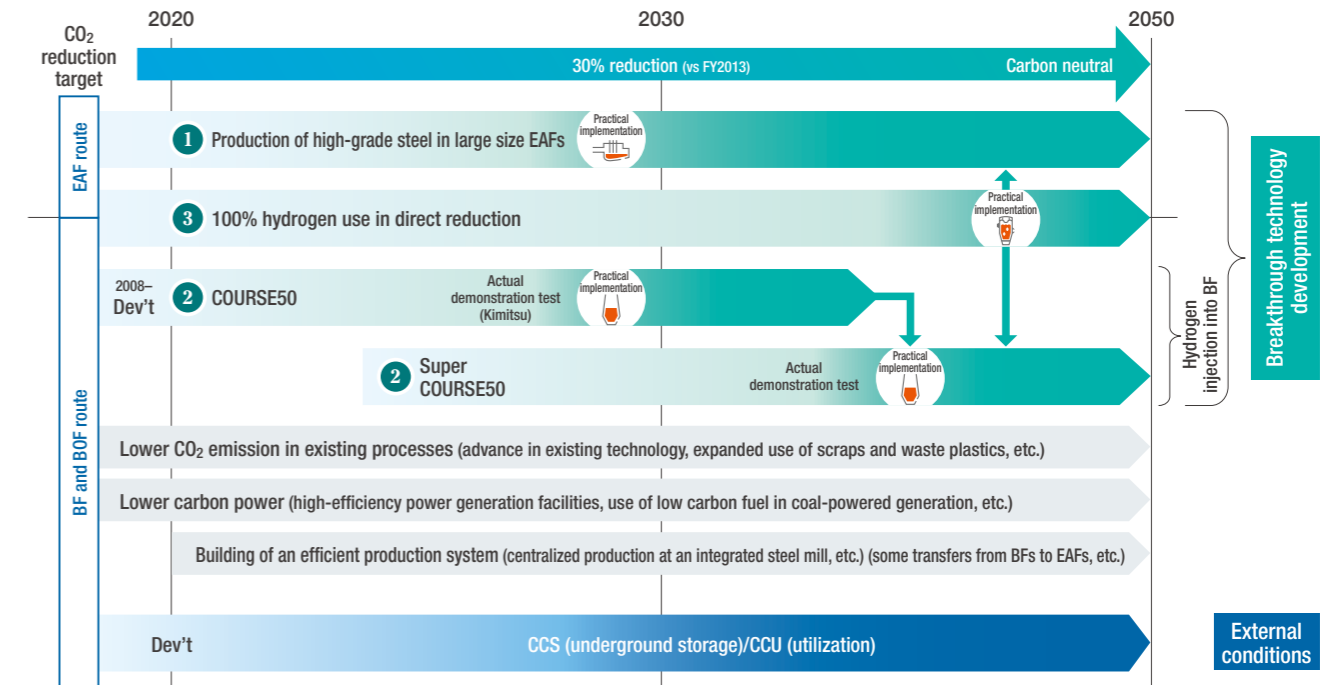


<sup>1</sup> Aromatics include para-xylene and other compounds, which are used to produce polyester fiber and resin for PET bottles.

In this project, we will conduct R&D of long-distance, mass-volume transport technologies of CO<sub>2</sub> in a scale of one million tons per year, that lead to lower-cost transportation, and also conduct R&D, demonstration tests, and surveys to establish ship transport technology for liquefied CO<sub>2</sub> through demonstration tests and related surveys. The project aims at the social implementation of CCUS around 2030.

## Toward achieving the Carbon Neutral Vision 2050

### Roadmap



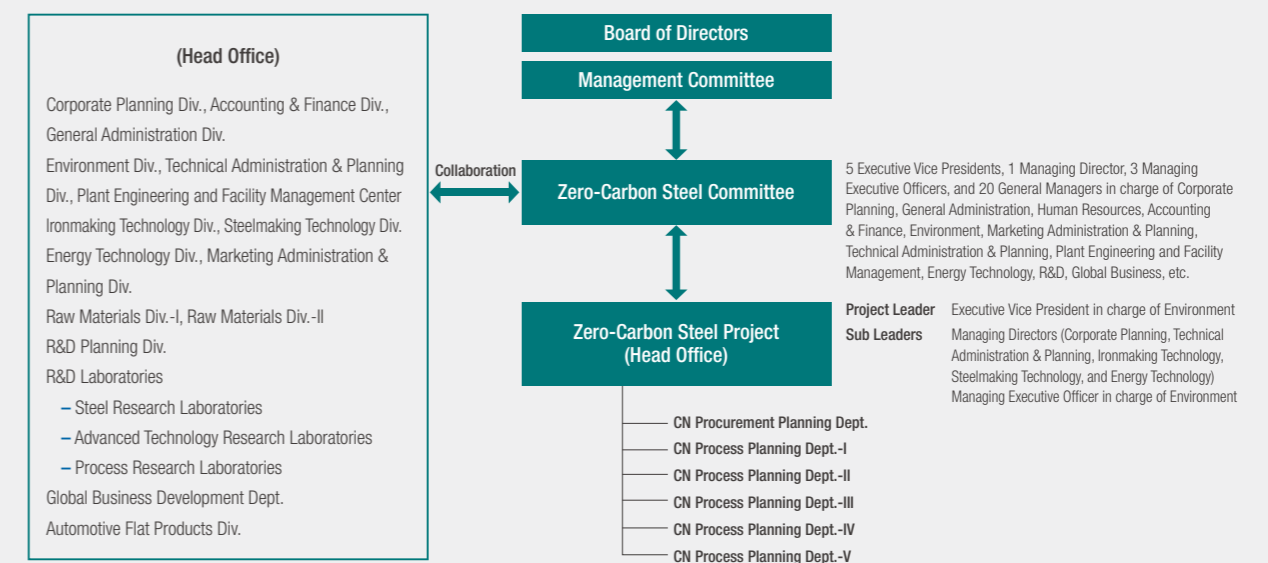
\* BF: Blast Furnace, BOF: Basic Oxygen Furnace, EAF: Electric Arc Furnace

### Structure toward achieving zero-carbon steel

To examine and implement various measures to develop and commercialize breakthrough technologies in steelmaking process, which is the key to achieving zero carbon steel (a top management priority), we established the Zero-Carbon Steel Committee, in which all five Executive Vice Presidents,

participate. Further, in April 2021, a project team of about 60 to 70 officers and employees of various divisions was formed by the Committee to consider carbon neutral technologies.

#### Structure to promote the Zero-Carbon Steel



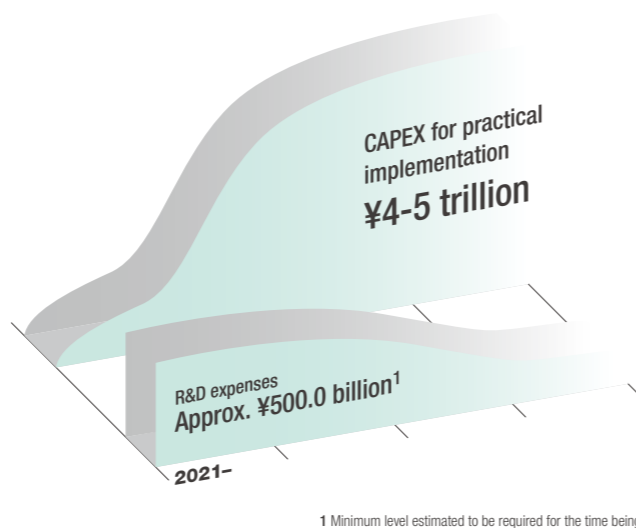
## Collaboration with others in society to realize zero carbon steel

In order to realize the zero-carbon steel objective, which is believed to be essential for Japan's steel industry to continue to lead the world and to maintain and strengthen the competitiveness of Japan's overall industry, Nippon Steel has been taking on the challenge to develop and implement breakthrough technologies ahead of the other countries. This is our most important management challenge.

In our estimates, the needed innovations will roughly require a half trillion yen in R&D expenses and 4-5 trillion yen in capital expenditures. In such a case the production cost of crude steel may more than double the current cost even if external conditions, including the estimated prices of electric power and hydrogen, are best met in around 2050.

Beside the challenges taken by the steel industry, collaboration with others in society is essential in various aspects to realize zero-carbon steel: 1) long-term and multi-year government support for R&D in the field of breakthrough innovation etc.; 2) establishment of an inexpensive, stable, large-scale hydrogen supply infrastructure; 3) action on behalf of realization of carbon free power at an international competitive cost, 4) promotion of national projects for the development and commercialization of economical-rational CCUS; 5) securing of equal-footing in international competition; and 6) building of a system for society as a whole to bear enormous cost. Facing these issues, we have been carefully explaining our ideas to relevant ministries and experts. Through Nippon Keidanren (Japan Business Federation) and the Japan Iron and Steel Federation, in which we take a leading position, we are making various recommendations regarding Japan's climate change measures and energy policies in accordance with the Paris Agreement, at councils and committees of various ministries in Japan.

Investments needed for the zero-carbon steel project



1 Minimum level estimated to be required for the time being

### Three factors to increase costs for realizing zero-carbon steel

- 1 Huge R&D expenses
- 2 Huge CAPEX for practical implementation
- 3 Increase in operational cost, even if inexpensive carbon free hydrogen and zero-emission power are to be secured

The production cost of crude steel may more than double the current cost.

### Three collaborations required for realizing zero-carbon steel

- 1 A national strategy to realize a "virtuous cycle of environment sustainability and economic growth"
  - Long-term and continuous government support for R&D in the field of breakthrough innovation etc.
  - Establishment of inexpensive and stable large-scale hydrogen supply infrastructure
  - Realization of carbon free power at an international competitive cost
  - Promotion of national projects for the development and commercialization of CCUS
- 2 Realization of government's comprehensive policies to secure equal-footing in international competition, strengthen industrial competitiveness, and lead to business chances
- 3 Formation of consensus on the issue of cost bearing by society
  - Establishing a system for society as a whole to bear the enormous costs of realizing of zero-carbon steel, such as R&D expenses, CAPEX for replacing existing facilities, and significant increase in production costs.

## Contributing to the realization of a carbon neutral society through eco-products

In addition to promoting drastic technological innovation in the steel manufacturing process, we are contributing to the realization of a carbon neutral society by providing high-function steel products (Eco-Products) that help customers save energy and reduce CO<sub>2</sub> emissions when using final products. Specifically, we will provide high-performance electrical steel sheets for drive motors as well as ultra-high-tensile steel plates for lighter body weight of electric vehicles, to achieve significant CO<sub>2</sub> reduction effects when our products are used as manufactured products.

As measures to improve the capacity and quality of electrical steel sheets, we have decided to invest over 100 billion yen in total in the Kyushu Works Yawata Area and Setouchi Works Hirohata Area. In addition, in response to the growing demand for ultra-high-tensile steel sheets that achieve lighter weight and higher strength in automobiles, we have also begun to establish a new-generation hot-rolling mill in the Nagoya Works. We will continue to expand our capacity to develop and supply high-function products that meet the needs in the future carbon-neutral society.

p. 31

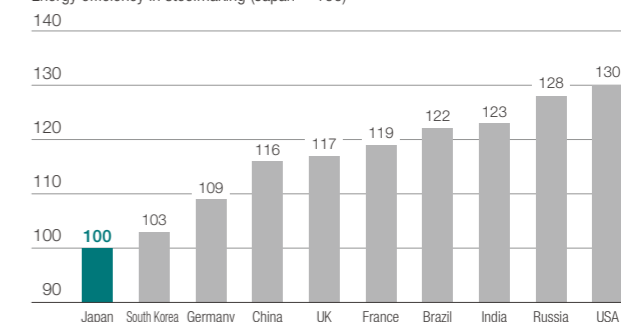
## Contribution to the global value chain (Eco Solutions)

The Japanese steel industry, including Nippon Steel, contributes to reducing CO<sub>2</sub> emissions on a global scale by transferring Japan's excellent energy-saving technology overseas. Specifically, we are promoting bilateral energy conservation and environmental international cooperation with India and countries in Southeast Asia, through three ways: public-private partnership meetings; technologies customized list; and assessment of steelworks on their status of energy saving. Since fiscal 2020 this activity has been undertaken in collaboration with the Japan International Cooperation Agency (JICA).

Noteworthy is the technology transfer for the Coke Dry Quenching (CDQ) equipment; use of this equipment has a significant effect on reducing CO<sub>2</sub> emissions. The transfer was made by Nippon Steel Engineering Co. of the Nippon Steel Group, contributing to CO<sub>2</sub> emission reduction of approximately 22.96 million tons globally by fiscal 2019.

Energy efficiency in steelmaking by country (2015)

Energy efficiency in steelmaking (Japan = 100)



Source: International Comparisons of Energy Efficiency (Sectors of Electricity Generation, Iron and steel, Cement), RITE, 2010 (The Japanese translation and numerical values were provided by the Japan Iron and Steel Federation.)

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## Use of by-products and waste in CO<sub>2</sub> reduction

### 1 Waste plastics

Using coke ovens at seven areas of Nippon Steel's five steelworks, about 200,000 tons of used plastic containers and packaging collected from general households nationwide are recycled 100%, in compliance with the Act for Promotion of Use of Recycled Resources. This contributes to reduction of about 600,000 tons of CO<sub>2</sub> a year. In the future, we will consider further expanding the use of waste plastics.

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### 3 Blue carbon

Nippon Steel has promoted scientific analysis on usefulness and safety of use of steel slag — a by-product from the steelmaking process. To improve this technology, we began a basic study on blue carbon (CO<sub>2</sub> absorption and fixation in the marine ecosystem), which is getting more attention as a measure against climate change. We started to collect basic data on how much CO<sub>2</sub> can be fixated by using steel slag and creating shallow bottoms, tideland, and seaweed beds. Nippon Steel's approach is to use our own large water tank (sea laboratory), to develop methods for creating tidal flats, shallow bottoms, seaweed beds, etc. by utilizing steel slag, and improve the environment in coastal areas. We started by aggregating basic data in order to find out how much CO<sub>2</sub> can be fixated.

pp. 10, 39

### 2 Blast furnace cement

Use of blast furnace slag in production of cement enables us to reduce use of limestone and fuel, contributing to reduction of 320 kg in CO<sub>2</sub> emission per one ton of cement (40% reduction compared to ordinary cement production).

p. 33



Large water tank Sea Laboratory



## Nippon Steel's current energy-conservation initiatives (Eco Process)

Nippon Steel has been working on energy conservation from diverse starting points: improving efficient use of energy generated in the steelmaking process (i.e., power generation from recovered by-product gas and waste heat); making operational improvements in each process; renovation of older coke ovens and other equipment; introduction of high-efficiency power generation facilities and oxygen plants; and conversion to regenerative burners in the reheating furnaces.

Thanks to the achievement from these continual efforts, as well as a decline in product output mainly due to the impact of the COVID-19 pandemic, the Nippon Steel Group consumed 896 petajoules (PJ) of energy in fiscal 2020, posting a significant reduction from fiscal 2019. The Group's energy-derived emissions also dropped significantly to 76 million tons (preliminary).

Despite steady positive impacts generated from efforts for energy conservation, the CO<sub>2</sub> emissions intensity has deteriorated mainly due to a decline in production efficiency caused by a decline in production in fiscal 2020 and the impact of heavy rain and operational troubles in fiscal 2018 and 2019, in addition to the impact of introducing energy-consuming large dust collectors and other equipment.

Meanwhile, the Japan Iron and Steel Federation (JISF), where we are actively involved as a core member, is promoting "three ecos" and further

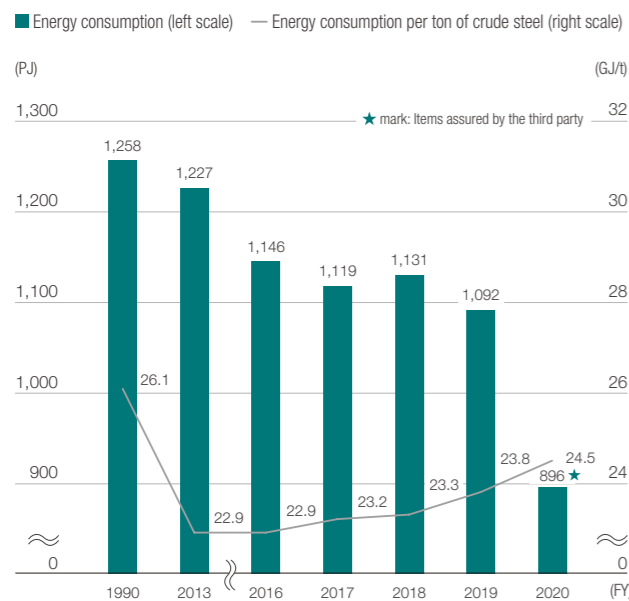
CO<sub>2</sub> emission reduction in its Action Plans for a Low-Carbon Society. We achieved the fiscal 2020 goal of the Eco Process one year ahead of plans in fiscal 2019, and are currently working on formulating goals for fiscal 2030.

### Japan Iron and Steel Federation's Action Plans for a Low-Carbon Society ("Three ecos and innovative technology development")

	Eco Process	Eco Products	Eco Solution
<b>CO<sub>2</sub> emission reduction plans</b>	Aim at improving energy efficiency	Contribute to emission reduction when steel materials are used in final products	Contribute to worldwide energy reduction by technology transfer and diffusion
<b>FY2019 results</b>	3.30 million t-CO <sub>2</sub>	31.94 million t-CO <sub>2</sub>	68.57 million t-CO <sub>2</sub>
<b>Phase I FY2020</b>	3 million t-CO <sub>2</sub> + α <sup>1,2</sup>	34 million t-CO <sub>2</sub>	70 million t-CO <sub>2</sub>
<b>Phase II FY2030</b>	9 million t-CO <sub>2</sub> <sup>1</sup>	42 million t-CO <sub>2</sub>	80 million t-CO <sub>2</sub>

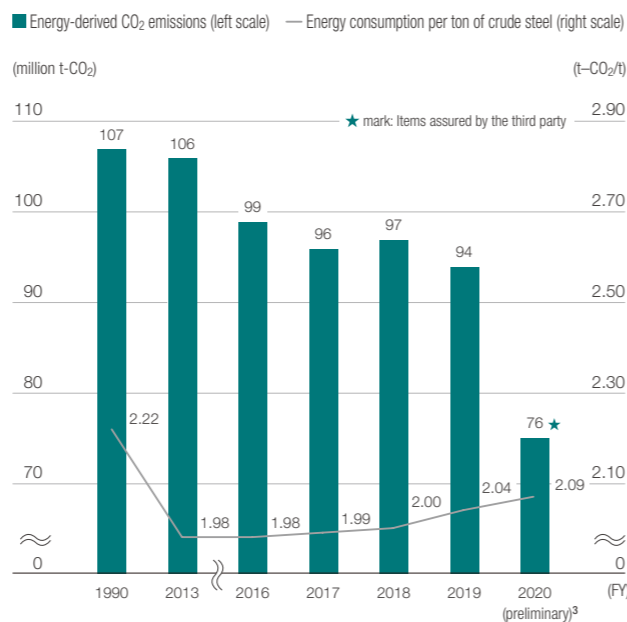
<sup>1</sup> The target reductions in CO<sub>2</sub> emission volume are set for fiscal 2005 as the base year and based on a certain crude steel production assumption.  
<sup>2</sup> The primary focus is on a 3 million ton reduction in CO<sub>2</sub> emissions by steelmakers' own initiatives for efficient use of energy and other ways. Concerning collection of waste plastics and other ways, only an increase in the collected volume compared to fiscal 2005 is counted as the amount of reduction in emissions.

### Nippon Steel Group's energy consumption<sup>7</sup>



[Calculation method] Based on the Action Plans for a Low-Carbon Society [Conversion factor] Source: METI, Agency for Natural Resources and Energy "Table of heat generation and carbon emission coefficient by energy source" (Revised January 31, 2020) [Boundary of data collection] Nippon Steel<sup>8</sup>, associated EAF mills (Osaka Steel, Sanyo Special Steel, Nippon Steel Stainless Steel, Oji Steel, Tokai Special Steel, Nippon Steel Structural Shapes Corporation, and Tokyo Kohetsu), and three Sanso Center companies<sup>9</sup>

### Nippon Steel Group's energy-derived CO<sub>2</sub> emissions<sup>7</sup>



<sup>3</sup> Preliminary figure: The amount of CO<sub>2</sub> per unit of purchased electricity from a General Electricity Utility in fiscal 2020 is assumed to be the same amount as in fiscal 2019.  
<sup>4</sup> Excluding energy consumption and CO<sub>2</sub> emission associated with the IPP operation by the steelworks  
<sup>5</sup> The amounts of energy consumption required for production of coke purchased by Nippon Steel and CO<sub>2</sub> emissions are included in the aggregate.  
<sup>6</sup> Concerning the three Sanso Center companies, the amount of energy consumption required for production of oxygen purchased by Nippon Steel Group and CO<sub>2</sub> emissions are included in the aggregate.  
<sup>7</sup> According to the change in the boundary of data collection, the amounts of energy consumption and CO<sub>2</sub> emissions in the past years have been revised retroactively.

## Nippon Steel's climate-change management structure

Nippon Steel recognizes climate change as one of important managerial issues. Concerning climate change, its trend, Nippon Steel's policy, risks and opportunities, the Environmental Management Committee and the Zero-Carbon Steel Committee meet four times or more per year in total to discuss

and check progress. Related important issues are reported and discussed at the Management Committee and the Board of Directors, and thus are supervised in this regard by the Board of Directors.

## CO<sub>2</sub> emissions in the value chain

CO<sub>2</sub> emissions originated from energy source and generated in Nippon Steel's manufacturing process (Scope 1 and Scope 2) as well as CO<sub>2</sub> emissions in the value chain (Scope 3), which are calculated by using the Green Value Chain Platform of the Ministry of the Environment and other methods are as follows.

	CO <sub>2</sub> emissions (thousand tons-CO <sub>2</sub> )			Calculation method
	2018	2019	2020	
<b>Scope 1 Direct emissions from owned sources associated with use of fuel</b>	81,099 <sup>10</sup>	78,384 <sup>10</sup>	62,860 <sup>8</sup> ★	Based on the Action Plans for a Low-Carbon Society. See the boundary of data collection stated below.
<b>Scope 2 Indirect emissions from the generation of purchased energy</b>	12,563 <sup>10</sup>	11,878 <sup>10</sup>	10,846 <sup>8</sup> ★	
<b>Scope 1 + 2 (Energy consumption per ton of crude steel: t-CO<sub>2</sub>/t)</b>	93,662 <sup>10</sup>	90,261 <sup>10</sup>	73,706 <sup>8</sup> ★	
<b>Scope 3 All indirect emissions (not included in scope 2) that occur in the value chain of the reporting company</b>				
① Purchased goods and services	17,280 <sup>11</sup>	17,063 <sup>11</sup>	14,379 ★	Calculated using method <sup>12</sup> below for purchased iron ore, coking coal, coke, and oxygen
② Capital goods	1,516	1,656	1,632	[Amount of capital expenditures] X [Emission factor]
③ Fuel and energy related activities not included in Scope 1 or 2	368	305	291	[Amount of electric power procured and fuel used] X [Emission factor]
④ Transportation and distribution (upstream)	775	683	629	[Transportation distance reported in the Energy Saving Law document] X [Emission factor]
⑤ Waste generated in operations	5	5	4	[Amount of waste] X [Emission factor]
⑥ Business travel	3	4	4	[Number of employees] X [Emission factor]
⑦ Employee commuting	13	13	14	[Number of employees] X [Emission factor]
⑮ Investments	1,231	1,208	1,125	[Emissions by subsidiaries and affiliates that emit GHG of over 10,000 tons] X [Equity stake of each company]
<b>Crude steel production (domestic, consolidated-base, 10,000 tons)</b>	4,850	4,589	3,663	★ marks: Items assured by the third party

### Scope 1 and 2

[Conversion factor] Source: METI, Agency for Natural Resources and Energy "Table of heat generation and carbon emission coefficient by energy source" (Revised January 31, 2020) [Boundary of data collection] Nippon Steel<sup>8</sup>, associated EAF mills (Osaka Steel, Sanyo Special Steel, Nippon Steel Stainless Steel, Oji Steel, and Tokai Special Steel, Nippon Steel Structural Shapes Corporation, and Tokyo Kohetsu) <sup>8</sup> Preliminary figure: The amount of CO<sub>2</sub> per unit of purchased electricity from a General Electricity Utility in fiscal 2020 is assumed to be the same amount as in fiscal 2019. <sup>9</sup> Excluding CO<sub>2</sub> emission associated with the IPP operation by the steelworks <sup>10</sup> The breakdowns of Scope 1 and Scope 2 in the past years are retrospectively revised according to the change in the boundary of data collection and improved accuracy in data calculation.

### Scope 3

[Source of emission factor] The Ministry of the Environment's emissions unit value database for accounting of greenhouse gas emissions throughout the Supply Chain (ver. 3.1) (March 2021, Ministry of the Environment) METI, Agency for Natural Resources and Energy "Table of heat generation and carbon emission coefficient by energy source" (Revised January 31, 2020) [Boundary of data collection] Nippon Steel <sup>11</sup> Past figures are retroactively revised according to the change in calculation method. <sup>12</sup> Iron ore and coal: [Amount purchased of procured iron ore and coal] X [Emission factor] Coke: [Amount purchased of procured coal at source] X [Emission factor] + [Amount of energy used in production of coke] X [Emission factor by energy source] Oxygen: [Amount of energy used in production of oxygen] X [Emission factor by energy source]

## CO<sub>2</sub> emission reduction by raising efficiency in logistics

Nippon Steel maintains a high modal shift rate<sup>13</sup> of 96% and works on reducing CO<sub>2</sub> emission by raising efficiency in logistics, such as by using large vessels. As part of the efforts, we are introducing new measures, including introduction of "Utashima" — a hybrid-type cargo vessel, equipped with lithium-ion batteries (awarded the Small Cargo Vessel Award of the Ship of the Year 2019<sup>14</sup>). In addition, in cooperation with the Ministry of Land, Infrastructure, Transport and Tourism and various organizations, we are actively undertaking efforts to introduce ships utilizing new alternative fuels, such as hydrogen and ammonia, in order to reduce greenhouse gas generated by sea transport.



Hybrid Cargo Ship "Utashima" equipped with lithium-ion batteries

### Logistics sector's ton-kilometer<sup>15</sup> achievements for FY2020

	Transportation quantity: 10,000 tons/year	Million ton-kilometers/year	g-CO <sub>2</sub> /ton-kilometers
Ship	1,523 (50%)	10,653 (90%)	39
Railway	6 (0%)	43 (0%)	25
Truck and trailer	1,232 (45%)	1,146 (10%)	211
<b>Total</b>	<b>2,761 (100%)</b>	<b>(100%)</b>	

<sup>13</sup> Modal shift rate: Modal shift means replacing a means of transport from trucks to trains and ships. The modal shift rate, according to the definition by the Ministry of Land, Infrastructure, Transport and Tourism, is a ratio of volume transported by trains and marine transportation (including ferries) in long distance transport of over 500km. <sup>14</sup> Award by the Japan Society of Naval Architects and Ocean Engineers <sup>15</sup> ton-kilometer: Total sum of the weight of load (ton) transported multiplied by transport distance (km). The reference amounts (in grams) of CO<sub>2</sub> emissions per ton-kilometer travelled are the average for all industries (Ministry of Land, Infrastructure, Transport and Tourism)

## Adaptation to climate change

In addition to taking mitigation actions against climate change, Nippon Steel is making initiatives to prepare and adapt to potential impacts of such change. We have many products that are used for a long time as construction material for embankments and other public infrastructure. They contribute to providing solutions for "National Resilience," such as protecting towns from flooding or high tides caused by heavy rains or typhoons. Adaptation

to climate changes also leads to business opportunities for Nippon Steel. In various steelworks in Japan and overseas, water storage tanks have been installed and an administration office is built on a piloti structure, which allows to create an open space with no walls on the lowest floor and makes the building less vulnerable to tsunami. This is a part of efforts of Nippon Steel to be well prepared for emergencies such as flooding and high waves.



## Information disclosure according to recommendations of the Task Force on Climate-related Financial Disclosures (TCFD)

Given the international community's commitment to achieving long-term goals of the Paris Agreement, Nippon Steel signed the statement of support for the Task Force on Climate-related Financial Disclosures (TCFD) in May

2019, considering the climate change as one of priorities that the planet is facing today. Based on the recommendations, we are committed to information disclosure on the climate change impact to our business activities.

### [For reference] TCFD's recommendations and supporting recommended disclosures

TCFD's recommendations and supporting recommended disclosures	Reference page
<b>[Governance] Disclose the organization's governance related to climate-related risks and opportunities.</b>	
a) Describe the board's oversight of climate-related risks and opportunities.	pp. 25, 41
b) Describe management's role in assessing and managing climate-related risks and opportunities.	p. 41
<b>[Strategy] Disclose the actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning where such information is material.</b>	
a) Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term.	p. 28
b) Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.	p. 28
c) Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.	p. 28
<b>[Risk Management] Disclose how the organization identifies, assesses, and manages climate-related risks.</b>	
a) Describe the organization's processes for identifying and assessing climate-related risks	p. 41
b) Describe the organization's processes for managing climate-related risks.	p. 41
c) Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management.	p. 41
<b>[Metrics and Targets] Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material.</b>	
a) Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process.	p. 11
b) Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.	pp. 25, 26
c) Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.	p. 12

## Scenario analysis

- Medium- to long-term growth in global steel demand is projected, largely influenced by population growth and economic growth in emerging countries, according to the Long-Term Vision for Climate Change Mitigation published by the Japan Iron and Steel Federation in 2018. Since scrap alone cannot meet all steel demand, pig iron production in the blast furnace route is expected to increase (from 1.22 billion tons in 2015 to 1.40 billion tons in 2050).
- As companies are increasingly required to respond to climate changes and to disclose related information, investors and other stakeholders are increasingly interested in the steel industry's response to risks, such as (1) potential significant reduction in CO<sub>2</sub> emissions; (2) changing trends of steel users, including the automobile sector (i.e., increase in electric vehicles, shift to lightweight materials); and (3) adoption of carbon pricing that leads to an increase in operating cost.

- Upon identifying our potential risks and opportunities driven by climate change and considering their significance to our current business strategies, we made scenario analysis for a long-term span to 2050, while referring to the two scenarios (the below 2°C warming scenario and the 4°C warming scenario<sup>1</sup>) of the International Energy Agency (IEA), so as to utilize them for devising our future business strategies.
- In addition, we have formulated a new climate change countermeasure vision with the aim of achieving "carbon neutral in 2050" consistent with the 1.5°C warming scenario, and have decided to tackle development of breakthrough technologies aimed at zero-carbon steel as a top management challenge.

<sup>1</sup> The below 2°C warming scenario is a case wherein much-needed measures will be implemented to keep global average temperature increase below 2°C (1.75°C) compared to pre-Industrial Revolution times. The 4°C warming scenario is a case that global average temperature will increase by 4 degrees, without taking any economic or additional measures against climate change.

## TCFD scenario analysis

Scenario	Factor	Events		Impact to Nippon Steel	Nippon Steel's strategy
2°C	<b>Transition factor 1</b> Advance in electric vehicles (EVs); decline in powertrain-related steel demand	Estimates for 2050 <sup>2</sup> EVs: 911mn units (47% of total) Internal combustion engine vehicles (ICEVs): 1,017mn units (53%)	↑	<ul style="list-style-type: none"> <li>■ Potential decline in the ratio of powertrain-related steel demand, driven by electrification, but potential increase in demand for the global cumulative number of vehicles and thereby an increase in steel demand.</li> <li>■ Increase in demand for high-performance steel for EVs.</li> </ul>	<ul style="list-style-type: none"> <li>■ Capturing growing demand by providing high-performance steel products (high-tensile steel, electric steel sheet), using its global supply network, and total solutions (NSafe™-AutoConcept).</li> </ul>
	<b>Transition factor 2</b> Shift to other lightweight materials, prompted by tighter fuel efficiency regulations, etc. (multi materials)	Shift to other lightweight materials, prompted by tighter fuel efficiency regulations, etc.	↑	<ul style="list-style-type: none"> <li>■ Switch to other lightweight materials is possible but should not be significant as steel remains superior in environmental impact from the LCA viewpoint.</li> <li>■ Increase in demand for high-strength steel, carbon fiber reinforced plastics (CFRP), titanium steel, etc.</li> </ul>	<ul style="list-style-type: none"> <li>■ Penetration of the LCA concept</li> <li>■ Advance in strength of high-strength steel and provision of total solutions (NSafe™-AutoConcept) to compete with other lightweight materials</li> <li>■ Cooperation with Group companies (Nippon Steel Chemical &amp; Material) to capture demand for CFRP, etc.</li> </ul>
	<b>Transition factor 3</b> Increasing social demand for CO <sub>2</sub> reduction (shift to low-carbon steel)	Promotion of shift to low-carbon steel	↑	<ul style="list-style-type: none"> <li>■ Increase in the ratio of use of scrap (25% to 47%<sup>3</sup>), due to more accumulation and generation of scrap; an increase in blast furnace steel production to continue up to 2050 to satisfy steel demand not satisfied by steel made of scrap</li> <li>■ Increase in demand for low-carbon steel</li> </ul>	<ul style="list-style-type: none"> <li>■ Promotion of the use of reduced iron and other measures to reduce CO<sub>2</sub> in existing processes</li> <li>■ Realization of zero-carbon steel by promoting the carbon neutral vision (breakthrough technology development, including high-grade steel production in large-sized EAFs and hydrogen reduction steelmaking)</li> <li>■ Consideration of the cost burden on society as a whole</li> </ul>
	<b>Transition factor 4</b> Increase in operating cost caused by adoption of carbon pricing	Adoption of carbon pricing	↓	<ul style="list-style-type: none"> <li>■ Significant impact of carbon pricing, which is an additional burden and deprives funds for R&amp;D</li> <li>■ Follow-up on the impact on carbon pricing discussions, including developments in the EU border adjustment measures</li> </ul>	<ul style="list-style-type: none"> <li>■ Hydrogen reduction steelmaking and use of direct reduced iron to reduce CO<sub>2</sub> emission</li> <li>■ Negotiation on transfer with customers</li> </ul>
	<b>Transition factor 5</b> Heightened needs for products and solutions associated with a hydrogen-oriented society	Increase in demand for hydrogen-related infrastructure and facilities	↑	<ul style="list-style-type: none"> <li>■ Profit growth by provision of the Group's products and solutions that support a hydrogen-oriented society [Ex] Stainless steel for high-pressure hydrogen (HRX19™); hydrogen station (Nippon Steel Engineering)</li> </ul>	<ul style="list-style-type: none"> <li>■ Enhancement of the Group's product menu and expanding sales in Japan and overseas</li> </ul>
	<b>Transition factor 6</b> Higher needs for energy-efficient products and technology in the world	Eco-friendly technology solution to boost demand	↑	<ul style="list-style-type: none"> <li>■ Profit growth, driven by our Group's long-proven energy-saving technology solutions [Ex] Dissemination of CDQs, all of which are handled by Nippon Steel Engineering, into emerging countries</li> </ul>	<ul style="list-style-type: none"> <li>■ Expansion in provision of Eco Products in the world</li> <li>■ Government-private cooperation; Technologies customized list; and steelworks diagnosis to provide energy-saving technologies to emerging countries (contribution to the global value chain)</li> </ul>
4°C	<b>Physical factor 1</b> Suspension of operation by raw material suppliers, due to abnormal weather	Difficulty to procure raw materials, caused by abnormal weather	↓	<ul style="list-style-type: none"> <li>■ Limited assumed risk in securing stable procurement of raw materials by taking the following measures:                             <ul style="list-style-type: none"> <li>— Material sourcing from multiple regions in the world</li> <li>— Keeping raw material inventories in steelworks and ships</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>■ Continual procurement from multiple sources</li> <li>■ Appropriate days of inventory; risk management</li> </ul>
	<b>Physical factor 2</b> Suspension of operation and shipment, due to abnormal weather	Difficulty in operation, caused by a natural disaster	↓	<ul style="list-style-type: none"> <li>■ BCP measures have been adopted. Limited risks in production disruption caused by natural disaster. Excessively abnormal weather may result in suspension of operation, etc.</li> </ul>	<ul style="list-style-type: none"> <li>■ Continual implementation of adaptation measures, with consideration of long-term trends: Measures against typhoons and heavy rain; measures to prevent crane overturns; measures against earthquakes and tsunami (securing emergency evacuation places, embankment reinforcement, etc.)</li> </ul>
	<b>Physical factor 3</b> Heightened needs for solutions for "National Resilience" against natural disasters	Natural disaster caused by abnormal weather	↑	<ul style="list-style-type: none"> <li>■ Profit growth by providing products and solutions for National Resilience against earthquakes, tsunamis, heavy rain, typhoons, etc.</li> </ul>	<ul style="list-style-type: none"> <li>■ Enhancement of the Group's product menu and expanding sales in Japan and overseas</li> </ul>

<sup>2</sup> Source for EV-related data: IEA ETP2017 B2DS

EVs only refer to battery electric vehicles (BEVs) with no internal combustion engine (ICE). ICEVs include plug-in hybrid vehicles (PHVs).

<sup>3</sup> The ratio of the use of the EAF route is calculated from the estimated crude steel production in the JISF's paper "A challenge towards zero-carbon steel."

## Scenario analysis

# PICK UP

### Transition factor 1

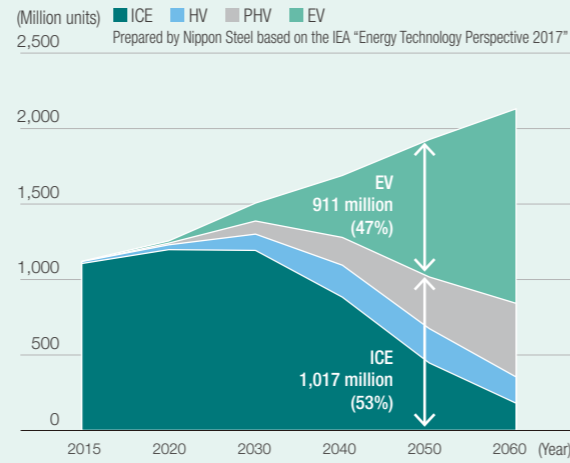
#### Response to advance in electric vehicles (EVs)

According to the International Energy Agency (IEA), the ratio of vehicles with an internal combustion engine (ICE) is expected to decline but the global cumulative number of vehicles is projected to increase, which results in an increase in demand for steel materials for automobiles.

In addition, advance in electric vehicles (EVs) is expected to both increase demand for non-oriented electrical steel sheets for motors of eco cars and promote development of higher-grade sheets. Due to such demand growth potential, we have decided to invest over ¥100 billion for electrical steel sheets in the Kyushu Works Yawata Area (approx. ¥56 billion investment) and the Setouchi Works Hirohata Area (approx. ¥49 billion).

Facing the request from customers for even higher efficiency in motors, so as to lengthen vehicle operation distance, we will continue efforts to develop electrical steel sheets with further reduction in iron loss.

Global vehicles owned by vehicle type (B2DS scenario)



### Transition factor 2

#### Response to shift to other lightweight materials

Aluminum and carbon fiber reinforced plastic are lighter in weight than steel and may appear to be a preferable material at the time of product use. However, these materials cause more CO<sub>2</sub> emission in the manufacturing process than the equivalent for steel and are difficult to be recycled, and the quality of the products tend to deteriorate. From the Life Cycle Assessment (LCA) viewpoint, which considers the impact of a material from production to recycling, steel has lower environmental impact. We make efforts in broadly encouraging judgments using LCA. We are also taking up the challenge of making lighter-weight steel products. As an example, for vehicles, in addition to development of advanced high-strength steel sheets, we have created the "NSafe™-AutoConcept," which combines solution technologies (a component structure and processing technologies to materialize it) that maximize

performance of materials. This enables a 30% reduction in vehicle body weight compared to conventional vehicles.

If each element technology of the NSafe™-AutoConcept comes to be widely used, extreme-lightweight all-steel vehicle bodies can be made at low cost. Development of higher-strength components is also expected to be another way to secure further reduction in weight.



### Physical factor 3

#### Heightened need for solutions for "National Resilience" against natural disasters

In recent years, severe natural disasters have occurred more frequently in Japan and earthquakes, heavy rains and snow, volcanic eruption, and other disasters have caused extensive damage to people's lives. The Japanese government therefore developed the Fundamental Plan for National Resilience, based on the National Resilience Basic Law, and has been implementing various measures.

Against this background, the Nippon Steel Group has expanded its technology and product portfolio, which contributes to national resilience, and has made proposals to potential clients (i.e., the national and local governments), design consulting firms, etc. We have steadily made achievements particularly in areas such as adoption of our technology and products in measures against tsunami and earthquake-caused liquefaction, as well as repair and reinforcement of agricultural civil engineering facilities (i.e., water-use facilities and reservoirs).

#### Storms and typhoons

##### Steel-slit dams



Capturing of giant rubble and driftwood in debris flow

#### Earthquakes and tsunami

##### NS ECO-PILE™ method



Construction with no waste soil, and high pull-out strength

## ECO PROCESS (The way we manufacture is "eco-friendly")

Nippon Steel is committed to reduction of the environmental impact created by production activities and manufacturing processes. We make continuous efforts in all processes to not waste limited resources and energy.



#### Recycling rate of by-product gas

All by-product gases generated in the steelworks are used as in-house energy source.

100%

#### Rate of use of exhaust heat in generation of steam

61% of steam used as various heat sources within steelworks is generated by exhaust heat, with no use of fuel.

61%

#### Rate of use of in-house generated energy in power generation

In-house generated energy, such as exhaust heat and by-product gas, is used for 72% of in-house power generation.

72%

#### Supply of electricity to local communities

Supply of 38% of self-generated electricity to local communities

38%

As its main raw materials for steel production, Nippon Steel uses iron ore mined overseas, coal as for reduction of iron ore, and scrap generated by society.

By-product gases, such as coke oven gas generated when coal is thermally cracked in an oxygen-free environment in the coke manufacturing process and blast furnace gas generated from blast furnaces, are fully utilized as fuel gas for steel heating furnaces or energy sources for power generation plants on the premises of steelworks.

In addition, Nippon Steel itself generates 91% of the electricity it uses at steelworks, 72% of which is from internally generated energy sources such as waste heat and by-product gases. By not wasting but utilizing energy generated within the steelworks, we do our part to reduce CO<sub>2</sub> emissions.

We are also engaged in the recycling of various types of by-products generated by society or other industries by utilizing our steelmaking processes that are carried out at high temperature and high pressure. In recent years, we have been actively recycling waste plastics and other waste materials. Reuse of these waste, which are traditionally landfilled or incinerated, as raw materials or energy in steelmaking processing is another way that we reduce CO<sub>2</sub> emissions.

#### Efforts to improve energy efficiency of blast furnace

In the blast furnace, a reduction reaction to remove oxygen from iron ore, using carbon as a reducing agent, is conducted. Nippon Steel has developed and adopted various technologies, including those to make larger blast furnaces, improve energy efficiency through stable operation, and power generation by use of blast furnace top pressure. These efforts have resulted in realizing the world's top-class energy conservation and CO<sub>2</sub> reduction.



Kansai Works No. 2 blast furnace

#### Coke Dry Quenching (CDQ) for large-scale waste heat recovery

The CDQ equipment quenches hot coke made in the coke oven with inert gas, and the heat is used to generate steam for power generation. Compared to the conventional wet quenching, 40% energy saving has been achieved. Since the first CDQ unit was installed in the Kyushu Works Yawata Area in 1976, the CDQ equipment has been installed in steelworks nationwide and its technology has been transferred overseas.



CDQ

#### Introduction of regenerative burners

A pair of burners alternately heat the air or absorb the heat in the heating furnace, and the exhaust gas heat is effectively used to obtain high-temperature pre-heat air. This combustion system allows to achieve energy savings of one-quarter compared to the conventional system, and also excels in terms of environmental measures such as lower emission of NO<sub>x</sub>.



Regenerative burners

#### Building a foundation for stable production (continued enhancement of strength in manufacturing)

Many of our steelworks are passing about 50-year milestone since the start of their operation. Our workforce is also undergoing drastic generation changes. Against such a background, we are implementing measures in hardware aspects (such as refurbishing, renewal, and new construction of facilities), and in software aspects (such as standardization of know-how, human resource development, and company-wide expert activities aimed at utilizing company-wide know-how to resolve specific issues) in order to prevent production cuts and inefficiencies, caused by problems, and achieve stable production.



Muroran Works No. 5 coke oven (CO) refurbishment



## ECO PRODUCTS (What we produce is “eco-friendly”)

Our Group’s products have advanced functions and reliability, which are based on our superior technological capabilities, and are used in diverse areas including energy, transportation and construction equipment, and household products. They typically help our customers become more efficient while making their products lighter or lengthening product life. That translates into the saving of resources and energy, and into a reduction in CO<sub>2</sub> emissions at the point of use at our customers, thereby contributing to lessening the environmental impact.



**Proposal to reduce weight, as a next-generation steel car concept**

Reduction of CO<sub>2</sub> emissions, improvement of safety, and reduction in cost for vehicles

### NSafe™-AutoConcept

This is a next-generation steel car concept to realize significant weight reduction and improved safety. We have expanded our technical menu of materials development, structural and functional design, construction method development, and performance evaluation, and have also been proposing technologies to adapt to the next-generation mobility, such as electric-powered vehicles including EVs.

Awards received from outside institutions in FY2020 p. 64

Reduction of electrical energy loss (iron loss)

Energy saving and CO<sub>2</sub> emission reduction

### High-efficiency electrical steel sheets

Electrical steel sheets are used as the iron-core of motors for transformers, automobiles, home appliances, industrial machinery, and so on. By maximizing the magnetic properties of electrical steel sheets, the loss of electrical energy (iron loss) is reduced, contributing to energy conservation and CO<sub>2</sub> emission reduction.

Larger steel products for construction use

Simpler design and more efficient processing

Reduction of construction periods (valued also as a measure against labor shortage)

### Mega NS Hyper Beam™

A new product, Mega NS Hyper Beam™, has about 20% greater web thickness than conventional fixed outside-width H-shaped steel of a large-sized cross section. Together with Nippon Steel's nine conventional H-shaped steel products, the Mega NS Hyper Beam™ has acquired the EcoLeaf Environmental Label, an international certification program that discloses the quantitative environmental information related to LCA of products.

Stainless steel for hydrogen infrastructure with enhanced strength and workability

Contributing to social dissemination of next-generation energy use

### HRX19™ stainless steel for high-pressure hydrogen environments

HRX19™ has the world's top-level hydrogen embrittlement properties, and has 60% higher strength than conventional materials. It also can be welded. It is an advanced material that is safe, compact, and has a long product life, besides satisfying requirements for a hydrogen station.

Enhanced impact-absorption performance of steel plates for shipbuilding

Safety enhancement of marine transportation

Reduced impact from marine accidents

### NSafe™-Hull, highly-ductile steel plates for shipbuilding

Having 50+% higher ductility than conventional steel, NSafe™-Hull is the world's first steel that prevents oil leakage at the time of a ship's collision, thereby contributing to preservation of the marine environment. It has been adopted for large-sized bulk carriers and ULCCs (Ultra Large Crude Oil Carriers).

Awards received from outside institutions in FY2020 p. 64

Weight reduction of railway wheels and axles

High-speed railway transport

Improved energy efficiency

### Wheelsets (wheels and axles) for high-speed railways

Nippon Steel manufactures almost all wheels and axles used by railways in Japan. We are pursuing weight reduction by reducing the thickness of wheels and developing hollow axles, for example, and contributing to improvement in energy efficiency in railway transport, together with high-strength, highly-durable rails and lightweight driving equipment.

## ECO SOLUTION (Sharing our “eco-solutions”)

With the understanding that the transfer of Japan’s advanced energy-saving technologies overseas can be one of the most effective ways to globally reduce CO<sub>2</sub> emissions, Nippon Steel is participating in many energy-saving and environmental initiatives in Japan and overseas. For example, we work with the World Steel Association and directly with countries such as China and India.



### Japan's steel industry's international cooperation in energy conservation

As a core member of the Japan Iron and Steel Federation (JISF), Nippon Steel is involved in multinational projects such as those for the Environment Committee of the World Steel Association. In addition, the JISF is promoting **1** joint meetings of public and private steel-related parties, **2** preparation of customized list of technologies, and **3** assessment of steelworks as to energy-saving status. These are the three pillars of collaboration for bilateral energy-saving and environmental cooperation with India, Southeast Asia, and other countries and regions.

#### 1 Joint meetings of public and private steel-related parties

In public-private steel-related joint meetings, we share the Technologies Customized List, the results of assessment of steel mills, and introduce detailed technical information and financing schemes, in order to realize the early transfer of energy-saving technologies to emerging countries. By fiscal 2020, 19 joint meetings have been held: 9 times in India and 13 times in six ASEAN countries. In 2020, we held the online “AJSI Webinar 2020” conference with ASEAN countries and shared examples of energy saving and environmental conservation measures.

#### 2 The technologies customized list

We identify the appropriate technologies for each country and region, and in addition to detailed technical information, we conduct the assessment of steel mills, and provide the Technologies Customized List, which complies information such as on suppliers, for reference. In fiscal 2018 the technologies customized list was updated into the fourth version for India and into the third version for the ASEAN countries.



Technologies customized list

#### 3 Assessment of steelworks

Experts from the Japanese steel industry visit the steel mills overseas to propose energy-saving technologies, provide operational improvement advice based on the operational conditions of the facilities, and conduct the energy-saving assessment of steel mills using the international standard ISO14404. Up to fiscal 2020, we had carried out the assessment of 12 steel mills in India and 14 mills in six ASEAN countries.



Assessment of steelworks

#### Activities as a Climate Action member

Nippon Steel participates in the Climate Action Program of the World Steel Association, which uses universal methods to calculate and report on the CO<sub>2</sub> emitted by steelworks. We have been selected as a Climate Action member.



Climate Action member certificate

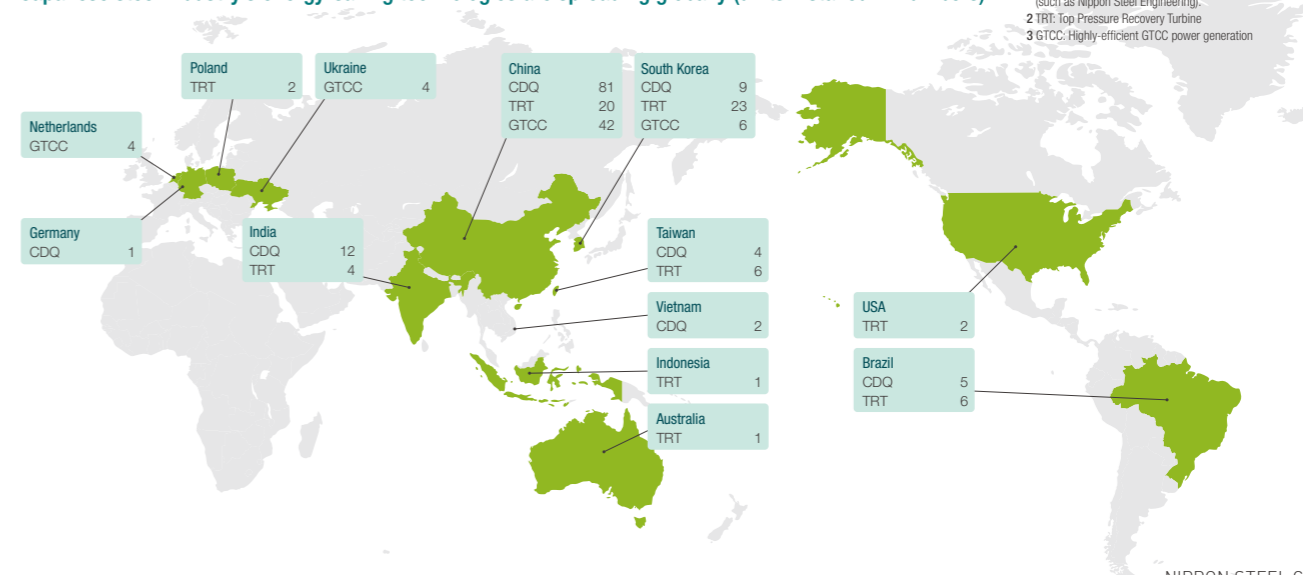
### Contribute to reduction of CO<sub>2</sub> emission on a worldwide scale

Japan's steel industry can contribute to reduction of CO<sub>2</sub> emission on a worldwide scale by transferring its advanced energy-saving technologies to emerging countries. The reduction effects of CO<sub>2</sub> emission by transfer of Japanese steelmakers' energy-saving technologies have amounted to 68.57 million ton reduction in CO<sub>2</sub> emissions per year in total.

	Number of units	CO <sub>2</sub> emission reduction (10,000 t-CO <sub>2</sub> /year)
Heat recovery	7	98
CDQ <sup>1</sup>	114	2,296
TRT <sup>2</sup>	65	1,150
Oxygen Converter Gas collection	22	821
Oxygen Converter Gas waste heat collection	8	90
GTCC <sup>3</sup>	56	2,402
<b>Total</b>	<b>272</b>	<b>6,857</b>

(FY2019)

### Japanese steel industry's energy-saving technologies are spreading globally (units installed in numbers)





# Contributing to Creation of a Circular Economy

## Steel is a flexible, repeatedly-recyclable material

Steel, a material, used in great quantities in many kinds of products around us, is actually an eco-friendly material not only in its production but also in disposal of its products since almost all used steel is recycled endlessly into all kinds of products. As it is easy to remove impurities from steel products, steel is a flexible, repeatedly-recyclable eco-friendly material.

## Use of resources and energy efficiently

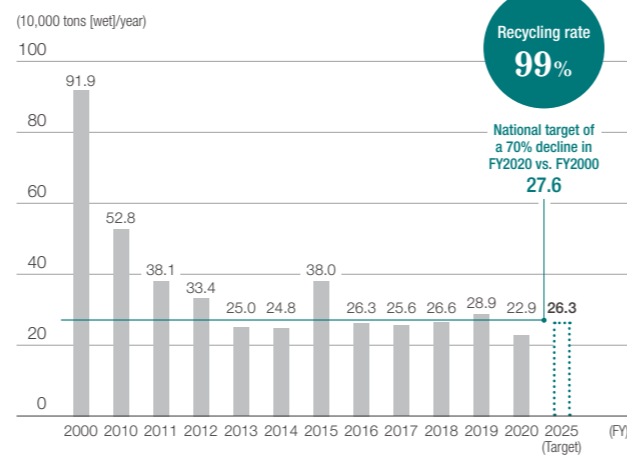
Nippon Steel's steelworks use 100% of by-product gas generated in the steelmaking process, as fuel for heating of steel or as energy for an onsite power plant. Concerning water resources, 90% of water used in cooling and cleaning of products and manufacturing facilities are reprocessed and repeatedly used.

## Promotion of in-house zero emissions

### ► By-products generated and the amount finally disposed

In the iron and steel-making process, over 600 kg of by-products, such as steel slag, dust, sludge, and used refractory bricks, are generated for each ton of crude steel produced. In fiscal 2020, Nippon Steel produced 33.34 million tons of crude steel and generated 20.38 million tons of by-products. As a result of efforts to reduce most of by-products, such as by recycling, the final disposal amount was decreased to 229,000 tons, falling below the national target of 276,000 tons. The recycling rate has been maintained at a very high level of 99%. Going forward, we will strive to further reduce the amount of waste by setting the target in the final disposal amount for fiscal 2025 at 263,000 tons – approximately 10,000 tons of incremental reduction from the target for fiscal 2020.

Nippon Steel's final disposal amounts



### ► Effective use of steel slag

Almost all steel slag is effectively utilized. Approximately 70% of blast furnace slag is used for cement, while steelmaking slag is used for materials for road base layers, civil engineering work, fertilizer, soil improvement, etc.

"Blast furnace cement," a mixture of pulverized blast furnace slag and ordinary Portland cement, contributes to a 40% reduction of CO<sub>2</sub> emissions during manufacturing, since the cement-making process can be omitted. The steel slag products are designated as a "designated procurement item" under the Act on Promoting Green Procurement, and have been certified as recycled products by some local governments.

Nippon Steel's pavement materials, KATAMA™ SP, are advantageously used in keeping with the characteristics of steel slag. They are used for forest roads and farm roads, as well as for weed preventive pavement to be installed near mega-solar panel installations and other locations.

Geo-Tizer™ made of steel slag can be mixed with soft soil (mud, such as surplus excavated soil from construction sites or farmland soil) to reform the soil to make it usable. Unlike conventional soil-improvement materials (i.e., cement and lime), this soil produces less dust, significantly reduces CO<sub>2</sub> emissions in its production, and is less expensive, enabling reduction of construction cost. The remediated soil is outstanding in compacting and can also be easily excavated, as it does not excessively solidify.

Calcia modified soil — a mixture of steelmaking slag and dredged soil — has been used to improve the marine improvement, such as by back-filling deep-dug seabed areas and creating shallow bottoms and tideland. In addition, Nippon Steel's Vivary™ iron supply units, which are composed of steel slag and humus made from waste wood, provides iron needed for seaweeds to flourish, promoting regeneration of an area of the sea bed that had lost much of its living organisms. [▶ p. 10, 39](#)

Moreover, as steel slag contains nutrition that helps plants grow, it is also widely used as fertilizer, contributing to improving farming productivity.

Steel is a flexible, repeatedly-recyclable material that can sustain resource circulation: it is a perfect example of a circular economy. Nippon Steel strives for the greatest efficiency possible, including minimization or elimination of waste, in use of our energy and limited resources, in every process of steelmaking. Consequently, we work to recycle internally-generated by-products so that we can realize zero emission. We are also actively engaged in recycling of waste generated in society or by other industries.

## Recycling of dust and sludge

To recycle the dust<sup>1</sup> and sludge<sup>2</sup> generated in the iron and steelmaking processes, for them to be used as raw materials, Nippon Steel operates a dust reduction kiln (RC: Resource circulating oven) at East Nippon Works Kashima Area and a rotary hearth reduction furnace (RHF) at East Nippon Works Kimitsu Area, Setouchi Works Hirohata Area, and Hikari (NIPPON STEEL Stainless Steel Corporation). This enables us to recycle all internally-generated dust. In March 2009, we obtained special approval for RHF under the Waste Disposal Act to carry out recycling of externally-generated dust as well.

By-products and recycling (FY2020)

By-product	Amount generated (wet weight – million tons)	Recycling application	Recycling rate
Blast furnace slag	10.14	Blast furnace cement, fine aggregate, road base, etc.	100%
Steelmaking slag	4.39	Road base, civil engineering materials, fertilizer, etc.	99%
Dust	2.70	Raw materials for use in-house and also zinc refining	100%
Sludge	0.40	Raw materials for in-house use	89%
Coal ash	0.46	Cement raw materials, construction materials	100%
Waste furnace materials	0.27	Reuse, etc.	64%
Others	2.02	In-house use, others	99%
<b>Total</b>	<b>20.38</b>	<b>Total recycling rate</b>	<b>99%</b>

1 Fine dust collected with a dust collector  
2 Semi-solid slurry recovered from industrial wastewater or sewage treatment

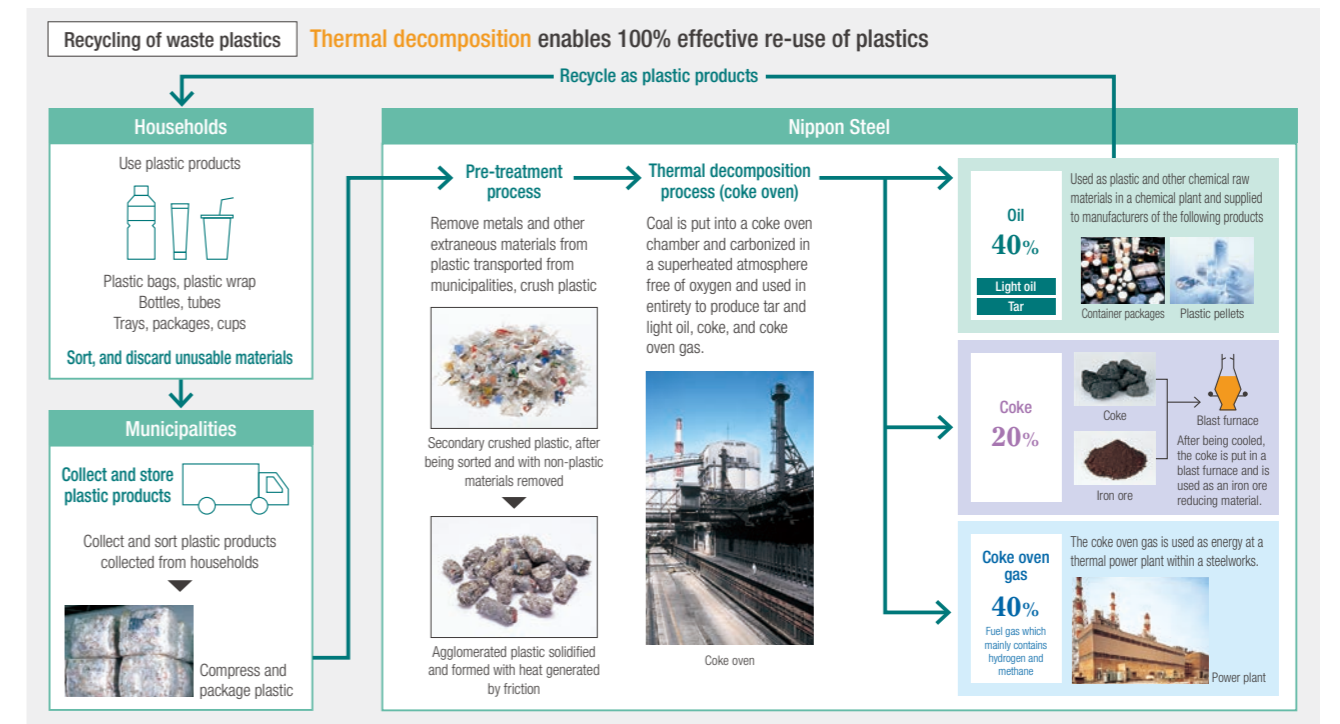
## Contributing to worsening waste plastic problems

Nippon Steel recycled 100% of plastic containers and packaging used and collected from households, using a coke oven and a chemical recycling method. Specifically, after thermal decomposition (in the coke oven), 40% is collected as hydrocarbon oil and recycled into plastic products; another 40% is collected as coke oven gas and used as energy at a power plant within a steelworks; and the remaining 20% is coke and used in the iron-making process.

We have established a system to receive waste plastics from local governments nationwide and are handling about 200,000 tons per year, equivalent to roughly 30% of waste plastics collected all over Japan. Our method of using coke oven has an extremely high recycling efficiency and a great treatment capacity, contributing to a circular economy in many regions. The

cumulative amount processed in fiscal 2000–2020 was approximately 3.48 million tons, equivalent to 11.10 million tons in terms of reduction in CO<sub>2</sub> emissions. Recently, we have begun to recycle chemical fibers and food trays mainly into plastic products, under the same recycling method. Furthermore, as the Plastic Resource Recycling Promotion Law enacted this year calls for collection not only of container packaging plastics but also waste plastics in bulk collection, we are also working hard to develop technologies including increased treatment to meet these plastics processing needs.

This expanded use of waste plastics has been incorporated in our "Carbon Neutral Vision 2050" measures to combat climate change, and is presented as one of the examples of the efforts of Nippon Keidanren (Japan Business Federation) activity in its "Recycling Economic Partnership."





# Promotion of Environmental Risk Management

## Activities for reducing environmental risks

### ► Atmospheric risk management

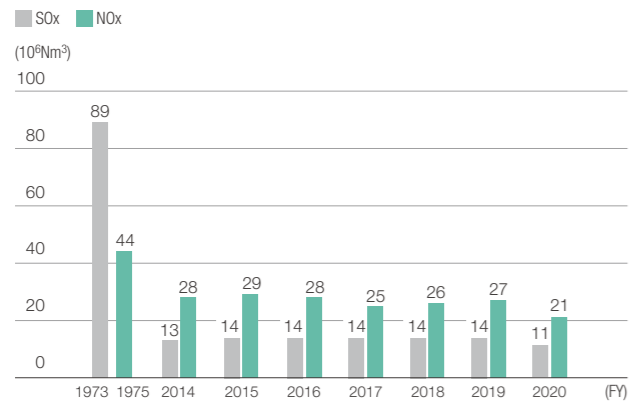
In order to reduce emissions of sulfur oxides (SOx) and nitrogen oxides (NOx), Nippon Steel is taking measures such as using low-sulfur fuel, adopting low NOx generating burners and installing effective equipment, including equipment that reduces SOx and NOx emissions. To curb emissions of soot and dust generated from factories and raw material yard, we try to enhance their collection by installing dust collectors and prevent scattering of particles by installing windscreens, windbreak trees and sprinklers, based on air pollution risk analysis through scientific simulation. We also conduct constant monitoring and regular patrols to ensure that no abnormal emissions are released.

Since April 2018, mercury concentration in emission gas has been regulated in Japan. At our facilities mercury contained in waste gas is effectively captured by dust collectors or is absorbed by activated carbon. We have confirmed that all of our facilities, including waste incinerators which are regulated for mercury concentration, conform to the regulations. For sintering furnaces and electric arc furnaces for steelmaking, we voluntarily manage their mercury concentration in accordance with a voluntary management standard, issued by the Japan Iron and Steel Federation (JISF) in April 2018. We carried out voluntary measurement and confirmed conformity with the voluntary management standard at all facilities subject to the voluntary initiatives in fiscal 2020. These results and evaluations are disclosed on the JISF's website in around September every year. Through such efforts, we strive to prevent mercury emission into the air.

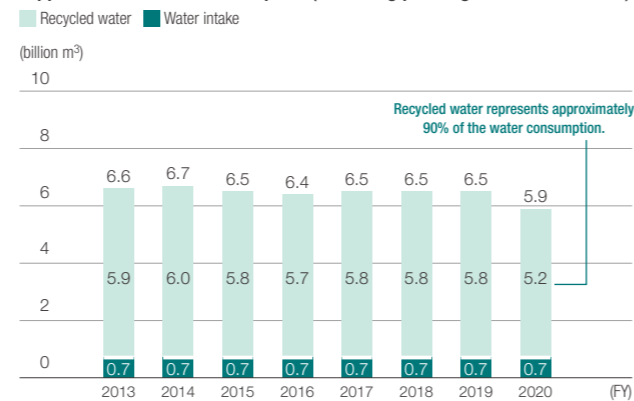
### ► Water risk management

We use about 5.9 billion m<sup>3</sup> of industrial water a year, of which approximately 90% is derived from recycled or reused water to reduce wastewater discharge, at all of our steelworks and factories combined. We try not to waste precious water resources, and to control wastewater discharge. To achieve this, we make daily efforts to maintain and improve the performance of wastewater treatment equipment, and the inspection and control of wastewater quality. Our operational bases in Japan are evaluated by the World Resources Institute (WRI) Aqueduct to confirm that we are not to be prone to high-level water stress. Nevertheless, in preparation of the remote chance of a water intake restriction, some of our steelworks possess their own water reservoir. In certain circumstances, we contribute to easing water stress of the community by providing water for agricultural use or by cooperating in other ways. In consideration of the importance of complying with the Water Pollution Control Law and preserving the water quality in the sea area to which it is discharged, we ensure that in the event of an operational problem the drainage outlets will not release abnormal wastewater outside the steelworks. Water drainage automatic monitoring systems, water shutoff gates, emergency reservoirs, etc. are installed to prevent water pollution. We also strive to check, repair, and maintain equipment in order to prevent water pollution, and to train our personnel in methods of checking of operations and controlling work procedures. Moreover, our steelworks have taken measures, such as to install a large storage tank so that water tainted with iron ore powder would not directly be released into the sea even if our steelworks were struck by a local torrential rain caused by weather abnormality. If there is a crack in an embankment facing the sea, there is a risk of a leakage of groundwater with unknown contaminants. In order to prevent this, the embankment is regularly inspected from the sea side enabling us to maintain and manage it in a sound condition. In areas with potential risk of leakage of water which may exceed permissible levels of contaminants, a board or sheet water barrier may be installed so as to prevent leakage even if a crack develops on the embankment.

Emission of SOx and NOx



Nippon Steel's water consumption (excluding power generation facilities)



Nippon Steel is promoting management of environmental risk with the aim of continually enhancing preservation of the environment in various regions, with due consideration of environmental risks, which differ by each steelworks and factory, and with due consideration to compliance with Japan's Air Pollution Control Act and other regulations.

Environmental measures at steelworks

Prevention of scattering of materials and dust

**Spraying of water and chemical in coal yards**

Water and chemical are sprayed on piles of iron ore and coal to restrain the scattering of raw materials.

**Sprinkler trucks**

These trucks spray water on the road and empty lots or clean the road within works to restrict the secondary scattering of dust.

**Road cleaning trucks**

**Windbreak net at yards**

A windbreak net is installed to reduce the strength of wind and restrain the scattering of raw materials.

**Electric dust collectors**

Dust generated in the burning process is collected by two types of dust collectors (electric or with bag filter), depending on the characteristics of the dust (i.e., particle size distribution, emission gas concentration.)

**Dust collectors with bag filters**

**Wet type desulfurization equipment**

The wet desulfurization method enables SOx in emission gas to be eliminated.

**Active coke dry type desulfurization equipment**

The dry desulfurization and denitrification methods, using active coke, enables SOx and NOx in emission gas to be eliminated.

**Low NOx regenerative burners**

Burners featuring reduced levels of NOx generation and outstanding fuel savings have been installed.

**Waste water coagulating sedimentation treatment equipment**

Fine undissolved matter is coagulated into bigger masses by chemical treatment, permitted to settle, and is removed.

**Pressurized flotation system**

Floating oil is removed by tiny bubbles formed by released air.

**Activated sludge treatment equipment**

Organic matter is decomposed and eliminated by bacteria.

**Filtration equipment (secondary treatment)**

Undissolved residues in the treated waste water are filtered by a sand layer and removed.

**Waste water automatic monitoring equipment**

The water quality of waste water is automatically monitored.

**Waste water closing gate**

Waste water flow is shut in case of trouble.

**Rainwater effluent treatment facility**

Undissolved residue from rainwater is coagulated and eliminated.

**Checking of embankments**

The embankments are regularly inspected from the sea side to find potential issues.

**Repair of the damaged area of embankment**

Damaged areas found by inspection are promptly repaired to maintain and manage the embankment in a sound condition.



### ► Soil risk management

We are taking appropriate measures in compliance with the Soil Contamination Countermeasures Act, guidelines issued by the Ministry of the Environment, local government ordinances, and so on. We report to the local government when performing landform modification work such as excavation which is required to be reported. We conduct pollution surveys when needed.

Starting in fiscal 2018, the Revised Soil Contamination Countermeasures Act is being enforced in stages will be expanded. We will continue to comply with relevant ordinances.

## Management of discharged chemical substances

### ► Comprehensive management of discharge

Nippon Steel appropriately manages and tries to improve the production, handling, and discharge or disposal of chemical substances in accordance with the Chemical Substance Management Law<sup>1</sup>, Chemical Substance Evaluation and Regulation Law<sup>2</sup>, and other laws concerning the management of chemical substances as well as the procedures employed. According to the targets of the Chemical Substance Management Law, we thoroughly manage the material balance, which includes the amount of chemical substances handled, the amount discharged to the environment, disposable amount, and the amount used as products. Similarly, we take care in managing the Volatile Organic Compounds (VOC<sup>3</sup>), which are said to cause photochemical oxidants and suspended particulate matter. In complying with the Chemical Substance Evaluation and Regulation Law, we identify and provide notification of the amounts of production and sales of the targeted chemical substances.

Nippon Steel also took the lead in promoting use of alternatives to using steelmaking materials and equipment that contain hazardous materials such as polychlorinated biphenyl (PCB) and mercury. According to safe handling standards, we systematically replace or dispose possibly hazardous parts and materials, given the time limit for disposal or the expiration date, stipulated for each area.

### ► Management of discharge based on the Chemical Substance Management Law

In 1999, two years before the enforcement of the Chemical Substance Management Law, Nippon Steel began surveying chemical substances according to the voluntary control manual developed by the Japan Iron and Steel Federation (JISF). At present, in compliance with the Chemical Substance Management Law, we monitor 462 chemical substances and try to control their emission and improve the way we manage it. In fiscal 2020, there were 53 target substances for notification and the emission amount was 345 tons into the atmosphere and 30 tons to public water areas, while the disposal amount of mostly manganese, chrome, other metals, and their compounds to outside of the steelworks was 5,480 tons in aggregate.

Every year, data is compiled by each steelworks and experience in carrying out reduction measures is shared with other steelworks. In addition, the compiled results are disclosed on our website.

We have similarly been working on reducing volatile organic compounds (VOCs). In fiscal 2009, the 30% reduction target relative to fiscal 2000 was achieved. Since then, low discharge levels have been maintained.

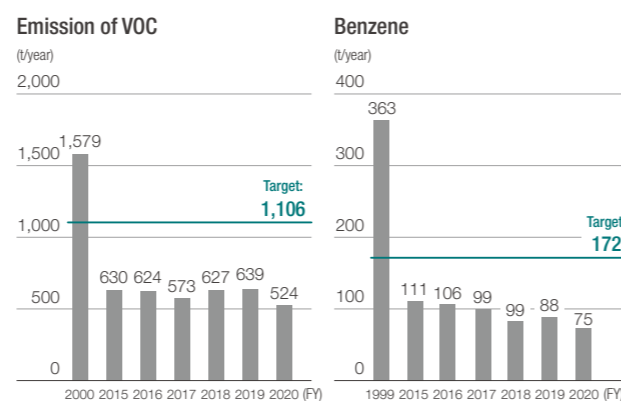
### ► Voluntary priority control of select chemical substances

#### • Dioxin

Some of our facilities, such as sintering facilities and incineration facilities, are a source of emissions of dioxins into the atmosphere. All these facilities have conformed to the emission concentration standard and have achieved levels of emissions far below the voluntary reduction target, based on the JISF guidelines, relative to fiscal 1997.

#### • Benzene, tetrachloroethylene, dichloromethane

We developed a voluntary reduction plan of hazardous air pollutants specified in the environmental standard, which we handle. As a result of our systematic undertaking, we have already reached the targets for all three pollutants and have been maintaining the target levels.



1 An abbreviation of the Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof (Law concerning Pollutant Release and Transfer Register (PRTR))  
 2 An abbreviation of the Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc.  
 3 Volatile organic compounds (VOC): Organic chemical compounds emitted into the atmosphere in the form of gases, which are considered to be the source of undesirable airborne particles and photochemical oxidants, which became subject to control under the Air Pollution Control Act of 2004, as amended.

## Appropriate treatment of industrial waste

In order to appropriately handle industrial waste generated in our business activities, we thoroughly carry out (1) management by sorting industrial waste depending on the status of its occurrence, (2) appropriate selection and continuous management of collectors, transporters, and disposal contractors, and (3) appropriate management of Manifests (industrial waste management documentation).

In order to enhance compliance in waste treatment by appropriately managing the Manifests, all Nippon Steel steelworks and offices have adopted the e-Manifest system and fully utilize it for waste management.

We also evaluate collectors, transporters, and disposal contractors based on our internal rules and conduct on-site inspections at predetermined frequency, so as to continuously and appropriately ensure proper management.

## Environmental measures taken in steelworks

# COLUMN

### Emissions reduction of volatile organic compounds (VOC)

Nippon Steel is working to reduce VOC emissions, which are said to be the cause of photochemical oxidants and airborne particulate matter. After collecting the VOC-containing gases emitted from the manufacturing process, the gas is conveyed away and detoxified in the combustion furnace or recovered as a liquid in an adsorption tower.

The combustion furnace (photo) in the East Nippon Works Kimitsu Area heats gas containing VOC, such as benzene, to 800°C or higher and decomposes it into water and carbon dioxide. The decomposition efficiency of VOC in this combustion furnace is greater than 99%, contributing significantly to the reduction of VOC emissions. We have already achieved our voluntary reduction targets for VOC emissions and benzene emissions, but will continue to further reduce emissions.

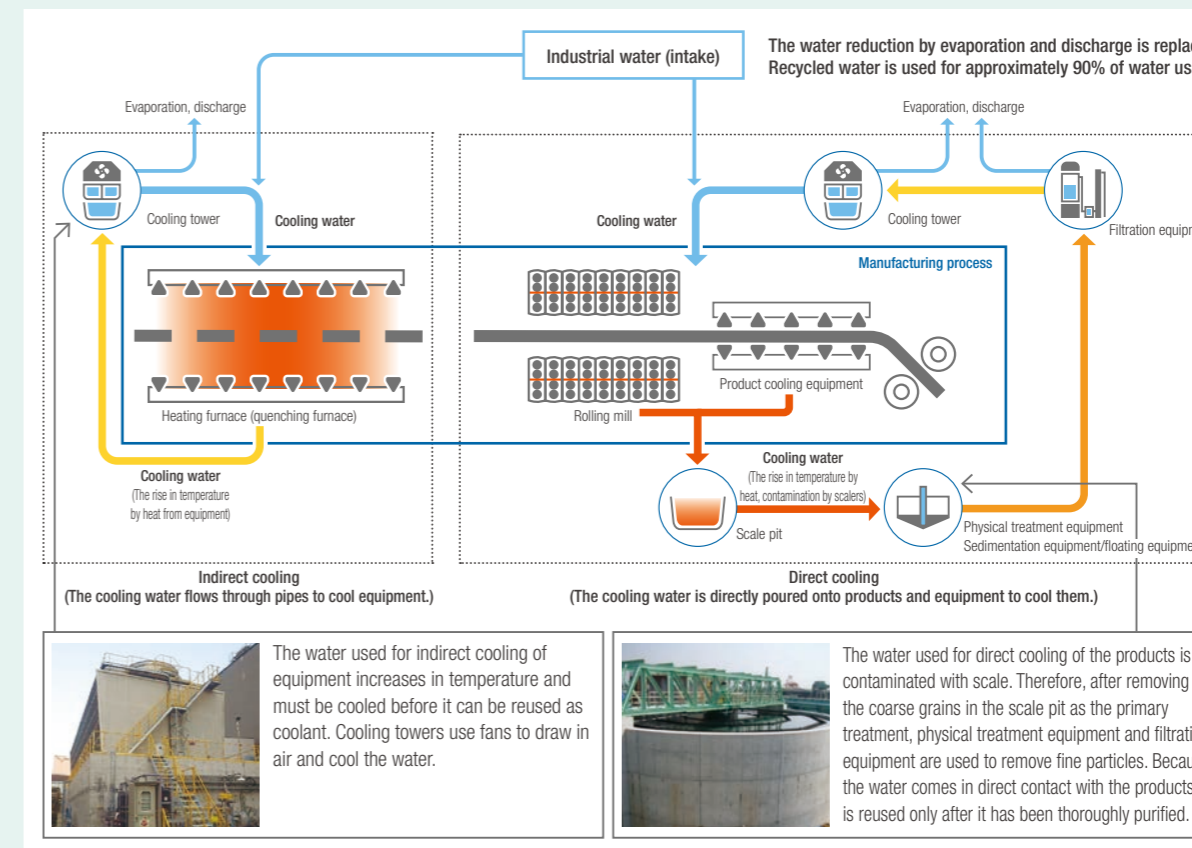


Exhaust gas burning furnace in the East Nippon Works Kimitsu Area

### Responding to water resource risk — a system for recycling of industrial water in steelworks

Nippon Steel reclaims and reuses most of the water used in the steelmaking process, with a small remaining portion to be properly treated and discharged out of the steelworks. In the case of recycling, water is cooled and

cleaned once it is used, and various treatments are carried out depending on the application. We therefore thoroughly inspect and maintain each processing facility and control the water quality in daily operations.



Introducing other initiatives in the website [https://www.nipponsteel.com/en/csr/env/env\\_risk/index.html](https://www.nipponsteel.com/en/csr/env/env_risk/index.html)

- Atmospheric risks** Measures against risks of abnormal generation of NOx  
Reduction in emissions of SOx and NOx, etc.
- Water risks** Measures against risks of abnormal water discharge  
Measures against local torrential rain and water leakage of embankments  
Addressing water risks, etc.
- Industrial waste** Electronic Manifest, etc.





# Initiatives on Conservation of Biodiversity

As a member of Nippon Keidanren (Japan Business Federation), Nippon Steel has affirmed the Declaration of Biodiversity by Keidanren and Action Policy (revised in October 2018) and has accordingly been taking initiatives on biodiversity preservation.



## Policy for the initiatives

We will promote the initiatives on conservation of biodiversity, which are closely aligned with measures to deal with climate change and creation of a circular economy, under the following policy.

- As a member of Nippon Keidanren, we comply with the “Declaration of Biodiversity by Keidanren and Action Policy”.
- Recognizing both that our business activities greatly rely on the nature’s gifts, and that biodiversity is vital for realizing a sustainable society, we understand the relationships of our business activities with biodiversity and are pledged to respond to challenges rooted in diverse local features, in order to build a society in harmony with nature.
- As a member of the international community, we also recognize that initiatives aimed at building a society in harmony with nature are closely related to global issues of measures to deal with climate change and creation of a circular economy. We aim to realize a sustainable society through an integrated environmental corporate management which includes these initiatives in business activities.

### “Creation of Hometown Forests”

▶ Reproducing “the grove of a village shrine” and nurture biodiversity

We have carried out the “Creation of Hometown Forests” projects at our steelworks and factories in Japan under the guidance of Dr. Akira Miyawaki (professor emeritus of Yokohama National University), with the aim of facilitating harmonious coexistence between nature and humans. This project comprises research on the natural vegetation inherent to a certain area in a nearby grove associated with a historical shrine (*Chinju-no-mori*), careful selection of suitable trees, growth of their saplings in pots, and planting them in designated places by local residents and our employees.

This was the first project by a private company in Japan to create a forest that harmonizes with the local scene and is based on an ecological approach. This is one way we try to raise the awareness of our employees regarding the environment. At present, our forests in aggregate have grown to total around 830 ha (about the size of 180 Yankee Stadiums).

Wild birds and animals visit the forests we make and maintain at our steel works sites across Japan. Wild birds and animals inherent to the land return to the forests. Thus, the “Creation of Hometown Forests” helps conserve biodiversity, and sequester CO<sub>2</sub>.



### “Creation of Sea Forests”

▶ Implemented in 38 spots in Japan to improve sea desertification

With the aim of offsetting a part of the decline in the supply of iron from nature, which is said to be one of the causes of sea desertification, Nippon Steel has developed the Vivary™ Unit via joint research with The University of Tokyo and uses it to promote regeneration of seaweed beds.

While humic acid iron is the combination of iron ions and humic acid in the soil of a land forest in the natural environment, we have developed the technology to artificially generate humic acid iron by using steel slag and humic substance originated from waste wood. The Vivary™ Unit has received a safety certificate from the Safety Check and Certification System of steel slag products of the National Federation of Fisheries Cooperative Associations.

In Mashike Town, Hokkaido, starting from an experiment in 2004, we developed a large-scale project (300-meter coastal line) by 2014, confirming expansion of seaweed beds and an increase in intake of sea urchin. This project is also expected to restore once-atrophied seabed and steadily raise biodiversity.

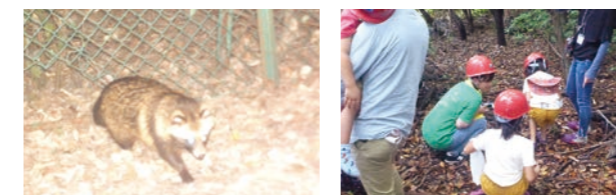


Some animal inhabitants of the Hometown Forests	
Muroran	Ezo deer, Ezo red fox, Ezo squirrel, eagle, buzzard, magpie
Kamaishi	Moon bear, Japanese serow, deer, hare, black-tailed gull
Naoetsu	Japanese dace, carp
Kashima	Pheasant, shrike, duck
Kimitsu	Bulbul, pheasant, little tern, swallow, egret
Nagoya	Raccoon, pheasant, bulbul, shrike, swallow, great tit
Osaka	Weasel, starling, bulbul
Wakayama	Raccoon, marten, bulbul, tiger keelbuck
Sakai	Duck
Amagasaki	Heron, bulbul, lizard, killifish, white-tailed skimmer
Hirohata	Buzzard, shrike, oriental turtle dove, bulbul, starling, bunting
Yawata	Weasel, pheasant, gray heron, Japanese cormorant
Kokura	Gull, Japanese wagtail, graphium sarpedon
Oita	Whooper swan, kingfisher, killifish, mayfly, firefly
Hikari	51 species of birds including black-tailed gull and herring gull

## Participation in community projects

▶ Participation in ecological preservation activities in the community

Since 2012, the Nagoya Works of Nippon Steel has participated in the Inochi-wo-Tsunagu (Life Sustaining) Project, which consists of the students’ planning committee, 11 companies, Eco-Asset Consortium and Japan Ecologist Association of Support (NPO). This project seeks to develop an ecosystem network to links green areas at each company site and vicinity. To thereby increase the potential of the linked areas, an animal pathway was established and a fixed-point observation camera has recorded raccoons coming and going through the pathway. The project also included experience-based activities, including corporate greenery visits, fun-filled learning events for families, and craft-making events. Being highly evaluated 1) as a community-building, corporate-government-student alliance, 2) for its creation of an ecosystem network in multiple companies’ extensive, combined greenery space, and 3) as a model suitable for use elsewhere, the project has received the 46th Environment Award (Special Jury Award), co-sponsored by National Institute for Environmental Studies (NIES) and the Nikkan Kogyo Shimbun newspaper, and supported by the Ministry of the Environment.



## Contribution by use of by-products

▶ Steel slag being used for rice cultivation

Steel slag, a by-product of steelmaking, contains nutritional matter that helps grow plants. It is therefore used as a fertilizer for rice cultivation, dry-field farming, and pasture grass. Silica contained in steel slag promotes photosynthesis by keeping leaves upright and improving their light receiving orientation, while iron is effective in preventing root rot and leaf blight. The steel slag also contains phosphoric acid, manganese, boron, and various other components of fertilizer. Nippon Steel donated converter slag fertilizers to cooperate for research by Tokyo University of Agriculture for salt removal in farmland in the Soma area of Fukushima Prefecture, which was devastated by the earthquakes and tsunami of March 2011. The slag fertilizers has proved effective in rapid and efficient salt removal. The restoration of rice fields also means to restore habitats for birds, frogs, and various other living things.





# Promotion and Enhancement of Environmental Management

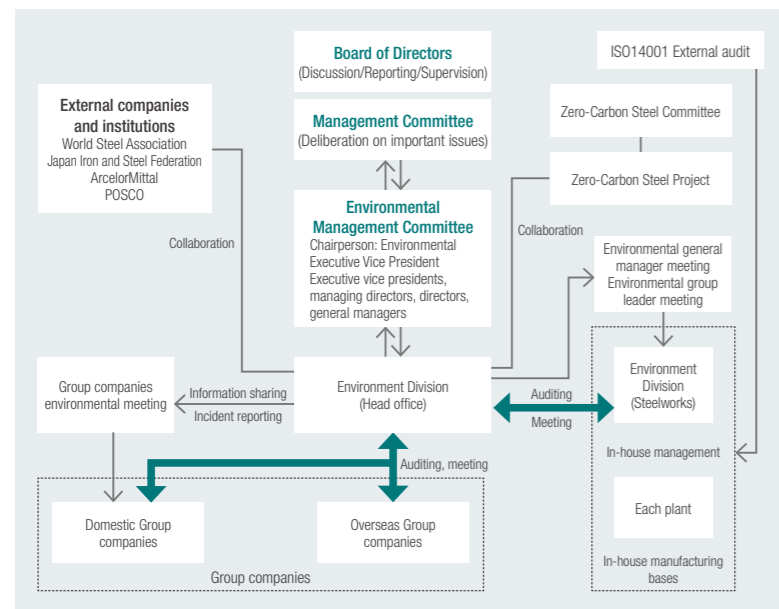
## Environmental management structure

Nippon Steel routinely follows the management cycle of PDCA, primarily through the work of the Environmental Management Committee<sup>1</sup>, which is held twice a year, to promote improvement of management. Positioning environmental risks as management issues, we have deployed a procedure that the Committee's activities are supervised by the Board of Directors, wherein environmental risks, related to climate change, air, water, and waste (among others), are given attention by the Environmental Management Committee that subsequently reports to the Board of Directors and the Management

Committee. As a part of the enhancement of governance, environmental general manager meetings and environmental group leader meetings, with participation by all steelworks, are regularly held. In particular, Nippon Steel works to reduce risks related to sedimented dust, wastewater, and waste including activities. These efforts are based on the work of experts conferences held for each of these areas. In addition, the Environmental Management Committee conducts specific risk management activities concerning climate change, as it involves significant risks in the longer term.

<sup>1</sup> The Environmental Management Committee consists of four Executive Vice Presidents, one Managing Director; and one Managing Executive Officer in charge of Corporate Planning, Accounting & Finance, General Administration, Legal, Human Resources, Environment, Technical Administration & Planning, Plant Engineering and Facility Management, Energy Technology, Research and Development, and Global Business; Head of Corporate Planning Division; Head of Legal Division; Head of Accounting & Finance Division; Head of R&D Laboratories; Head of Technical Administration & Planning Division; and Head of Environment Division

## Environmental management system



## Annual environmental management cycle



## Environmental audits

In accordance with the international standard ISO 14001, Nippon Steel has built an environmental management system, with each steelwork general manager serving as the responsible person. Each year, in addition to an internal auditing of each steelworks and a management review by its general manager, each steelworks is audited by the Head Office Environment Department. Environment officers of other steelworks and facilities also participate in these audits to cross-check. In addition, periodical reviews are conducted by the ISO certification agency.

For the group companies (84 companies subject to environmental review) including those overseas, a direct interview is conducted by a member of the Head Office Environment Department to improve management levels. This is part of the corporate governance conducted by the Head Office Internal Control/Audit Department.



Internal audit (hearings)



Internal audit (on-site patrol)

Nippon Steel has built an environmental management system that includes not only its own steelworks and factories, but also its group companies in Japan and abroad. Activities to reduce environmental risks are promoted by combining internal and external audits and following the plan-do-check-act (PDCA) cycle.

## Environmental conference participated in by group companies

From the group companies in Japan, Nippon Steel has identified 59 companies (as of April 2021) having certain environmental impact and holds meetings for those companies twice a year. In the meetings, the latest trends

of environmental laws and regulations are studied, cases of environmental initiatives are reported, and other information is shared with the goal of reducing environmental risks.

## Environmental accounting

### Philosophy of environmental accounting

Nippon Steel has adopted environmental accounting to be used as guidelines for corporate activities, and to accurately track the environmental costs and effects. The iron and steel industry is an equipment-intensive industry. We have achieved environmental preservation and energy conservation by installing environmental-friendly equipment such as dust collectors and improving the efficiency of production equipment. Costs of environmental preservation are quantified by adding the costs of capital investment associated with environmental measures, energy-saving measures, and recycling measures to expenses incurred to preserve the environment. We track capital expenditures for environmental, energy-saving, and recycling measures as well as expenses incurred to preserve the environment, as environmental preservation costs.

measures to improve the efficiency of reheating furnaces as well as overall energy-saving measures in each manufacturing process.

Environmental preservation costs totaled 101.2 billion yen, including 53.4 billion yen in air pollution prevention costs, 11.3 billion yen in water pollution prevention costs, 2.1 billion yen in costs for energy-saving measures, and 13.2 billion yen in environmental R&D costs. Expenses for waste disposal were reduced by promoting in-house recycling.

### Effects of environmental preservation

It is difficult to quantify environmental preservation effects in monetary terms, since such calculation would require many assumptions. Therefore, environmental preservation performance is reported as effects vs. costs of taking environmental measures in this report and on our website.

For example, reduction in energy consumption is shown on page 25; water consumption volume, on page 37; and various resources spent, on page 43. For atmospheric substances, SOx and NOx emissions are shown; for water quality and soil, individual performance indicators are used; for hazardous chemical substances, actual reduction volume of substances such as dioxins, benzene, and VOCs are stated; and for waste products, reduction in final disposal volume is stated.

### Environmental preservation costs

For fiscal 2020, capital expenditures for environmental preservation amounted to 19.4 billion yen in total, or approximately 4% of the company's capital expenditures. Investment in equipment for environmental measures of 17.0 billion yen include preventive measures for dust emissions, visible smoke emitted from steelworks stacks, extreme water discharge from drain outlets, and leakage of water from the revetments and quay walls at steelworks. Investment in energy-saving equipment of 2.4 billion yen comprises

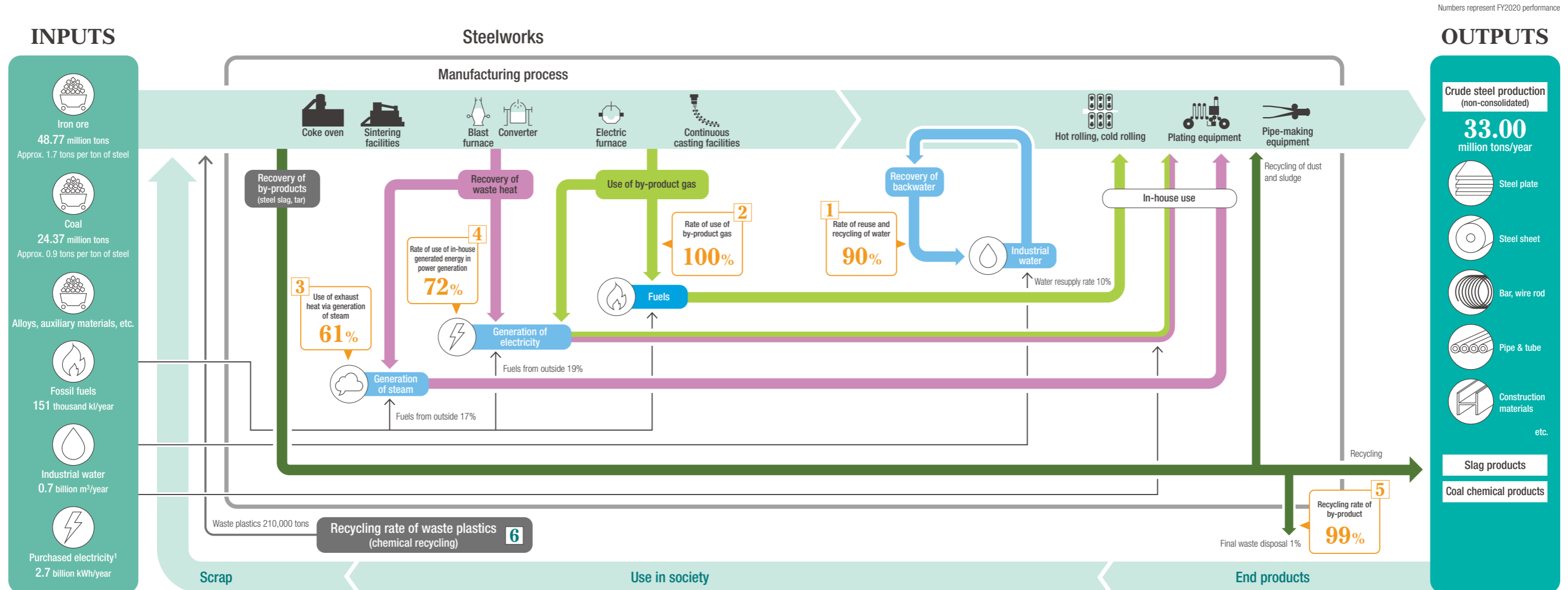
### Environmental preservation costs

Item	Definition	FY2020	
		Capital expenditures	Total expenses
Pollution Prevention Costs	Countermeasures against air pollution	16.1	53.4
	Countermeasures against water pollution	0.9	11.3
Global Warming Prevention Costs	Energy saving measures	2.4	2.1
Costs of Recycling Resources	Treatment of by-products and industrial waste	—	9.3
	Treatment of general waste from business activities	—	0.6
Environmental Management Activities Cost	Construction of EMS and acquisition of ISO14001 certification	—	0
	Monitoring and measurement of environmental loads	—	1.4
	Personnel expenditures related to environmental measures	—	2.8
Research and Development Costs	Development of Eco Products	—	7.1
	Development of products which have low environmental impact during manufacture	—	6.1
Social Activity Costs	Creating green areas at steelworks	—	2.6
	Supporting environmental organizations, and advertising	—	0.1
Other Environmental Costs	SOx levy	—	4.3
<b>Total</b>		<b>19.4</b>	<b>101.2</b>

Reference: Net income (consolidated basis) -32.4

# Energy Material Balance

Nippon Steel uses as raw materials iron ore mined overseas, coal as material of coke for reduction of iron ore, and steel scrap generated by society, and produces steel products by using industrial water and energy, such as electricity and fuel. Nippon Steel's manufacturing bases make utmost efforts at achieving efficient use of resources and energy in every manufacturing process, and utilize limited resources and energy so as there can be no waste. Specific efforts include improvement in product yield, efficient use of equipment, enhancement of efficiency in combustion, and reduced electricity use.



<sup>1</sup> Purchased electricity (kWh) excludes electricity purchased from Cooperative Thermal Power Companies.

## Efficient use of resources

### 1 Water resources

Of water used in cooling and cleaning of products and manufacturing facilities, 90% is reprocessed and repeatedly used, while the remaining 10%, which disappears mainly due to evaporation, is replaced.

pp. 35, 38

### 4 Electricity

Nippon Steel itself generates 91% of the electricity it uses at steelworks, 72% of which is from internally generated energy sources such as exhaust heat and by-product gases. In the future, we will also consider making more efficient facilities and switching fuel in order to further lower carbon generation.

### 2 By-product gas

By-product gases, such as coke oven gas generated when coal is thermally cracked in an oxygen-free environment in the coke manufacturing process and blast furnace gas generated from blast furnaces, are fully utilized as fuel gas for steel heating furnaces or energy sources for power generation plants on the premises of steelworks.

### 5 By-products

By-products generated in steelmaking are recycled for reuse in the same process or for commercial use. We thus promote achieving zero emission and contribute to conservation of resources and energy.

pp. 33, 34

### 3 Use of exhaust heat

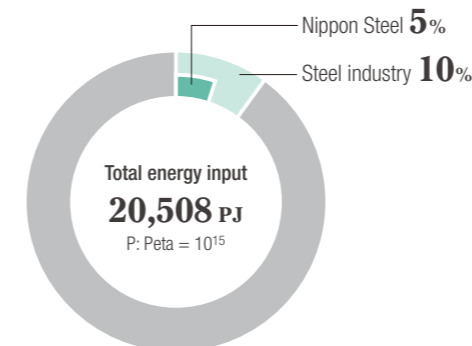
Exhaust heat, generated in the blast furnaces, sintering facilities, coke ovens, converters, and other facilities, is recovered and used in steam generation and power generation. In fiscal 2020, the suspension of coke furnaces and related equipment that stemmed from a significant reduction in production resulted to a decrease in waste heat recovery steam.

### 6 Recycling of waste plastics

Approximately 200,000 tons per year, or about 30% of plastic containers and packaging collected from households nationwide, are fully recycled by a chemical processing method using coke furnaces.

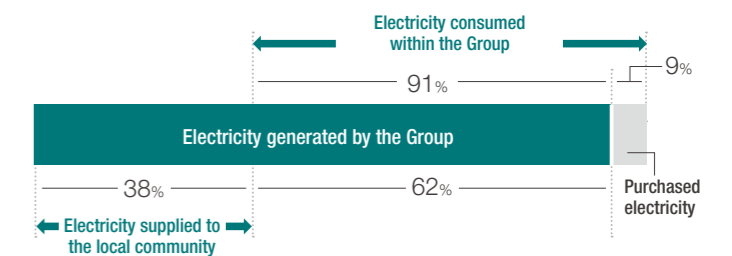
p. 34

## Nippon Steel's share in Japan's total energy input (FY2019)



Source: "General Energy Statistics" by the Agency for Natural Resources and Energy, Japan Iron and Steel Federation (JISF)

## Nippon Steel Group's<sup>2</sup> Electricity Supply and Demand Balance (FY2020)



The Group internally generates **91%** of the electricity it uses.

The Group supplies **38%** of internally-generated electricity to the local community.

<sup>2</sup> Including cooperative thermal power companies and affiliated electric arc furnaces

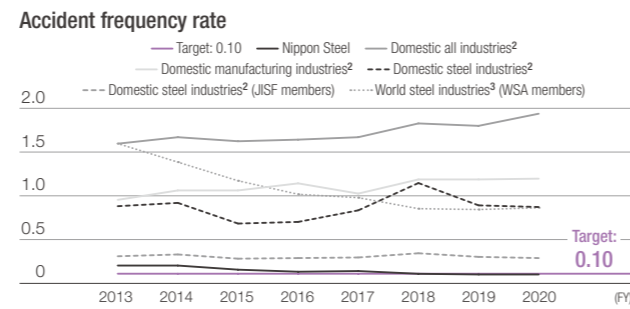


# Safety, Disaster Prevention and Quality

## Safety and health initiatives

### ▶ Reducing disaster risks to zero, and group-wide sharing of effective measures

We make a risk assessment when planning a new project and regularly conduct safety and risk assessment for existing projects, to prevent accidents and reduce risks. We also seek for greater safety of equipment even when such equipment is essentially safe, and take countermeasures against human error. We also actively promote use of IT in safety measures, such as checking worker location data via GPS, safety surveillance cameras, and helmet-mounted cameras. We conduct analysis of actual accidents for prevention of similar accidents and make known effective examples of accident-preventive measures. As a result of continuous execution of these measures, safety improved in fiscal 2020. There were 3 accidents for Nippon Steel's employees<sup>1</sup> and 16 for employees of subcontracting companies (including zero fatal accident for Nippon Steel and two in subcontracting companies) The accident frequency rate was 0.09 (compared to Japan's steel industry average of 0.87) and the accident severity rate was 0.08 (vs. 0.14). We will continue to strive for a safe work environment with the safety wellness targets for fiscal 2021 that are zero fatalities/severe accidents and less than 0.10 as the accident frequency rate.



1 Nippon Steel's employees include seconded employees as well as temporary and part-time workers, and those dispatched to Nippon Steel.  
 2 JISF "Safety Management Overview, 2021"  
 3 World Steel Association, Safety and health 2020 metrics report

$$\text{Accident frequency rate} = \frac{\text{Number of accidents and recordable incidents, accompanied by lost work time}}{\text{Total number of hours worked by all employees}} \times 1,000,000$$

**Target** Accident frequency rate **0.10** or less  
**Zero** fatalities accidents

### ▶ Acquisition of third-party certification

In fiscal 2019 Nippon Steel adopted a plan for all our steelworks and offices to obtain the ISO (JIS Q) 45001 Health and Safety certification (published in March 2018) by the end of fiscal 2021 and they have been acquiring it one by one.

Acquisition of ISO (JIS Q) 45001 certificates	
FY2019	Kansai Works Wakayama Area
FY2020	Amagasaki Area and Osaka Area of Kansai Works; Nagoya Works; Kyushu Works Oita Area; East Nippon Works Kashima Area
FY2021	East Nippon Works Naoetsu Area



Kashima Area's ISO (JIS Q) 45001 Health and Safety certification

### ▶ Safety training

We make efforts to improve training for accident prevention. The safety training programs are attended by all newly-appointed managers of manufacturing worksites (91 managers in fiscal 2018, 42 in fiscal 2019 and 81 in fiscal 2020). Our Taikan Program (an experience-based safety education program) allows employees to experience worksite risk through simulation, so as to better prepare them in anticipating and managing risk.

**Efforts Toward Safety and Health Management**  
<https://www.nipponsteel.com/en/csr/safety/index.html>

## Disaster prevention initiatives

### ▶ Initiatives to reduce disaster risks

Nippon Steel's Plant Safety Division is promoting initiatives for risk reduction in disaster prevention by working in three areas of focus: 1) corporate-wide implementation of measures against risks that emerge from instances of disaster, to prevent recurrence; 2) identification of disaster occurrence risks based on risk assessment plant by plant and by each of their process technology divisions; and implementation of tangible/intangible measures to reduce risks and control residual risks; and 3) voluntary monitoring

(auditing) concerning appropriate implementation of 1) and 2), by persons in charge of disaster prevention in each works; understanding of the control status through sessions with managers at the head office; and implementation of corrections, if needed. Targeting zero serious disaster-related accidents, we promote essential disaster prevention improvement measures in manufacturing sites.

In keeping with the corporate philosophy that "safety and health are the most valuable factors that take precedence over all other things and they are the basis that supports business development," we have firmly adhered to our manufacturing values, which include observing the principles of prioritizing safety, protecting the environment, and preventing disasters. All of our relevant employees also routinely practice quality control and assurance issues so as to enhance the quality of our products and services that satisfy our customers.

## Specific disaster prevention initiatives

**Target** **Zero** serious disaster-related accidents

- 1 Prevention of disaster recurrence (mitigating risks exposed by disaster)**
  - Enhance drills for initial response (drills at all plants in all steelworks; enhanced drill programs; use of dedicated training facilities; improvement of hazard sensitivity by use of CG, etc.)
  - Improve fire-fighting capacity of the in-house fire defense function, in cooperation with experts (joint fire drilling with public fire fighters; training for leaders, etc.)
  - Prevent forgetting past incidents and accidents (panel presentations in training facilities; session to learn about past incidents during training)
- 2 Disaster prevention risk assessment (identification of new potential disaster risk)**
  - Identify and assess risks in manufacturing sites based on the corporate-wide guidelines; manage residual risks; and develop and promote permanent measures
  - Identify accident risks related to operating processes and facility design and promote the drafting of permanent measures by outside experts and the process technology division in the head office
- 3 Measures to mitigate existing risks (measures for disaster prevention equipment)**
  - Prevent disaster recurrence; investment in measures for compliance and risk assessment
- 4 Auditing concerning disaster prevention**
  - Voluntary monitoring by disaster prevention organization at each steelworks for regular check-ups and corrective action on the status of disaster prevention activities at the manufacturing work front
  - Regular check-up and corrective action on the implementation status of disaster prevention management of each steelworks based on the hearings in the head office
- 5 Measures against earthquakes and tsunami and measures for natural disaster mitigation**
  - Promote measures against earthquakes in the order of 1) human injury prevention, 2) area damage prevention, and 3) production measures
  - Prepare procedures and devise measures for disaster mitigation to the nine categories of natural disasters (earthquakes, tsunamis, typhoons, heavy rains, floods, lightning, landslide disasters, heavy snow, volcanic eruptions)
- 6 Third-party monitoring toward enhancing safety competency in steelworks**
  - Assessment of steelworks by an NPO, the Japan Safety Competence Center
- 7 Group companies disaster prevention management**
  - Meetings to enhance coordination for disaster prevention management; individual visits to a workplace where a disaster or accident happened or which has risks related to disaster prevention

## Quality-related initiatives

### ▶ Activities aimed at strengthening the quality assurance system of the Nippon Steel Group

As a basic policy in line with the Japan Iron and Steel Federation's guideline, aimed at strengthening the quality assurance system, we are promoting 1) the enhancement of education on quality compliance (compliance with laws and regulations), 2) activities to reduce behavioral risks, and 3) advanced internal quality audit. Information on quality-related examples is promptly shared across the Group and at appropriate times measures are launched

to resolve issues through standardization, systemization, automatization, and other action. These measures are then implemented to enhance identification management of actual products and to improve reliability of testing and inspection. In addition, the five newly defined basic rules of quality behavior have been made known to all employees, with a focus on improving the awareness in quality compliance and preventing quality problems to occur.

## Specific initiatives

- 1 Enhancement of education on quality compliance**
  - Enhancement of quality compliance education opportunities (ICT utilization, e-Learning)
  - Spread and retention of the five basic rules of quality behavior (posters in the workplace, pre-work recitation, education for all employees)
  - Promotion of standardization and improvement in capacity of staff
- 2 Activities to reduce behavioral risks (risks of human intervention)**
  - Enhanced identification management and reliability of testing and inspection by promoting automation and systemization
  - Follow-up on the effectiveness of the system to prevent rewriting of test results
- 3 Advanced internal quality audit**
  - Periodic audit by the Quality Assurance Department of the Head Office
  - External audit by acquiring certification of ISO 9001, JIS, etc.
  - Promote own-initiative audits by educating internal audit staff and improving their capacity

# Respect for Human Rights

## Respect for human rights

### ► Basic policy

In compliance with the Universal Declaration of Human Rights and other international norms on human rights, the Nippon Steel Group is in the business of creating and delivering valuable and attractive products and ideas, by respecting our employees' diverse views and individualities and utilizing them for the good of all. Based on the United Nations Guiding Principles on Business and Human Rights, the Nippon Steel Group Conduct Code has been set. By adhering to its nine principles, Nippon Steel conducts business ethically, while paying full heed to human rights issues arising with the increasing globalization of the economy. Nippon Steel gives due attention to the rights of workers, and staunchly opposes the use of forced or child labor. These are prerequisites of our corporate activities. We have

### ► Addressing human rights risks

From the viewpoint of promoting human rights (HR) awareness activities by assigning human rights awareness advocates at each steelworks and each office, and of implementing corporate-wide human rights awareness activities, we hold a "corporate-wide forum of human rights awareness advocates" in March each year to exchange views on human rights awareness education and new human rights risks, and to consider the related action policy for the next fiscal year. Based on this, we hold a "corporate-wide forum of human rights anti-discrimination promotion" at the beginning of the fiscal year, chaired by the Executive Officer in charge of Human Resources, with the HR managers of each steelworks and each office as members. At this forum, the fiscal year's policy for promoting human rights development is determined.

In addition to implementing human rights awareness activities in accordance with the policies decided at the forum, each steelworks and

### ► Prevention of forced or child labor

Adhering to international norms concerning forced or child labor, Nippon Steel has the policy of prevention and eradication of both types of labor. We conduct regular monitoring surveys of our Group companies to prevent such violations in our business activities.

### ► Compliance concerning salaries

Adhering to laws and the group-company labor agreements, and respecting the rights to organize and to bargain, Nippon Steel strives to establish sound labor relations by sincere talks with organized labor. We hold regular meetings to discuss diverse issues including management issues (i.e., safety and health, production), labor conditions (i.e., wages and bonuses), and balance in work-life. Through exchange of opinions with union representatives, we seek close labor-management communication.

also prohibited as unjust the discriminatory treatment of workers based on nationality, race, belief, creed, gender, age, sexual orientation, and disability. In addition, we give careful consideration to the traditions and culture, business practice, and labor practice of each country or region as we accelerate overseas business development.

Based on these basic ideas concerning respect for human rights, we strive to create a workplace environment where employees can share diverse values and maximize their abilities. We thereby seek to improve productivity, work conditions, benefits, and the working environment, with the aim to enrich the life of employees and achieve the corporate development.

each office are actively engaged in employee awareness-raising activities, including holding workshops on a specific issue of the steelworks or office. We also participate in enlightenment organizations and activities hosted by public entities and others in each community. We do this as concerted efforts for human rights enlightenment with the communities.

Along with the group-wide expansion of our efforts to Group companies in Japan and overseas, monitoring surveys on the status of compliance with labor-related laws and regulations, the establishment of consultation contacts, and other issues are regularly conducted via a checklist on internal controls.

Through these efforts, we are continuously and systematically promoting activities to prevent human rights abuses. This includes the understanding of human rights risks that change with the times and the development of a system and a strategy to reduce the risks.

### ► Human rights awareness education

Based on the policy decided at the "corporate-wide forum of human rights anti-discrimination promotion," information on human rights is incorporated in training courses for all ranks, from new employees to experienced ones. We also provide education on a variety of subjects, including the issues of harassment and anti-discrimination, understanding of LGBTQ, and human rights issues in the conduct of our business.

Two-way communication with employees based on good labor-management relations is important in order to prevent human rights abuses. We therefore incorporate education toward building sound labor-management relationships in training of executives of the Company and the Group companies.

In addition to general education that contributes to the prevention of human rights abuses in workplaces, we also address specific human rights abuse risks in formulating and oversight of specific work assignments. Examples include education on fair recruitment selection by employees

Nippon Steel respects human rights and strives to create the working environment which allows diverse human resources to be more empowered.

assigned to the tasks of hiring in order to prevent job discrimination, and education on cross-cultural understanding and communication for those assigned to overseas business in the context of preventing human rights abuses (i.e., consideration for each country's unique traditions, culture, business practices, and labor-management practices).

### ► Mechanism of corrective actions

We have clarified whom to contact for consultation on various compliance issues including human rights. This is a part of efforts to establish a group-wide claim handling mechanism that makes it easy for employees and related personnel to ask for consultation, and that enables the Company to understand and identify incidents of discrimination.

Specifically, a Compliance Consultation Room has been established to accept inquiries and reports and give counseling regarding human rights abuses such as harassment, from employees of the Company and Group companies and their families, as well as from employees of business partners. Reports and consultations from various stakeholders are accepted through the Inquiry Form accessible on the website. Regarding the response to these individual incidents, such as internal reports and consultations, we investigate the facts and, if necessary, seek advice from outside parties,

### ► Communicating with stakeholders

Adhering to laws and the group-company labor agreements, and respecting the rights to organize and to bargain, Nippon Steel strives to maintain sound labor-management relationships. With a focus on mutual understanding through two-way dialogue, we have a place for discussion with labor unions for the entire Company as well as for each office. We discuss the management status, safety, health, and production management issues, working conditions such as salaries and bonus payments, balancing of work and personal life, and other issues. Close labor-management communication is also maintained, particularly concerning the actual work cases for which the labor unions received reports from their members. The minutes of these discussions are recorded and broadly shared through the Intranet and other means, for senior management to work union members.

The number of recipients of training courses by rank on human rights in fiscal 2020

**3,020**

including lawyers and outside professional organizations, to protect the privacy of the persons and to ensure that they do not receive unfavorable treatment. We then provide guidance and education to those involved, and strive to appropriately resolve the incidents.

Furthermore, since labor-management relations play an important role in preventing human rights abuses and resolving related incidents, in the event of disputes concerning the interpretation of collective agreements, labor-management agreements or other rules directly related to them, a grievance committee is established to resolve the dispute, based on the agreement concerning complaint-handling procedures that has been concluded with the labor union. The committee comprises members from both the management and the labor side.

Labor-management discussions in fiscal 2020

**114** times for the entire Company  
**950** times at offices

Number of union members and unionized rate (March 31, 2021)

**28,118**  
(100% unionized)

In-house magazines for the entire Company and each individual office are regularly published as a means to send various messages to employees. PR magazines are also published to convey our business and other information outside. Our offices also regularly set up a place for dialogue with the nearby residents' associations to ask for their understanding of our business operations and listen to opinions and requests from them; this is part of what we do to realize better communication with the local community.

# Diversity & Inclusion

## Basic policy

From the perspective of creating a company where diverse employees are productive, perform at their best, be empowered, and feel proud and fulfilled, we are reinforcing our diversity & inclusion efforts while focusing on the following five areas.

- 1 Promote female employee's participation and career advancement
- 2 Realize work life balance so as to enable employees with various backgrounds and circumstances to perform at their best
- 3 Develop health management in order for employees to perform at their best until the retirement age of 65
- 4 Prevent harassment
- 5 Promote empowerment of the elderly and the disabled

The "Diversity & Inclusion Dept." has been established as a dedicated unit to promote diversity and inclusion efforts.

### Status of employees (non-consolidated basis)

	Men	Women	Total
Number of employees (March 31, 2021)	26,578	3,001	29,579
Number of new hires (FY2021)	375	51	426
Average years of service (March 31, 2021)	16.0	11.0	15.5
Rate of voluntary termination (FY2020)	2.8%	3.4%	2.9%

## Promotion of women's participation and career advancement

### ► What we have done so far

We have introduced the following programs: 1) a childcare leave which is more generous than legally required; 2) a program for employees who rejoin the company after having left it because of childcare or nursing care and other reasons; 3) a leave to assist overseas relocation of a spouse; and 4) a temporary exemption program for employees who have difficulty in relocation because of childcare or nursing care and other reasons. We have also been opening 24-hour childcare centers in steelworks and have introduced maternity work clothes for use by steelwork employees who are in the childbirth/childcare period, in order to help them continue their shift work without feeling concerned. We are thus enhancing programs to support employees' work-life balance. In addition, we are investing in improving work infrastructure such as showers, toilets, and dressing rooms at manufacturing sites, and improving work practices, so as to establish a comfortable working environment for female employees.



In-house childcare center (Nagoya Works)

Number of in-house childcare centers (April, 2021)	5 centers
Number of users of in-house childcare centers (April, 2021)	100

### ► Toward further promoting women's participation in the workplace

Based on the various programs and work environments that we have established, we have developed the following action plan to support female employees to continue to demonstrate their abilities through career

development, and to promote their empowerment in all workplaces and levels, including enhancement of promotion to managerial positions.



Through our efforts in promotion of diversity and inclusion, we are committed to creating a company where diverse employees are empowered, and feel proud and fulfilled.

### Plan of action as a general employer, based on the Act on the Promotion of Female Participation and Career Advancement in the Workplace in Japan

In order to develop an employment environment where female employees can perform at their best, an action plan is formulated as follows:

- 1 Plan period: 5 years (April 1, 2021–March 31, 2026)
- 2 Goals, details of efforts, and implementation schedule

**Target 1** Aim at at least double and possibly triple the number of female employees in management positions in 2025 from 36 in 2020, and to increase by at least four times and possibly seven times by 2030.

From FY2021

- Hire more women.
- Confirm the individual circumstances and intentions of female employees, and consider placement and development measures based on their circumstances in order to enable them to continue to work and actively perform.
- Invest in the working environment so as to expand the placement of women, mainly at steelworks (improvement in work infrastructure, work content, etc.)
- Consider and implement work support measures for employees in the childcare status period, such as measures for childcare centers that offer night-time service.
- In light of the enhancement of the programs related to childbirth and childcare, prepare a brochure to introduce the relevant programs, distribute it to employees, and revise related programs as needed.
- Provide career education that will contribute to the further promotion of female employees' performance.
- Provide education on diversity to executives who supervise female employees.

**Target 2** Aim at 75% or higher utilization rate of paid leave days.

From FY2021

- Prepare a pamphlet on the vacation and leave program, distribute it to employees, and develop educational activities.
- Encourage taking paid leave days by setting with the labor union some specific days recommended for paid leaves and by conducting a campaign to do so in the summer.
- Managers to take the initiative in taking off on paid leave days.
- Managers to support each employee to take paid leaves as scheduled.

### ► Improved hiring and retention

The ratio of women in overall hiring is 17%, and we will continue to expand their hiring. We also seek to improve the retention rate of female employees by taking the following measures: 1) promotion of teleworking; 2) elimination of long work hours (for those with constraint on workplace or work time due to childcare or other conditions to continue to work); 3) career assessments for female employees; and 4) flexible placement and development based on the understanding of individual circumstances.

Our other continual efforts include investment in the work environment with the aim of expanding women's placement mainly at steelworks,

and child-care support measures such as the establishment of childcare centers that offer night-time service. In fiscal 2021 we plan to open in-house childcare centers at the East Nippon Works' Kashima area and the Murooran Works.

The ratio of women in overall hiring (Average ratio for FY2019–FY2021)	Office staff and engineers	31%
	Operators and maintenance personnel	12%
	Overall hiring	17%

### ► Support for employees' career development and work-life balance

In addition to establishing career education programs to contribute to the further promotion of female employees' performance, we also encourage them to develop their capability by providing opportunities for growth through proactive efforts in anticipation of various life events, and by actively promoting advancement to managerial positions.

We will create a workplace culture where work and home life are comfortably balanced by making various programs well known to employees, through improvement and introduction of brochures which explain the programs. We also provide to managers education concerning unconscious bias and diversity management.

With the aim of encouraging male employees with young children to actively participate in childcare, we encourage them to take child-care and related leave.

### Utilization of childcare support program (FY2020)

Number of childcare leave users and acquisition rate	100 men (8.5%) 137 women (100%)
Return ratio of female employees after childcare leave	97.9%
Number of users of the short-work hour program for childcare	119



## Diversity & Inclusion

### Realizing the work life balance as a means to enable people with diverse situations perform well in the workplace

#### ▶ Restraint on long-work hour

As a precondition for an environment in which diverse human resources can perform at their best, we are committed to reducing long work hours based on appropriate work time management. Prior to the revision of the Labor Standards Act, starting in fiscal 2018, we set up work time capping rules for all employees, including managers, to promote improved work

management and work practices that lead to more efficient, higher-value-added output.

We will continue to pursue workstyles that achieve maximum results within a limited amount of time, while incorporating the effects of business reform and DX measures.

#### ▶ Enabling flexible ways of working

All human resources with their diverse attributes and circumstances, such as age, gender, and restrictions on work time and workplace due to childcare and nursing care, ideally should make the most of their finite time available and perform at their best. From this viewpoint, we are expanding our work system to move away from traditionally-set ways of working and pursue more flexible and diverse ways of working in accordance with the nature of work at any given time and fluctuation in workload flow of operation needed at that time, and the circumstances of each individual.

In fiscal 2019, we revised the work-at-home system, which was previously limited to childcare cases, and introduced the teleworking system. Among employees under the flexible time system and those eligible to the short-work hour program for childcare and nursing care, those approved by the Company on the basis of their work assignment can do teleworking. The workplace in this case is not limited to home but any location.

Along with the introduction of the teleworking system, we have also adopted various IT tools to develop the environment that allows employees to work at any place as in the office. This has led to an efficient way of work, using spare time on business trip or out of office, and maximizing the ability of employees with childcare, nursing care, and other circumstances. In response to the COVID-19 pandemic, and since the Japanese Government made initial requests to refrain from going out and declared of the state of

emergency, we have used the accumulated knowledge and experience, and have actively utilized the teleworking system.

A flexible time system has also been introduced. Since fiscal 2019, a more flexible management structure has been in place by our expanding the workplaces that could use the “coreless flexible system,” which eliminated the core time — an essential time period to be in the office, so that we can achieve a more harmonious way of working, balanced with personal life.

Based on these systems, we aim to achieve improved productivity and employees’ work-life balance, while pursuing ways in which individuals can perform at their best.



#### ▶ Realization of a flexible way to take time off from work

We have been establishing the employee environment so that it facilitates a flexible way to take time off from work, tailored to the circumstances of individual employees and their life stage.

With regard to annual paid leave, we encourage employees to use it to get refreshed physically and mentally. Each business site has set recommended dates to acquire annual paid leave. The head office, for example, sets every Friday in August as an “Eco-paid leave day,” and recommends that employees not set meetings and other events on those days in order to make it easier to take off those days. The annual leave utilization rate in and before fiscal 2019 exceeded 70%, but declined to about 60% in fiscal 2020 partly due to the effects of the temporary leave that was implemented in response to a large-scale production cuts. Looking ahead toward the target of 75% or higher in terms of the utilization rate, we will continue to work together with labor union to promote taking planned annual paid leaves in accordance with individual needs.

Concerning childcare leave, our program is applicable to a period that exceeds the statutory requirements and allows employees to accrue expired leave days for use. Currently, we are encouraging male employees who are

entitled to childcare leave to do so and get actively involved in childcare. Through education and other means, we also focus on fostering a workplace culture that makes it easier for employees to take childcare leave.

Matched to the ongoing aging of Japanese society, programs for nursing care leave and time off for nursing care have been established to support employees continue working while attending to nursing care. The expired leave days that have been accrued can be used for nursing care purposes, as part of our efforts to provide an environment in which employees can work with peace of mind while providing care.

To promote the use of these programs, we distributed a brochure that summarizes each type of work and vacation program applicable for each life stage. We try to make the programs better known through various training programs.



#### ▶ Benefit programs

In order to support the various life stages of employees and enable them to achieve a good work-life balance, we are also focusing on welfare measures. We support employees’ personal life with various programs:

provision of housing, including dormitories and company housing, and a cafeteria plan (work-life support program).

### Promote health management for employees to with a goal of maximizing workability until retirement at age 65.

#### ▶ Basic policy

We aim all employee work at their best from the time of joining the company to retirement, which has been extended to the age of 65. In order to accomplish this, we support them to maintain and enhance both mental and physical health. We conduct health promotion measures focusing on disease prevention as well as early detection and treatment. We are committed to providing an advanced health checkup including cancer or mental disorder

screening and encouraging employees to take regular checkups and provide a consultation or a counseling about lifestyle or stress coping by health care professionals, as needed. Employees are expected to also be committed to implementing measures for their own health maintenance, such as to get various checkups and improve their daily lifestyle.

#### Nippon Steel Corporation Group Code of Conduct

##### 5 Create a healthy, safe and comfortable work environment, and respect the character and diversity of our employees.

#### Nippon Steel's Basic Policy on Safety and Health

##### Basic Philosophy

- 1 Ensuring and maintaining the safety and health of employees of the Nippon Steel Group is the Group's most important, top-priority values and the basis that supports business development.
- 2 Under the Management Principles of “developing and bringing out the best in our people,” the Nippon Steel Group makes continuous efforts to abide by this philosophy and continues to contribute to society through their safety and health.

##### Specific Guidelines

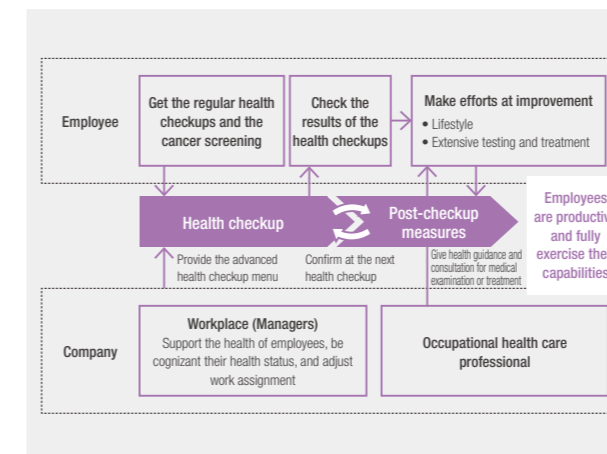
- 1 We observe applicable laws and regulations, and give top priority in all business decisions to ensuring safety and health.
- 2 We maintain awareness and understanding of actual workplace conditions, provide the guidance needed to ensure safety and health, and remove factors that might lead to accidents.
- 3 We follow plans to implement measures to realize safer, healthier work procedures and work environments.
- 4 We ensure the observance of rules and engage in hazard prediction, and proactively implement workplace activities to enhance the level of safety and health.
- 5 We provide the education and training needed to ensure the safety and health of people working in the Nippon Steel Group.
- 6 We continuously develop and improve safety and health efforts through the safety and health management system.

Monday, April 1, 2019

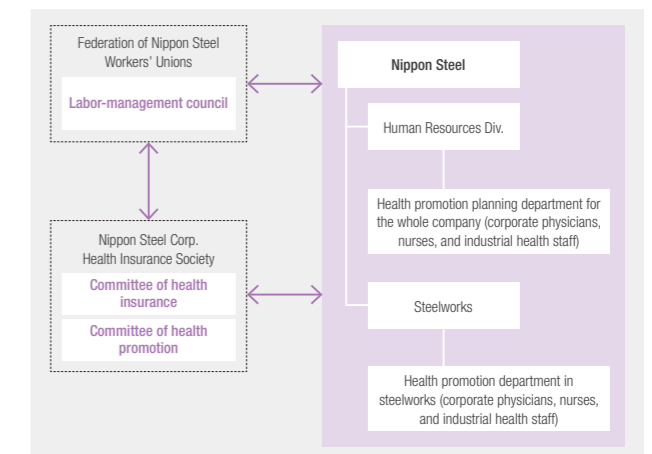
Eiji Hashimoto

President of Nippon Steel Corporation

#### Commitment to the health of both the Company and its employees



#### Organization for health promotion



## Diversity & Inclusion

### Promoting physical wellness

#### Cancer disease control

Various cancer screening (including non-statutory exams) based on age and gender are incorporated in our health checkups.

In particular, regarding exams for gastric and colon cancer, which are high risk diseases, we set the priority targets age and screening frequency

Type of examination	Priority target (target age and test frequency)
Gastric cancer examination (gastric fluoroscopy)	Once every two years, 50-years old or older
Colorectal cancer test (fecal occult blood)	Once a year, 40-years old or older
Prostate cancer test (PSA)	Once every 3 years, 50-years old or older
Breast cancer screening (mammography)	Once every 2 years, 40-years old or older
Cervical carcinoma of the uterus (uterine cytology)	Once every 2 years, 20-years old or older
Gastric cancer risk test (pylori)	When joined the company and at 40
Liver cancer risk test (hepatitis virus)	When joined the company and at 40

#### Cerebral cardiovascular disease control

We have established a unique company-wide system that enables us to assess and manage the risk of diseases based on the results of health checkups. We provide health guidance according to risk factors or control the frequency of health checkups.

It is important that worker with high risk of cardiovascular disease improve their lifestyle. We will improve the implementation rate of specified health guidance, which aimed at improving the dietary and exercise habits of workers, by setting a target rate and promoting medical visits. We cooperate with the Health Insurance Union for achieving the goal.

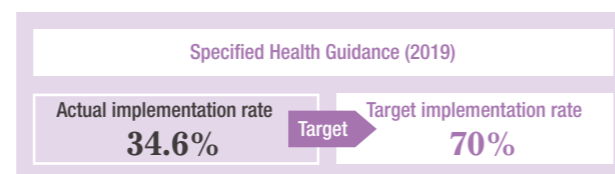
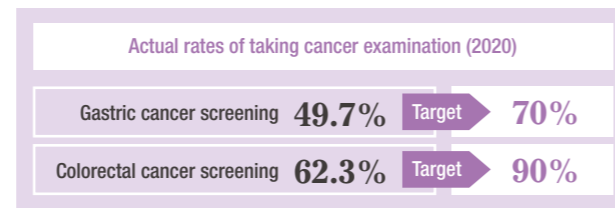
### Promoting mental wellness

Aiming for each employee in the Nippon Steel Group to enjoy a robust life on and off the job, we provide a consulting service for prevention and early detection in the area of mental health, and have incorporated the issue of mental health in in-house seminars for each rank of employee. We also offer education on how to be aware of one's own stress and to deal with it, how managers should care for their subordinates and manage their teams, and how to coordinate with the corporate health care professionals (physician, nurses, and other staff). We provide the stress check which is workplace stress survey every fall. Occupational health care professionals give guidance for improvement by teams and individuals based on the result of the stress check. In contributing to a vigorous work environment, managers implement necessary measures according to the issues of a team or an individual, coordinating with the personnel department and the health department. Because early detection and early response are important in the treatment of mental illness, we identify those who are at risk at the Health Consulting Contact by various measures in association with the Company's "mental health e-learning and questionnaire event conducted every June." Occupational health care professionals swiftly respond to the findings of the events to foster mental wellbeing.

### Support to employees who work overseas

To enable employees who have been assigned to work overseas to be free of undue worries, a seminar for the employees and their family is held before the overseas assignment, and information on mandatory vaccination, the local medical system, and other matters are provided. Under the policy of providing continuous health management support during overseas assignments, interviews with occupational health care professionals are regularly conducted counseling via online and at the time of a temporary return to Japan, in addition to aftercare checkups of the regular medical exams. Moreover, one of the Company's physicians periodically visits overseas

for the examination, based on evidence. We also set our target rate of exam-taking and encourage employees to take exams for early detection and treatment of cancer.



#### Our mental health initiatives

Classification	Details
Proactive action (Self-care)	<ul style="list-style-type: none"> <li>Mental health education programs by rank (target: new hires and young employees)</li> </ul>
(Care by management supervisors)	<ul style="list-style-type: none"> <li>Stress check for awareness of their stress</li> <li>Support from supervisors or colleagues</li> <li>Mental health education programs by rank (target: managers)</li> </ul>
(Care by occupational health care professionals)	<ul style="list-style-type: none"> <li>Providing mental health education program by occupational health care professionals</li> </ul>
Early detection	<ul style="list-style-type: none"> <li>Screening of those in poor conditions in the interview during a regular health checkup</li> <li>Screening of highly-stressed people via stress checkups</li> <li>e-learning to extract those who wish to be consulted</li> <li>Establishment of a health counseling contact</li> </ul>
Support for employees' return to jobs and prevention of recurrence	<ul style="list-style-type: none"> <li>Support for employees' return to jobs based on the return-to-work program</li> <li>Re-designing of work assignments for a smooth return to the workplace</li> <li>Regular interviews after return by occupational health care professionals</li> </ul>

offices, researches local medical institutions and the daily-life environment, and meets with the employees who work overseas to offer advice. We have contracted with a medical service company to provide the medical care locally, in preparation for the employees possibly becoming ill overseas.

Concerning the COVID-19 infections, necessary infection prevention measures, including evacuation measures, have been implemented in consideration of the local infection situation and the state of medical care, with the first priority on the safety and health of the employees who work overseas and their families.

### Health-wellbeing activities

In addition to the above-stated health measures, we collaborate with the Health Insurance Union and labor unions in a variety of health-wellbeing activities, such as the "Health Challenge Campaign" living habits, "Health e-learning" for improving employee health awareness, and passive smoking preventive measures.

Classification	Details
Health Challenge Campaign	<ul style="list-style-type: none"> <li>A company-wide effort in which employees challenge for two months to improve their own life habits</li> <li>Provide courses that are effective in improving health checkup results and lifestyle. Ex. Take 8,000 steps a day/Have good breakfast</li> </ul>
Health e-learning	<ul style="list-style-type: none"> <li>Twice a year for all employees</li> <li>The themes for 2020: "Healthy Life Basics: Sleep," "Cancer Prevention and Cancer Screening"</li> </ul>
Passive smoking preventive measures and non-smoking guidance	<ul style="list-style-type: none"> <li>Since April 2020, smoking in Company buildings has been prohibited (excluding designated smoking rooms).</li> <li>Visits to the on-site clinic or other clinics for smoking cessation or Web-based similar visits. For employees who wish to stop smoking, an occupational health care professional will provide individual guidance.</li> </ul>

## Preventing harassment

In order for all Nippon Steel employees to work with vigor, it is extremely important to respond appropriately to harassment issues, and we are strengthening our efforts to prevent them.

Specifically, we have clarified our internal policies to prevent harassment in terms of working regulations and internal regulations, and we have also prepared and distributed leaflets to promote awareness among all employees. In addition, we engage in education through e-learning for all officers and employees, and through sponsoring lectures on harassment at milestone training events, spanning activities from new employees to higher management. In addition to continuing these efforts, we will periodically review and improve the contents of our efforts, including the factoring in of awareness of unconscious biases as part of our training programs.

Several dedicated consultation and reporting points of contact have been established so that employees who face a harassment issue can consult with other people, in addition to someone close to themselves, such as their supervisor or colleague. We are striving to create an environment wherein a harassment issue can be resolved without the employee concerned taking it on all alone.

Each of the contact points takes individual actions and makes sure not to disbenefit anyone for reporting or cooperating. After investigating and confirming the existence of a problem, we conduct fact checks and take strict measures in accordance with employment rules and other regulations.

## Empowerment of the elderly and the disabled

### Employment for the elderly

With regard to the promotion of the empowerment of the elderly, we extended the retirement age to 65 from 60 in fiscal 2021, after consultation with labor unions, and taking into account the declining working population, the response to the extended starting age of the pension system, and the maintenance and improvement of our workplaces.

Assuming that the same work will be carried out, even after the age of 60, the employment scheme as well as the salary and bonus scheme will remain the same up to the age of 65.

Under this new system, hopefully, all generations, up to 65 years of age, will continue to perform at their best at the front lines of our workplaces, while also invigorating the skill transfer process and communication within the workplace between generations, thereby creating a vibrant company.

### Employment for the disabled

Recognizing employment of the disabled as an important social challenge, we are implementing an action plan for their employment and providing a friendly working environment.

Since 2007, we have established special-purpose companies to expand employment opportunities. As of June 2021, at four special subsidiaries of

NS HEARTFUL SERVICE EAST NIPPON LTD., NS HEARTFUL SERVICE TOKAI LTD., NS HEARTFUL SERVICE KANSAI LTD., and NS HEARTFUL SERVICE KYUSHU LTD., over 100 people are actively engaged mainly in various outsourced work from Nippon Steel. The work includes data input and printing of written documents, cleaning of the steelworks premises, cleaning and management of the welfare facilities, and cleaning of work clothes.



Work scenery at one of the special-purpose subsidiaries



# Initiatives for Human Resources Development

Based on the belief that the development of excellent personnel is a prerequisite for the production of excellent products, Nippon Steel is rolling out robust programs to strengthen the overall capabilities of the Company's human assets.

## Initiatives for human resources development

### Basic Policy for Human Resource Development

Nippon Steel's Management Principles state that "we develop and bring out the best in our people to make our Group rich with energy and enthusiasm," positioning human resource (HR) development as a top-level concept. A goal of HR development is to create people who can understand and implement our Corporate Philosophy and our Employee Action Guidelines. All our employees keep this in mind.

Nippon Steel's basic approach to HR development is for supervisors to transfer to their subordinates, through daily dialogues on the job, understanding and knowledge of criteria for judgment and of operational skills. In order to share this mind with all employees, the following "Basic Policy for Human Resource Development" has been established.

- 1 HR development is the job itself, and supervisors play an important role in HR development.
- 2 OJT training is a basis of HR development and is complemented by off-the-job training.
- 3 Supervisors share objectives and outcomes of HR development clearly with their subordinates.
- 4 Each individual strives for continual personal improvement for further growth.

<p>Number of training/learning hours</p> <p><b>0.78 million hours/year</b> (27 hours/year per employee)</p>	<p>Objective</p> <p>Promote measures to develop human resources who serve the enhancement of workplace strength and technological advancement</p>
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### Development of operators and maintenance staff

The operators and maintenance staff ceaselessly put into practice their accumulated skills in steelmaking and maintenance, from joining the Company on the assumption of long-term employment to retirement. They thus fundamentally support the Company's manufacturing worksites. Smooth transmission of technology and skills from veterans to younger workers is essential and a system that facilitates this is needed. Therefore, after identifying, through a supervisor-subordinate dialogue, the skill or skills to be acquired, a skill development plan is developed and carried out. The status of planning and skill transfer is monitored by using a skill map — a list of skills for each individual. If needed the plan and its implementation are modified.

In light of the ongoing diversification in recruitment sources (especially the increase in female employees and middle-career recruitment) in

response to the rapidly declining working-age population in Japan, it is essential to promote the development of infrastructure and the creation of a workplace environment in which diverse personnel can be motivated and collaborate with each other. Specific efforts along these lines include the establishment of an environment and education on human rights and harassment. Off-the-job training (OFF-JT), which complements on-the-job training (OJT), is used throughout the Company by organizing the minimum skills and knowledge required by each rank of employees of Nippon Steel into a company-wide standard system. Through this, we work at measures to maintain and improve motivation of the elderly to continue working with health and motivation, and at education of workplace leaders to further increase their ability to add to and improve our knowledge base from the field ("field technology").



### Development of office staff and engineers

Following the Basic Policy for HR Development, Nippon Steel uses a "HR Development PDCA" for office staff and engineers, who implement OJT-based HR development plans. Specifically, development plans are formulated for each person based on the corporate philosophy and organizational strategies, and are discussed by supervisors and subordinates. Implementation is routinely checked and, if needed, revised. This PDCA for HR development follows a one-year cycle, from April through March of the following year.

An employee's period of time from joining the Company to becoming a manager is divided into three steps: "Discipline", "Creation" and "Independence". Based on the OJT, work reporting sessions and training by rank are carried out at the milestones of the 2nd, 3rd, or 5th anniversaries of the start of employment.

**"Discipline"**: In the initial few years, new hires learn the basics in each of our fields of expertise, and acquire the manners and basic patterns for work as a social person through each practice.

**"Creation"**: The employees in this step are assigned to perform a certain task from start to finish, develop their execution ability, identify their own field of expertise, and acquire a firm basic foothold in it.

**"Independence"**: Through experience of working according to their own responsibility, the employees develop their leadership skills. Together with development of skills, when they reach this phase they must also pay close attention to the development of their subordinates or junior colleagues.

In addition, various OFF-JT training courses are provided to learn specific skills and researches, which cannot be covered by OJT, and to acquire common skills required throughout the Company depending on the employee's qualification.

### Development of staff who support technological advancement

With the aim of achieving world-leading technologies and manufacturing capabilities, basic courses in engineering are taught so that employees can learn the essential technologies needed to systematically acquire the skills required for steelmaking. In particular, the content of courses classified as process-specific technologies is at the core of Nippon Steel's technology. Most of the lectures on the underlying and advanced technologies are given by our own engineers.

### Development of managers

The training courses are provided to managers match the managers' qualification and position, and are given so that they can acquire proper understanding of their responsibilities and authority as managers; knowledge, skills, and mindset that contribute to enhancing the management as supervisors; and group management capabilities. We gather managers in similar positions to cultivate each other and share experiences and opinions. In recent years, we have given increased attention to management education. We added new courses including one for line manager candidates to enhance line management skills on the manufacturing field, and one for new managers to ensure they have a correct understanding of their roles and responsibilities as managers, and acquire the required knowledge and management skills to conduct business.

### Development of staff for roles in overseas expansion

Nippon Steel is actively expanding business to overseas growth markets and many Nippon Steel employees are working on these projects, together with employees of our joint ventures and local employees. At these bases, we also contribute to local communities by locally hiring employees and creating job opportunities.

Nippon Steel also has programs for employees who can contribute to our overseas business expansion. For global Group employees and managers, we have been standardizing English "dialog ability" for each qualification, and a language education system suitable for any level of English has been created for that. Further, for young managers, there are middle-management seminars designed for them to acquire the knowledge, skills, and mindset necessary for domestic and overseas business. For young employees, we offer opportunities to study abroad or work at overseas operational companies for a certain period. We also provide a course for employees who are assigned to work abroad and their family members.

Concerning development of overseas local staff, we also make efforts to transfer to them Nippon Steel's criteria for judgment and operational skills, mainly through OJT, in line with the Company's Basic Policy for HR Development. In the ASEAN countries and India, where our overseas Group companies are concentrated, training courses by rank, as well as OFF-JT courses for specific skill learning or for special subjects are conducted.



### Development of employees who can contribute to digital innovation

We make extensive use of data and digital technologies for production and business process innovation and are promoting a Digital Transformation (DX) strategy combined with implementing measures to speed up decision-making and enhance our problem-solving.

Among our DX activities we have established a skills training program for employees to acquire data science knowledge and enhance

competence in order to add strength to our professional staff in this area and strengthen cyber-skills among all employees. Management education courses are also given to reform managers' consciousness in order to promote DX in each department.



# Supply Chain Management

## Sustainable procurement efforts

Economic development of emerging countries is a major element of change in the global purchasing environment, requiring Nippon Steel to make strategic purchasing for enhancing manufacturing capabilities. At the same time, it is becoming increasingly important for not merely our Company but also our entire supply chain to fulfill social responsibilities in order to realize a sustainable society. Against this background, we steadily and continuously procure raw materials, other materials, and equipment to achieve a stable supply of steel products for a sustainable society.

In terms of procurement of raw materials and fuels, we are sourcing from suppliers worldwide, including Australia, North America, South America, South Africa, and China, for a stable supply of more than 100 million tons of raw materials for the steelworks. The supply of materials is mainly iron ore and coal. In the procurement of materials and equipment, we purchase around one million product items of equipment and materials — from gigantic facilities such as blast furnaces to electric and mechanical products as well as safety, emergency, and office supplies — from about 3,000 suppliers other than major suppliers of iron ore and coal.

In engaging in these procurement activities, we are committed to compliance with laws and regulations, consideration of environmental conservation, elimination of racial discrimination and human rights abuses, confidentiality and thorough information management as prerequisites. We then strive to maintain and improve mutual understanding and trust with suppliers from a long-term perspective. In July 2020, upon affirming agreement with efforts made by the Ministry of Economy, Trade and

Industry, we made a declaration for the establishment of partnership relations with suppliers and other business partners to establish cooperative and co-existing relationships.

In connection with procurement of materials and equipment from numerous suppliers, we hold a Material/Equipment Procurement Partners Meeting, to be held once every three years with an objective to share our purchasing policy, in order to deepen dialogue and share procurement policies based on management strategies.

In fiscal 2018, about 1,300 suppliers attended our first Partners Meeting, where we asked them to cooperate in strengthening partnerships to improve manufacturing competitiveness and in promoting procurement activities to achieve the goals of the SDGs. In July 2021, the second Partners Meeting was held.

### Basic policy on equipment procurement

- 1 Compliance with laws
- 2 Equal opportunities
- 3 Building of a partnership
- 4 Fair disclosure of information and quick transaction processing
- 5 Consideration to resource protection and environmental preservation
- 6 Preservation of confidentiality

## Consideration to reducing environmental impact in procurement activities

Based on the Life Cycle Assessment concept, Nippon Steel is taking initiatives in reducing environmental impact at various points along the supply chain. In keeping with rising demand for tighter management of chemical substances, we have created management standards for 16 toxic chemical substances, including cadmium, jointly with customers and suppliers. We then established a system to manage substances of concern contained in purchasing materials and products, including packaging materials.

In addition, as stipulated in the Charter of Corporate Behavior by Keidanren, we have set up internal rules, including an appropriate purchasing policy, which puts us on record as fully considering resource protection and environmental preservation. Moreover, we have participated

in the Green Purchasing Network (GPN) since 1996, when the network was founded, in order to promote green purchasing activities. Jointly with businesses, governments, academia, local governments, and NGOs, we have taken the initiative in developing a framework to prioritize the purchasing of products and services that represent less environmental load.

Toxic material management concerning quality assurance

<https://www.nipponsteel.com/en/csr/customer/support.html>



## Optimal management of manufacturing and shipping

In order to deliver products that meet customer requirements on time, our head office unit, which manages all our sales and marketing, coordinates product manufacturing plans throughout the Company every day, while keeping track of sales and production. The process control units in each

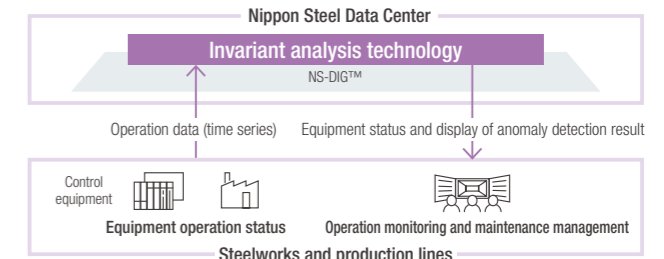
steelworks receive the plan, and manage the progress of each single product, while keeping in mind the productivity of each manufacturing base. These units work for optimal processing from manufacturing to shipment, and delivering products as scheduled.

To realize the production and supply of steel products required for a sustainable society, Nippon Steel is making various efforts concerning the procurement of raw materials, other materials, and equipment as well as the arrangement of systems for stable production, shipping and transportation, and the offering of solutions to meet customer needs.

## Efforts to stabilize production

We have a high computational capability that enables advanced image analysis and deep learning, performance of various data analyses, and development of AI and NS-DIG™<sup>1</sup>, an applicable platform. We also promote safety and operational support by introducing advanced IT, including AI and IoT, implementing preventive measures to stabilize production, and improving the quality.

As part of these efforts, we launched a long-term operational test of the on-line monitoring of facility status, using the AI technology "invariant analysis technology"<sup>2</sup> of NEC Corporation, in January 2021 at the East Nippon Works Kimitsu Area. The objective of this test is to build a facility monitoring platform at the steelworks. The introduction of the system enables AI to learn and model operational data to prevent potential problems and to improve efficiency in facility inspection and operation monitoring.



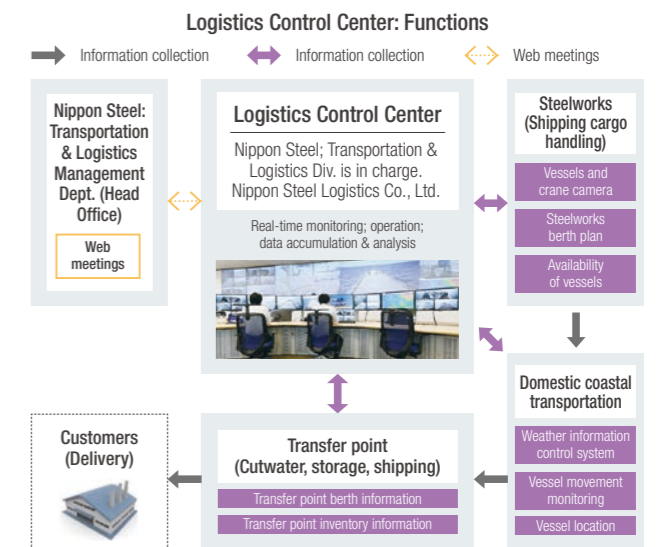
1 NS-DIG™ is Nippon Steel's platform capable of performing various data analyses and developing and applying AI, and provides high computational power to enable advanced image analysis and deep learning, so that any staff member familiar with the development and application of advanced IT can quickly make analysis at any time.  
2 Invariant analysis technology is one of NEC's state-of-the-art AI technologies "NEC the WISE". This is the AI technology that automatically and comprehensively extracts the universal relationships (invariants) that represent the characteristics of systems buried in mass-collected sensor data, without relying on the domain knowledge of the target plant or system, models them, and detects "unusual" behavior that does not match the model as a silent failure.

## Improve productivity in domestic logistics

Nippon Steel's backbone of industrial logistics is the use of approximately 200 domestic coastal vessels to transport about 60% of its domestic steel products. The domestic transport sector, similar to other logistics sectors, has a problem of shortage in workforce.

As one of ways to answer the question of how to improve logistics, the Nippon Steel Group is working on improving logistics efficiency by establishing a logistics control center at its head office and utilizing the latest domestic logistics control system. Specifically, we consolidate the information needed for allocation and control of the coasters, such as their location information, progress rate of quay cargo handling at the steelworks, and the status of inventory at transfer points. We then perform real-time monitoring and operation, thereby improving transportation efficiency.

We believe that these efforts will lead to increased productivity and ease of work in domestic industrial logistics as well as in the domestic shipping industry, and will contribute to alleviating the shortage in the workforce.



## Solution proposals to meet customer needs

Nippon Steel has been making advances in the development of solutions for the next-generation steel car concept NSafe™-AutoConcept (NSAC), which was announced in 2019. In anticipation of the performance required for each component of a next-generation steel car, which must embody substantial weight reduction and improved safety, we have been developing, in NSAC, advanced materials, as well as component structures (to maximize material performance) and processing technologies (for these

structures). At present, due to CASE, MaaS, and other changes in the automobile environment, various functions have become required for the vehicle body and components. Against this background, Nippon Steel is expanding the application range of NSAC technology for next-generation steel vehicles and is strengthening efforts to create value for customers and society by so doing.

## Together with Local Communities

### Environment preservation activities, jointly with local communities

In our Basic Environmental Policy, we are committed to conducting business activities that take into account the perspective of environmental conservation in the community. We are promoting environmental risk management, by means such as detailed responses to different environmental risks at each steelworks, and environmental protection activities in partnership with the local communities.

#### ► Kajima City coastal clean-up

In the East Nippon Works Kashima Area, we are conducting coastal cleaning activities in cooperation with Kashima City, Kashima City Tourism Association, Kashima Coast Protection Association, Kajima Junior Chamber, and Kashima City Construction Cooperative Association. Since the start of this activity in 1984, the cleaning area has been gradually expanded. In 2019, approximately 1,300 people participated and collected 6.6 tons of trash. (Due to the COVID-19 pandemic, the activity was suspended in 2020.)

This continued activity with residents in the community has received numerous awards. In April 2021, Nippon Steel's East Nippon Works Kashima Area received a Medal with Green Ribbon as an Environmental Beautification Association.



#### ► Collaboration with an NPO, "Mori wa Umi no Koibito"

The Tohoku Branch of Nippon Steel is a regular corporate member of the NPO, *Mori wa Umi no Koibito* (The forest is longing for the sea, the sea is longing for the forest), represented by Mr. Shigeatsu Hatakeyama, a fisherman raising oysters and scallops in Kesenuma City, Miyagi Prefecture, who received the Forest Hero award from the United Nations. Since 2012 We participated in the NPO's tree planting activity at Murone Mountain in Iwate Prefecture, which began in 1989, based on the theory that the chain of forests, villages, and the sea nurtures the blessings of the sea. In fiscal 2019, 64 of Nippon Steel's employees and family members joined the 31st tree-planting activity.

In fiscal 2020 and 2021, a tree-planting festival, was canceled due to the COVID-19 outbreak. However, we will continue to participate in such activities in the future.



### Together with government and public institutions Involvement in public policies and legal compliance

#### ► Suggestions on public policies, opinions as the industry, and cooperation with government

Over the years, Nippon Steel has provided personnel to key positions of the Japan Federation of Economic Organizations (Keidanren) and the Japan Iron and Steel Federation (JISF), and through the activities of these organizations, has expressed opinions and urged them to take action on deregulation matters and the implementation of institutional reforms aimed at improving the Japanese economy.

In the local communities, we also strive to cooperate with various organizations such as the local government and the local chamber of commerce and industry.

- Voicing opinions on deregulation and institutional reform aimed at maintaining and improving the vitality of the Japanese economy
- Participation in public policy studies, such as infrastructure development, adoption of the International Financial Reporting Standards (IFRS), revision of the Corporate Governance Code, tax reform, Digital Transformation (DX), workstyle reform and regional revitalization
- Recommendations on national strategy to achieve a "virtuous cycle of environmental sustainability and economic growth," the need for policies that will strengthen the international competitiveness of industries, and energy policy
- Promotion of voluntary initiatives by industry to achieve Japan's medium- to long-term targets based on the Paris Agreement (Low-Carbon Society Action Plan)
- Participation in the JISF's formulation of Basic Policies for the Japanese Steel Industry on Carbon Neutral in 2050

#### ► Adherence to relevant laws and regulations, and building of an appropriate relationship with government and public institutions

Based on the Nippon Steel Group's Corporate Philosophy and Code of Conduct, we have developed company rules and guidelines for the prevention of bribery of domestic and foreign public officials, compliance with anti-monopoly law and environmental regulations, and protection of personal information. We make sure that our officers and employees are aware of and adhere to laws and regulations and other rules.

#### ► Fair tax payment

We comply with relevant laws and regulations, and pay tax appropriately in all countries in which we operate. We maintain transparent, constructive communication with tax authorities, eliminate action that could be construed to be for evasion of taxes and bear fair tax burden.

Nippon Steel has many manufacturing bases all over Japan and are engaged in business activities rooted in local communities. In accordance with our attitude of maintaining harmony with local communities and society, we are promoting a wide range of activities, including promotion of environmental preservation, support in education and sports, *mecenat* (in French, *mécénat*, meaning sponsorship or patronage) of art and culture, holding dialogues with shareholders and investors, and coordinating with government bodies.

### Initiatives for dialogue enhancement

To achieve sustained growth and improve corporate value over the medium to long term the Company has adopted the Basic Policy for Information Disclosure and Dialogue with Shareholders and Investors. We strive to proactively provide information and cooperatively respond to questions raised by shareholders at the General Meetings of Shareholders. In addition, we regularly hold corporate briefings and plant tours, and publish interim reports for shareholders to promote shareholders' understanding and enhance communication with them. (In fiscal 2020, we did not conduct plant tours, to prevent the spread of COVID-19 infections.)

For institutional investors we host briefings on quarterly results and the Medium- to Long-Term Management Plan, visits to steelworks and research

centers, and other events, to discuss our strategies, businesses, operating performance, and other issues. Small meetings with investors, various conferences, and visits to overseas institutional investors are other means for enhancing communication.

In fiscal 2020, we held a Carbon Neutral Vision 2050 Briefing and a DX Strategy Briefing.



Visit to steelworks

### Support for educational activities

#### ► Support of community-based education

Nippon Steel has been engaged in unique community-based environmental education support programs and educational activities concerning "Monodzukuri (product-manufacturing)." In 2020, the COVID-19 pandemic made it difficult to host visits to steelworks. We therefore sent lecturers from steelworks or branch offices to special occasions in the local communities upon requests of the latter.

In the East Nippon Works Kashima Area, on-line learning sessions were provided as a new undertaking. We also donate to Tohoku University's endowment and support its activities on behalf of children in the areas affected by the Tohoku Earthquakes and Tsunami of 2011. The fund aims at spreading knowledge on prevention and reduction of damage from natural disasters and developing the ability to judge risks of such disasters.

#### ► Hosting of plant visits

In order to understand the steel industry, there is no better way than a visit to a steelworks — seeing steelmaking facilities and how people work there, and talking with them if possible. In fiscal 2019, approximately 130,000 people participated in our plant tours, but in fiscal 2020, the tours were not conducted in order to prevent the spread of COVID-19 infections.

#### ► Internship programs and the endowment of a university course

For many years, Nippon Steel has been internship opportunities to students to help them learn our business and gain some work experience. We also endow a university course, which also contributes to one of our business strategies, "enhancement of our technological superiority."

### Activities in the support of art, music, and sports as social contribution

#### ► Activities in the support of music

Nippon Steel is active in corporate philanthropy activities in the support of music, particularly through the work of the Nippon Steel Arts Foundation. The Foundation manages Kioi Hall in Tokyo, organizing performances of its resident chamber orchestra and promoting Japanese traditional music. We also give the annual Nippon Steel Music Awards, established in 1990, to young classical music performers and to those who have contributed to the development of classical music.

#### ► Activities in the support of sports as a social contribution

Nippon Steel manages or supports sports teams in the local communities of its steelworks. These include a judo club, which has produced Olympic medalists; baseball teams, which have sent many of its players to the professional leagues; a football team, a rugby team, and a volleyball team. All of these teams also contribute to their local community through such various activities as sports classes for children, coaching of junior teams, and making our athletic facilities available to local residents for games and training. Together with local residents who support our teams, we strive to provide renewed vigor to our local communities, and at the same time to support their healthy lifestyle.

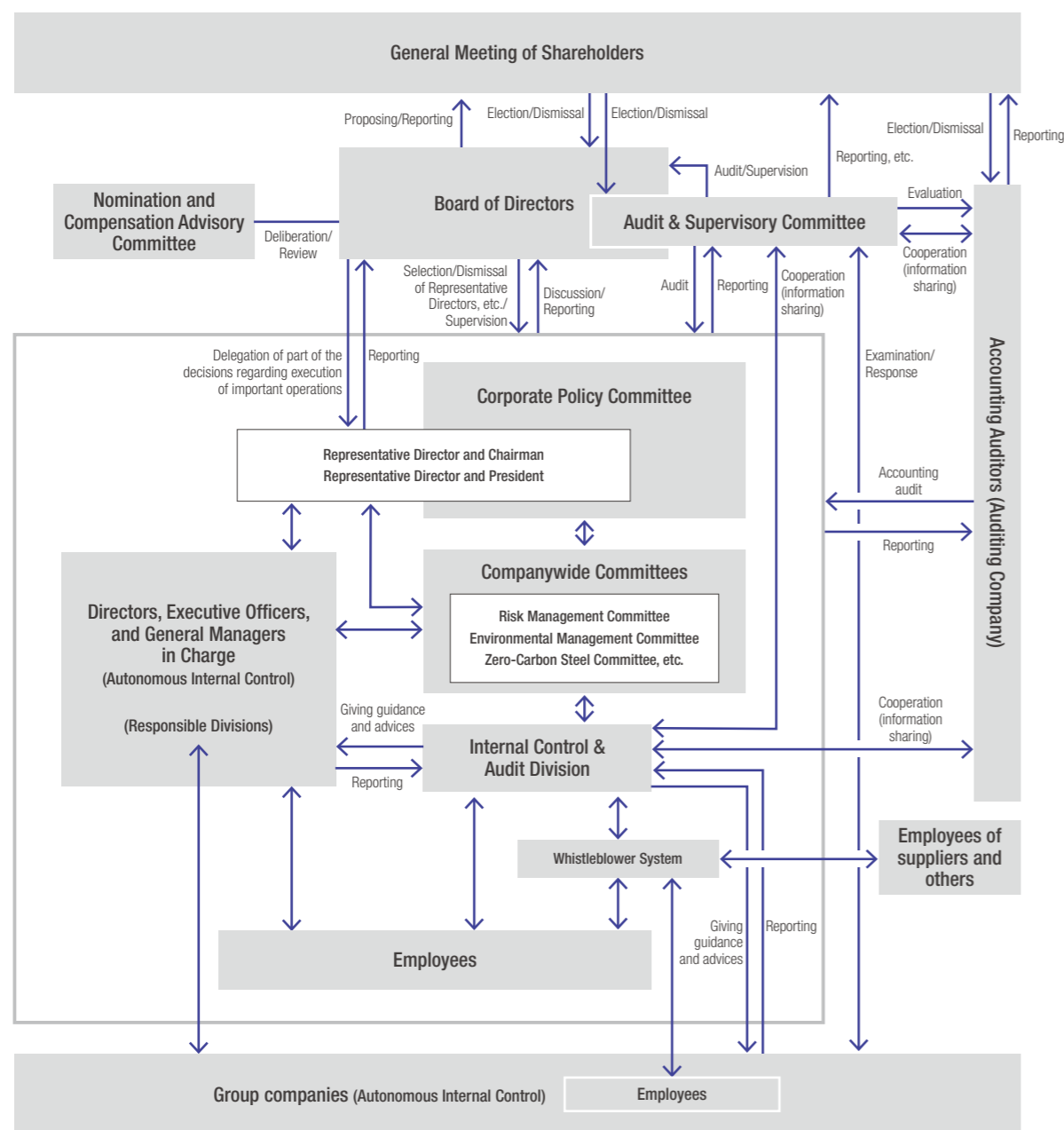


# Corporate Governance

## Basic policy

Nippon Steel has adopted a company structure with an Audit & Supervisory Board since 2020. This is because Nippon Steel strives to speed up management decision-making, enhance discussions on the formulation of management policies and management strategies at the Board of Directors by prioritizing items to be discussed, and strengthen the supervisory function of the Board of Directors, especially as the environment surrounding steelmaking and other businesses are changing more significantly.

Corporate governance structure and internal control system



## 1. Corporate Governance System

Currently, the Board of Directors of Nippon Steel is comprised of eighteen (18) members, of whom eleven (11) are Directors (excluding Directors who are Audit & Supervisory Committee Members) and seven (7) are Directors who are Audit & Supervisory Committee Members, and is chaired by the Representative Director and President. Outside Directors account for more than one-third (7 out of 18, including one female outside director) of all members of the Company's Board of Directors.

Of the above, the Directors (excluding Directors who are Audit & Supervisory Committee Members) are comprised of eight (8) Executive Directors who were employees of Nippon Steel with intimate knowledge of Nippon Steel's businesses, and three (3) Outside Directors who have vast experience in, and deep insights into, such areas as employment, labor, corporate management, international affairs, economies and cultures.

The Directors who are Audit & Supervisory Committee Members are comprised of three (3) Directors who were employees of Nippon Steel with intimate knowledge of Nippon Steel's businesses, and four (4) Outside Directors who have vast experience in, and deep insights into, such areas as laws, public administration, public finances, corporate accounting and economies.

The execution of important matters concerning the management of Nippon Steel and the Nippon Steel Group is determined at Board of Directors' meeting (held about once per month) after deliberations in the Corporate Policy Committee (once a week, in principle) comprised of the Representative Director and Chairman, Representative Director and President, Representative Directors and Executive Vice Presidents, and other members, pursuant to Nippon Steel's rules.

As corporate organizations engaging in deliberations before the Corporate Policy Committee and the Board of Directors, there are 21 company-wide committees in total, including the Risk Management Committee, the Environment Management Committee, the Zero-Carbon Steel Committee, the Ordinary Budget Committee, and the Technology Development Committee, depending on each purpose and each area, as of April 1, 2021.

### Corporate governance enhancement activities since 2006

- June 2006**
  - Reduction of the number of directors in the Articles of Incorporation from 48 to 15\* (\* Increase to 20 when Nippon Steel & Sumitomo Metal Corporation was established in 2012)
  - Adoption of the Executive Management System
  - Adoption of a limited liability contract with External Auditors
- June 2014**
  - Appointment of Outside Directors (two)
  - Adoption of a limited liability contract with Outside Directors
- June 2015**
  - Adoption of a limited liability contract with full-time Audit & Supervisory Board Members
- October 2015**
  - Establishment of the Nomination and Compensation Advisory Committee
- June 2018**
  - Increase the number of Outside Directors to three (appointment of a female director)
- June 2020**
  - Transition to a Company with an Audit & Supervisory Committee

## 2. Internal control system

Nippon Steel has established internal control and risk management systems, based on autonomous activities by internal divisions and Group companies, according to the Basic Policy on Internal Control System, which was resolved by the Board of Directors, and the Internal Control Basic Rules. The Internal Control & Audit Division cooperates closely with each area's functional division in charge of risk management, develops annual plans concerning internal control and risk management, prepares schemes for check and review, regularly ascertains the status of internal control across the entire Group, and works at continual improvement. As a whistleblower system, an internal consulting contact point was established to receive information not only from employees of Nippon Steel and the Group companies, but also from their families, suppliers, and others. The contact office receives reports and consultation (that may be made anonymously) on a wide range of subjects — from violation of laws, regulations, or company rules to ascertaining of rules thought to be needed for operations. It is also positioned as one of the bodies that monitors the status of internal control activities, in addition to its functions on compliance and optimization of operations, such as to prevent accidents and violation of laws, and to improve operations.

## 3. Risk management

The Risk Management Committee, chaired by the Executive Vice President in charge of the Internal Control & Audit Division, receives regular reports from the Division on the development and execution status of the internal control annual plan, the compliance status of laws and regulations, and the matters related to risk management, which include adherence to the Conduct Code of Nippon Steel Group Company and other company rules as well as ESG risks, such as labor safety, workplace sexual or power harassment and other abuse of human rights, environmental issues, disaster prevention, quality assurance, financial reporting, and information security. The Committee then deliberates and checks the status of measures taken. What was deliberated and ascertained by the Risk Management Committee, including important risks, is reported and deliberated by the Corporate Policy Committee, attended by the Representative Director and Chairman and Representative Director and President among other members.

The Board of Directors evaluates effectiveness of supervision of risk management and internal control by receiving regular reports on managerial important risks, including those originated by the Risk Management Committee and the Corporate Policy Committee.

For further information, please refer the Integrated Report 2021

pp. 89–102.

# Independent Assurance Report



## Independent Assurance Report

To the Representative Director and President of Nippon Steel Corporation

We were engaged by Nippon Steel Corporation (the "Company") to undertake a limited assurance engagement of the environmental performance indicators marked with ★ (the "Indicators") for the period from April 1, 2020 to March 31, 2021 included in its Nippon Steel Sustainability Report 2021 (the "Report") for the fiscal year ended March 31, 2021.

### The Company's Responsibility

The Company is responsible for the preparation of the Indicators in accordance with its own reporting criteria (the "Company's reporting criteria"), as described in the Report.

### Our Responsibility

Our responsibility is to express a limited assurance conclusion on the Indicators based on the procedures we have performed. We conducted our engagement in accordance with the 'International Standard on Assurance Engagements (ISAE) 3000, Assurance Engagements other than Audits or Reviews of Historical Financial Information' and the 'ISAE 3410, Assurance Engagements on Greenhouse Gas Statements' issued by the International Auditing and Assurance Standards Board. The limited assurance engagement consisted of making inquiries, primarily of persons responsible for the preparation of information presented in the Report, and applying analytical and other procedures, and the procedures performed vary in nature from, and are less in extent than for, a reasonable assurance engagement. The level of assurance provided is thus not as high as that provided by a reasonable assurance engagement. Our assurance procedures included:

- Interviewing the Company's responsible personnel to obtain an understanding of its policy for preparing the Report and reviewing the Company's reporting criteria.
- Inquiring about the design of the systems and methods used to collect and process the Indicators.
- Performing analytical procedures on the Indicators.
- Examining, on a test basis, evidence supporting the generation, aggregation and reporting of the Indicators in conformity with the Company's reporting criteria, and recalculating the Indicators.
- Visiting the Company's East Nippon Works Kimitsu Area selected on the basis of a risk analysis.
- Evaluating the overall presentation of the Indicators.

### Conclusion

Based on the procedures performed, as described above, nothing has come to our attention that causes us to believe that the Indicators in the Report are not prepared, in all material respects, in accordance with the Company's reporting criteria as described in the Report.

### Our Independence and Quality Control

We have complied with the Code of Ethics for Professional Accountants issued by the International Ethics Standards Board for Accountants, which includes independence and other requirements founded on fundamental principles of integrity, objectivity, professional competence and due care, confidentiality and professional behavior. In accordance with International Standard on Quality Control 1, we maintain a comprehensive system of quality control including documented policies and procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements.

*KPMG AZSA Sustainability Co., Ltd.*

KPMG AZSA Sustainability Co., Ltd.  
Tokyo, Japan  
September 27, 2021

# Awards Received in FY2020

Award name	Sponsor	Detail
2020 Good Design Award	Japan Institute of Design Promotion	New product "FeLuce™" hairline-finished electroplated steel sheet (Nippon Steel)
2020 Award for Excellence in Corporate Disclosure (26th) in Steel/Non Ferrous Metal Industry Category	The Securities Analysts Association of Japan	Highly evaluated for the top management's efforts to communicate to the financial markets, holding of a special briefing on sustainability and visits to steelworks and the enhancement of IR briefing materials on topics of interest (Nippon Steel)
The 3rd Japan Open Innovation Grand Prize "Minister of Land, Infrastructure, Transport and Tourism Award"	The Cabinet Office, etc.	Development and commercialization of high-ductile steel plates with excellent collision and grounding resistance to prevent marine oil spills (Nippon Steel, National Institute of Maritime, Port and Aviation Technology, Imabari Shipbuilding Co., Ltd., Nippon Kaiji Kyokai)
Award for World Class TMP Achievement	Japan Institute of Plant Maintenance	Initiatives to build a corporate structure that enables sustainable growth, such as promoting voluntary conservation, raising the level of plan maintenance, and improving the level of management (NS-Siam United Steel Co., Ltd.)
The 47th Iwatani Naoji Memorial Award	Iwatani Naoji Memorial Foundation	Development and commercialization of high-extension steel plates to improve collision safety of crude oil tankers and prevent marine oil spills (Nippon Steel)
The 53rd Ichimura Prize in Industry for Distinguished Achievement	Ichimura Foundation for New Technology	Development of ultra-high-tensile steel sheet processing technology to support the evolution of automobiles (Nippon Steel)
Named Top 100 Global Innovator 2020 (the only steel company for the ninth consecutive year)	Clarivate Analytics (USA)	Awarded as one of the world's most innovative companies by analysis of the trend in intellectual property and patents (Nippon Steel)
2020 MEXT Minister's Award "Prize for Science and Technology (Development Division)"	Ministry of Education, Culture, Sports, Science and Technology (MEXT)	Development of wire materials for ultra-high-tensile bridge cables with reduced environmental impact (Nippon Steel)
Equipment Supplier of the Year	Royal Dutch Shell Group	Made the most significant contribution to Shell's development and production target, and helped advance Shell's goal of virtually zero greenhouse gas emissions by 2050 (Nippon Steel, Sumitomo Corporation)

### Corporate profile (as of March 31, 2021)

Name	Nippon Steel Corporation
Head office	2-6-1 Marunouchi, Chiyoda-ku, Tokyo 100-8071, Japan
Establishment	April 1, 1950
President	Eiji Hashimoto
Capital	419,524 million yen (424,454 shareholders)
Stock listings	Tokyo, Nagoya, Fukuoka, Sapporo
Number of employees	106,226 (consolidated)
Group companies	389 consolidated subsidiaries 110 equity-method affiliates



FTSE4Good



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Nippon Steel Corporation has been selected as a constituent both of the "FTSE4Good Index Series" and the "FTSE Blossom Japan Index," well-renowned ESG investment indices four years in a row.

These indices are widely used as important criteria by investors worldwide, who increasingly focus on ESG initiatives of companies.

### Contact

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