



NIPPON STEEL

Nippon Steel Sustainability Report

2020

CONTENTS

01 Introduction

- 01 Corporate Philosophy, Management Principles
- 02 Message from the President
- 04 Attractiveness of Steel
- 06 Nippon Steel Group's Challenge History
- 08 Nippon Steel Group's Businesses
- 10 Value Creation Process and Nippon Steel's Strengths
- 12 Nippon Steel Group's Contribution to SDGs

14 Nippon Steel's ESG Materiality

16 Environmental Initiatives

- 16 Nippon Steel's Environmental Management
- 18 Promotion and Enhancement of Environmental Management
- 20 Energy Material Balance
- 22 Coping with Climate Change
- 36 Contributing to Creation of a Circular Economy
- 38 Promotion of Environmental Risk Management
- 42 Initiatives on Conservation of Biodiversity

44 Social Initiatives

- 44 Safety and health initiatives
- 45 Disaster prevention initiatives
- 45 Quality-related initiatives
- 46 Toward more stable production (continued enhancement of strength in manufacturing)
- 48 Respect for human rights and promoting diversity & inclusion
- 50 Initiatives for human resources development
- 52 Together with local communities

54 Corporate Governance

- 56 Independent Assurance Report
- 57 Awards Received in FY2019

Editorial policy

This Sustainability Report is the 23rd since the former Nippon Steel Corporation issued what is the first sustainability report by a Japanese steel manufacturer, in 1998. In April 2020, we absorbed Nippon Steel Nisshin and restructured and reestablished our organization and governance system. Our commitment to promote business activities that contribute to the realization of a sustainability society remains unchanged and we continue to carry out diverse initiatives.

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 form the basis for supporting our sustainable growth, in detail, by adding 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 FY2019 (from April 2019 to March 2020). For some activities, the period from April 2020 to June 2020 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 2020 of Nippon Steel (issued in October 2020) 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

Overview of the communication tools

Website

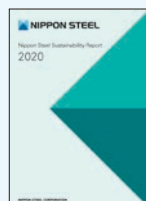
Details on the following subjects



<https://www.nipponsteel.com/en/>

Sustainability Report 2020

Easy-to-understand brochure on environmental initiatives, social initiatives and corporate governance



(Book form and PDF file)^{1,2}

Sustainability
<https://www.nipponsteel.com/en/csr/report/>

Integrated Report 2020

Brochure on the overall businesses and management for investors



(Book form and PDF file)^{1,2}

Investor Relations
https://www.nipponsteel.com/en/ir/library/annual_report.html

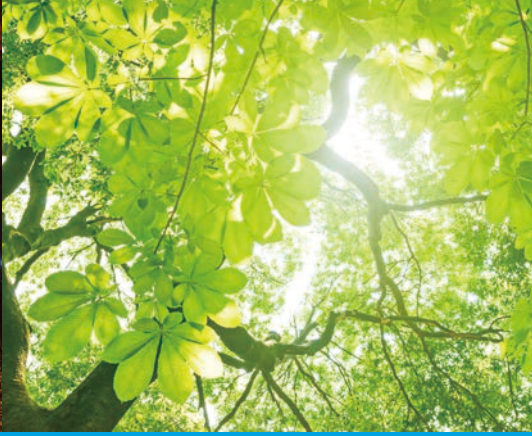
Various reports for shareholders

Brochure on the overall businesses and management for investors

- Fact Book
- Financial Results
- Securities Reports
- Corporate Governance Reports
- Documents related to the General Meeting of Shareholders, etc.



Investor Relations
<https://www.nipponsteel.com/en/ir/>



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.



Message from the President



Towards the Realization of a Sustainable Society (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.

Our Group's mainstay steelmaking business is expected to remain in an extremely harsh business environment partly due to the COVID-19 crisis, which has further aggravated the unprecedented environment of "higher raw material prices and lower steel product prices." Despite being in such situation or because of this, we find it important that we aim at "becoming the best steelmaker with world-leading capabilities" and contributing to the realization of a sustainable society. For that purpose, we focus on early transition to an optimal production framework in Japan, enhancement of globally-competitive strategic products in quality and quantity, and execution of initiatives to deepen our overseas business in response to the global trend of "local production and local consumption" and "favoring domestic production" so as to enhance our profitability. In this Sustainability Report 2020 we are pleased to present our wide-ranging initiatives in regard to the Environment, Social, and Governance (ESG) issues we face together, toward realizing a sustainable society.

Environmental initiatives

Having positioned environmental matters as priority issues that underlie in our corporate management 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 earth, 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. We have addressed the SDG issues by four ways: our 1) Eco Process (drastic reduction in CO₂ emitted in steelmaking process); 2) Eco Solutions (transfer and dissemination of our environmental technologies to emerging countries); 3) Eco Products (demonstration of energy-efficiency performance as final products by developing and supplying high-function steel materials); and 4) innovative technology development (considering zero-carbon steel further ahead). We believe that each of these initiatives can be an effective response to risks as well as creation of business opportunities. In May 2019 we signed a statement of support for the Task Force on Climate-related Financial Disclosures (TCFD). In this Sustainability Report, we have identified these risks and new business opportunities, considered their importance, and determined their impact on Nippon Steel as well as strategies. The proceeding of this scenario analysis has led us to develop some new business strategies. As an example, we decided to newly construct

manufacturing facilities for ultra-high-tensile steel sheets and electrical steel sheet, in order to respond to potential growth in their demand and rising needs for higher efficiency for vehicles. We will continue to contribute to the global environment through various business activities, which include provision of outstanding products and technologies in Japan and abroad, in addition to reduction of environmental impact associated with steel production.

To further advance toward realizing an ambitious vision on decarbonization, we began examining our CO₂ reduction scenarios that had set goals for 2030 and 2050. We intend to announce specific scenarios and strategies within the current fiscal year. We have also registered many innovation projects for Japan Keidanren's "Challenge Zero" Initiative, based on the notion that a virtuous cycle of the environment and growth can be created from non-consecutive innovations. A representative project among them is a challenge of hydrogen reduction steelmaking. This was adopted as a national project and Japan's public-private cooperative project is just about kicking off. As a core company carrying out activities for the project, we will also take up the challenge of developing hydrogen reduction steelmaking technology, which enables zero CO₂ emission in steelmaking.

Recently a "circular economy" has become a concept which is attracting increasing interest from the perspective of promoting economic growth while building a sustainable society. Steel is a material from which can be easily removed and which can be 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 and a 100% recycling of plastic containers and packaging generated in society. We are committed to contributing in the realization of a circular economy with further technological innovations.

Concerning maintenance and improvement of the living environment in community, 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 condition of each base of operations, thoroughly taking measures from both hard and soft aspects to reduce environmental burden.

Concerning biodiversity preservation, we have been actively engaged in environmental preservation activities in various regions, including the creation of hometown forests by our steelworks. The forests have grown to total around 830ha. In light of the scheduled adoption of the post-2020 Aichi Biodiversity Targets, we formally expressed our support to Keidanren's Declaration of Biodiversity and Action Policy and developed and disclosed our initiative policy. 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 the 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.

We are engaged in activities on behalf of safety, respect of human rights, promotion of diversity, social contribution via support of arts, culture, and sports, and community-based educational support, in addition to the maintenance and improvement of the communities' living environment, as a part of efforts to earn the trust of all of our stakeholders. Some of these activities are presented in this report. Notably, we began a telework program in fiscal 2019 as a part of Workstyle Innovation. I am pleased that this program is already working effectively during the current COVID-19 crisis. 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

For the company's sound and sustainable growth, and improvement of its corporate value in the mid- to long-term, we had established a corporate governance structure appropriate for our operation as a Company with a Board of Company Auditors but made a transition to a Company with an Audit & Supervisory Committee in June 2020. By enhancing the supervisory function to the management and accelerating decision-making, we are appropriately responding to a widened fluctuation in business environment conditions and an accelerated pace of change.

ESG initiatives are considered as one of our priority management issues, which form the base that supports sustainable corporate growth. We have recently made a step forward and have identified our materiality with due consideration to our corporate principles, values, stakeholders' expectation, and our growth strategy. Going forward, we intend to steadily promote its execution and follow-up by checking Key Performance Indicators to assess outcomes.

In this Sustainability Report, we have expressed our strong commitment to ESG initiatives to achieve sustainable growth and to contribute to realizing a sustainable society. We hope that you take a look of this report and let us know your feedback.

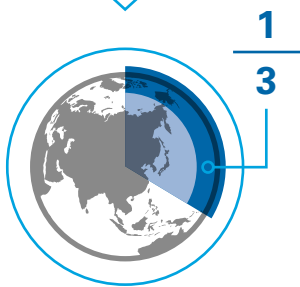
Attractiveness of Steel

Steel is one of the most familiar materials of which things are made and is indispensable for our daily lives. Thanks to its diverse properties and infinite potential, steel can be recycled endlessly, contributing to reduction in environmental impact and to a sustainable society.



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

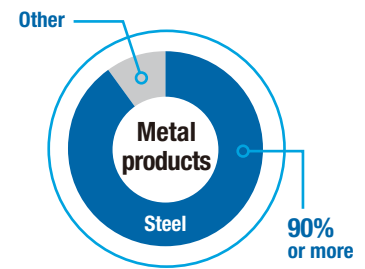
Iron is believed to constitute one-third of the Earth's weight.



Steel is an affordable material and is cheaper than water in a plastic bottle (in comparing price per unit weight).



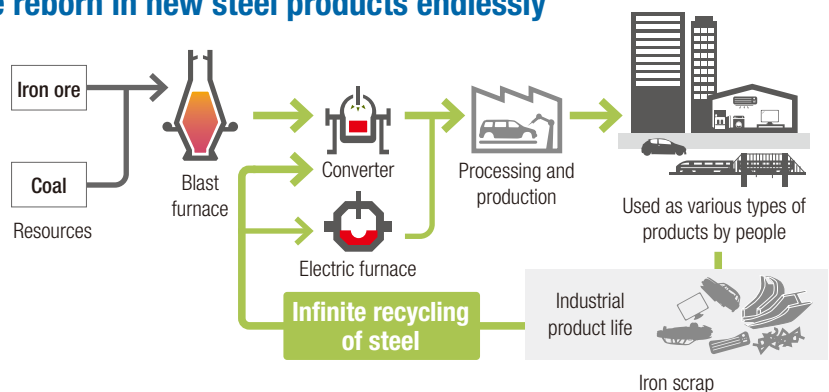
Steel represents 90% or more of metal products, as steel, being abundant, cheap, and having good workability, has a wide range of applications.



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

Steel can be easily sorted out from among other metals and materials, and degrades little when recycled. Steel is an optimal material that can be recyclable many times into various products, such as steel scrap from vehicle bodies being recycled into bridges and buildings.

Steel does not end its life even after the end of a life of a product made of steel. It becomes steel scrap to be recycled back to the steelmaking process, and is reused as a new product.



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	Weather resistance
Workability	Corrosion resistance	

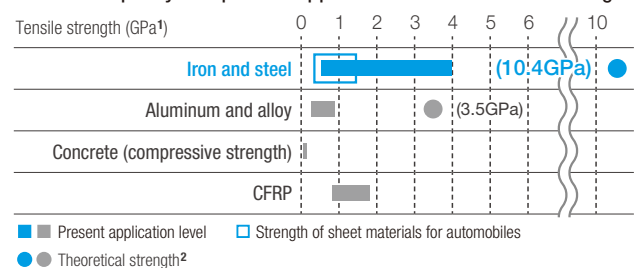
Infinite potential

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

Steel can also be described as a natural composite material to be adjusted for specific uses by controlling the level of carbon content. This also imparts diverse properties to it.

In addition to adjusting carbon and other content, steel's properties can be advanced by controlling the combination of its temperature and rolling at the manufacturing stage. The greater the understanding of the nature of different kinds of steel, the greater is its potential and real value.

Potential capacity and present application level of material strength

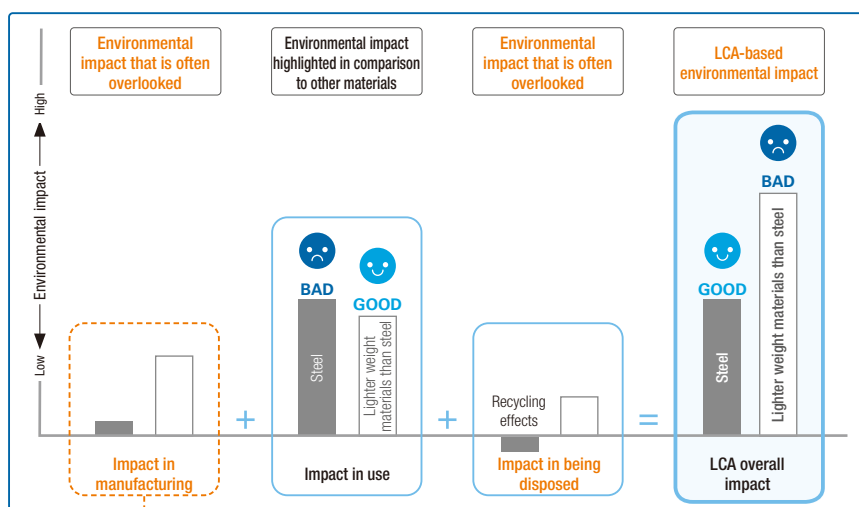


1 Gigapascal (GPa) is a unit to measure tensile strength. Giga denotes a factor of one billion (10⁹).
 2 Theoretical strength is said to be 1/5 to 1/7.5 of the modulus of rigidity. The above data uses 1/7.5.

Steel is an outstanding material from the perspective of the Life Cycle Assessment

The Life Cycle Assessment method (LCA) is a way 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 disposal and recycling of the end product. From the LCA perspective, steel can be regarded as a sustainable material with very low environmental impact relative to other materials.

Let's consider the overall life cycle



What about materials of products?

Comparison of CO₂ emissions in manufacturing for same vehicle component

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

Based on the public data of WorldAutoSteel

Some materials have low environmental impact in use but may have high environmental impact in the overall life cycle.

The Life Cycle Assessment (LCA) is therefore important.

While some materials are lighter than steel, steel has an extremely lower environmental impact in manufacturing.

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

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

Focusing only on the steelmaking process itself, 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 CO₂ emission reduction. As that scrap recycling effect offsets the CO₂ emissions in the BF process, environmental impact of the BF and EAF routes in total terms are the same over the life cycle of steel.

This approach is recognized in the ISO 20915 and the JIS Q 20915. As an example, the amount of CO₂ emission in making 1kg of hot-rolled steel is about 2kg in the BF route and 0.5kg in the EAF route. However, incorporating the recycling effect, the total amount of CO₂ emission is about 0.7kg for both the BF steel and EAF steel.

Thinking in terms of the whole life cycle (LCA) of a product is extremely important in considering environmental impact. This approach is becoming widely accepted in the global steel industry.

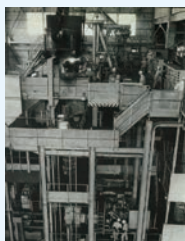
Nippon Steel Group's Challenge History

In order to accurately anticipate and adapt to the changes of the times and respond to the needs of customers, the Nippon Steel Group has strived to advance steelmaking technology and provide new products to society. We are determined to contribute to development of society while further enhancing our advanced technology.

Steel supported high economic growth

1960s

- **Construction of integrated seaside steelworks**
Constructed integrated steelworks in various parts of Japan, aimed at efficient imports of raw material, and production and shipment of steel products
- **Introduction of converters**
Shortened the smelting process time from 3-4 hours to 30%, and enhanced productivity by 10 times
- **Introduction of continuous casting machines**
The continuous process of feeding to the mold → heating → rolling of slab dramatically improved energy efficiency.



[1964]

The Tokaido Shinkansen adopted Nippon Steel's railway wheels and axles, and drive system.



The Zero Series trains
Courtesy of Railway Technical Research Institute

[1968]

Began production of oriented electrical steel sheets which is used in transmission/distribution transformers and reduces their energy loss

Energy saving challenge

1970s

- **Development of Top Pressure Recovery Turbine (TRT)**
Used gas pressure generated in a blast furnace for rotating the turbine for power generation

[1972]

Developed the world's first continual annealing furnace, integrating five annealing processes for automotive steel sheets into one continual process, and reducing manufacturing time from 10 days to 10 minutes.

[1976]

Developed the Coke Dry Quenching (CDQ), enabled exhaust heat to be collected and used for power generation, and contained dust generation.



[1971]

Started the Creation of Hometown Forests (projects to reproduce the natural vegetation based on the ecological method)



Respond to the yen's sharp appreciation

1980s

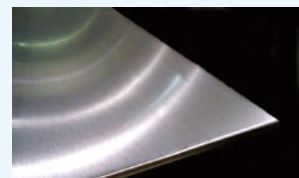
- **Installation of active coke dry type desulfurization equipment**
Substantially curbed emission of SOx and NOx



- **Start of blowing of fine powdered coal to the blast furnace**
Realized energy saving by expanded use of low-grade materials and reduction in use of coke

[1984]

Began production and sales of corrosion-resistance, lightweight, and high-strength titanium.



[1988]

Developed steel wires for high-strength cables, contributing to the construction of the Akashi Kaikyo (Strait) Bridge and other long bridges.



Major events

[1963] Opening of the Meishin Expressway
[1964] Opening of the Tokaido Shinkansen Line
[1964] Tokyo Summer Olympics

[1970] Japan World Exposition (Osaka Expo'70)
[1972] Sapporo Winter Olympics
[1973] Shift to the floating exchange rate regime
[1973] The first oil crisis
[1978] The second oil crisis

[1982] Opening of the Tohoku and Joetsu Shinkansen Lines
[1985] The Plaza Accord
[1985] The International Exposition, Tsukuba, Japan
[1988] Opening of the Seikan Submarine Tunnel
[1988] Opening of the Great Seto Bridge

Support in the era of concern for the global environment

1990s

[1996]

Developed regenerative burners
A pair of burners alternately heat the air or absorb the heat in the heating furnace, achieving about 25% energy saving



[1996]

Developed HIAREST steel that is resistant to cracking at the time of collision of a ship in order to prevent oil leakage and pollution of the ocean.



[1999]

Developed lead-free bars and wire rods with ensured workability.

[1998]

Issued the first sustainability report by a Japanese steel manufacturer



Support for customer's global expansion

2000s

- Development of ultra-high-tensile steel sheets (for automobiles)
Solved the issues of reducing vehicle body weight and improving collision safety



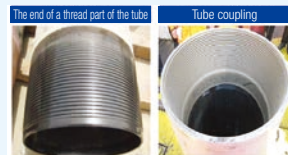
[2000]

Developed a waste plastics full-recycling process using existing coke ovens and began operation.



[2009]

Developed CLEANWELL™ DRY1, an eco-friendly premium connector for oil country tubular goods, not requiring use of a grease called dope, which contains a substance of concern.



[2004]

Started experimental operation of the Vivary™ iron supply unit, which uses steel slag, in the ocean in Hokkaido

Toward becoming the world-leading steelmaker with comprehensive strengths

2010s

[2010]

Expanded usage of biomass resources, such as used wood pallets, thinned forest wood, and other resources even including coffee grounds, as coal alternative fuel for power generation.

[2014]

Completed construction of the first commercial model of an energy-efficient CO₂ separation and recovery facility for a non-steelmaking area, at Muroran Works. CO₂ contained in the stack gas from blast furnaces or thermal power stations is separated and collected by use of a chemical absorption solution.



[2015]

Developed HRX19™ stainless steel, enabling high-pressure hydrogen to be used for hydrogen stations and fuel cell vehicles.



[2016]

Conducted a verification test of an experimental blast furnace of the COURSE50 project, aimed at reducing CO₂ emission by hydrogen reduction.

[2019]

Ten H-shaped steel products, including the Mega NS Hyper Beam™, acquired the EcoLeaf Environmental Label for the first time.

[1992] The United Nations Conference on Environment and Development (UN Earth Summit)
[1995] The Great Hanshin-Awaji Earthquake
[1987] Kyoto Protocol
[1998] Nagano Winter Olympics

[2002] FIFA World Cup Korea/Japan
[2005] The 2005 World Exposition, Aichi, Japan
[2008] Lehman Shock (Global Financial Crisis)

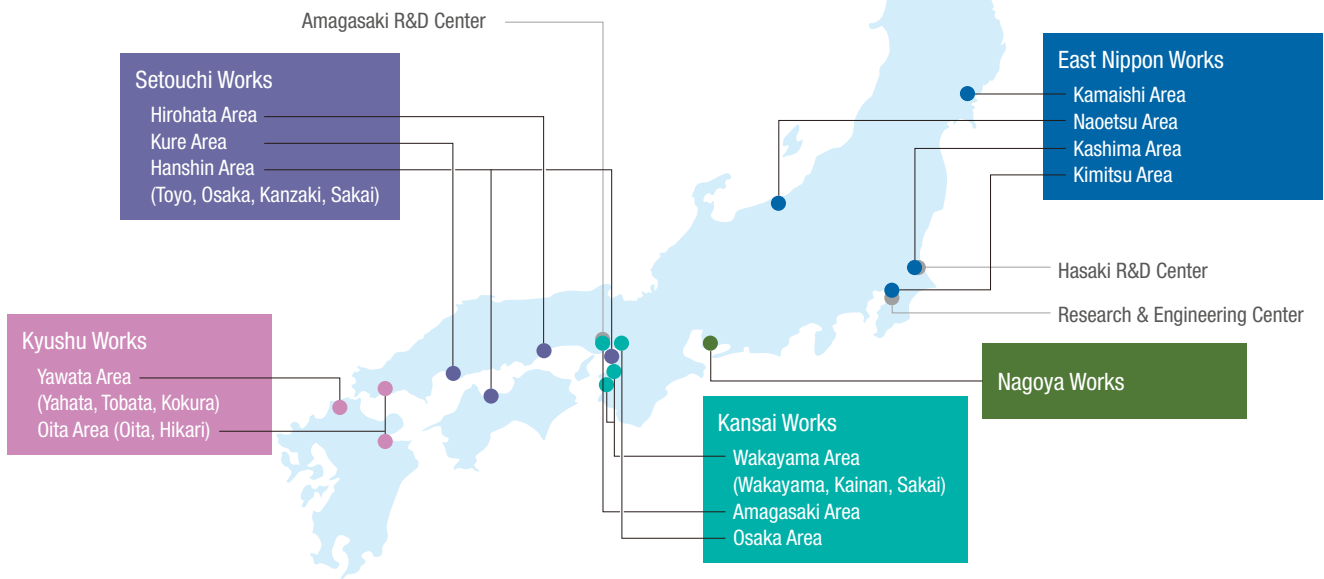
[2011] The Great East-Japan Earthquake and Tsunami
[2011] Opening of the entire line of the Kyushu Shinkansen Line
[2015] Opening of the Hokuriku Shinkansen Line
[2015] Paris Agreement
[2016] Opening of the Hokkaido Shinkansen Line
[2019] The Rugby World Cup in Japan

Nippon Steel Group's Businesses

Domestic Manufacturing and R&D Bases (Nippon Steel)

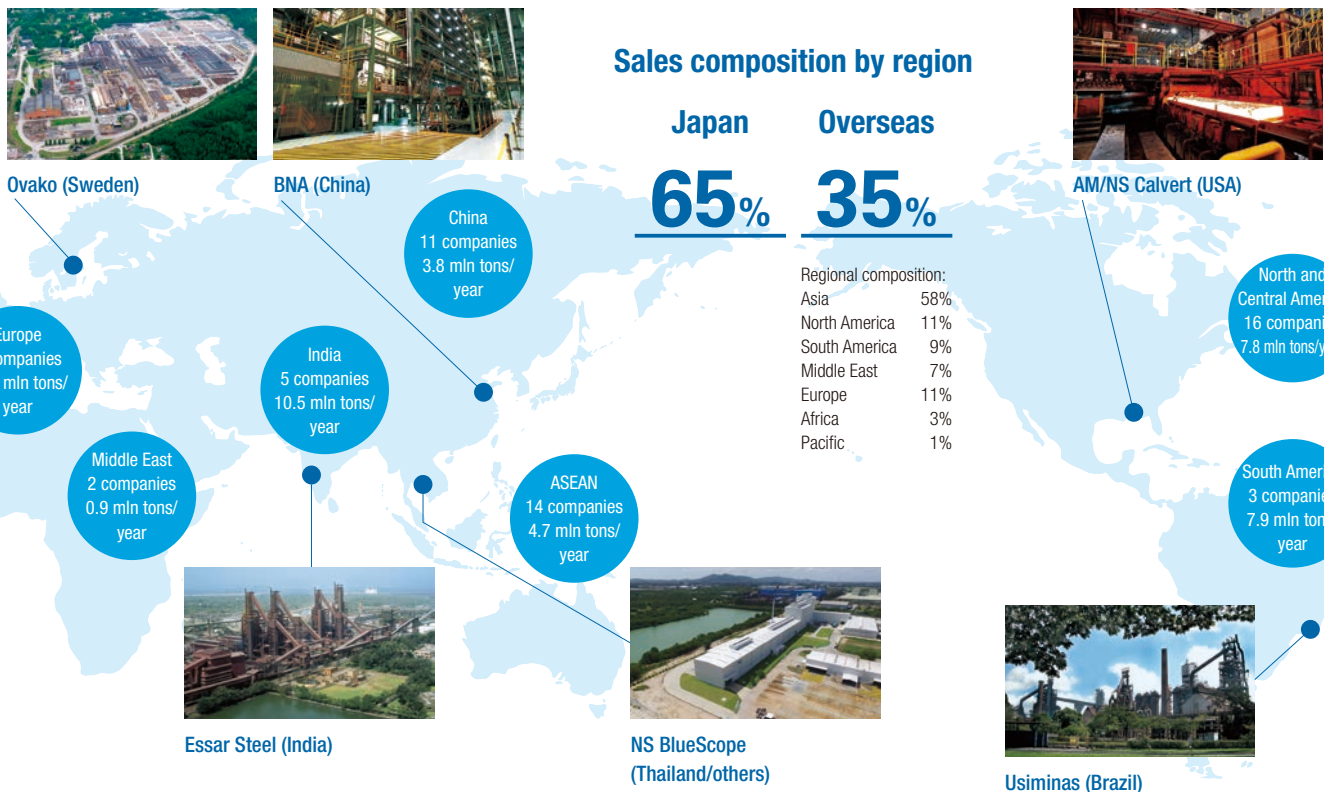
Nippon Steel is engaged in production at six steelworks — Murooran, East Nippon, Nagoya, Kansai, Setouchi and Kyushu — and R&D activities in three centers in Futtsu, Hasaki, and Amagasaki.

* In April 2020, 16 domestic steelworks were integrated and reorganized.



Overseas Manufacturing Bases

The Nippon Steel Group's overseas business is expanding to the extent of having a global supply network of 37 million tons in steel processing capacity, mainly for use of automobiles, resources and energy, infrastructure, electric appliances, containers, and others.



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.

Chemicals and Materials Business

¥215.7 bn

Nippon Steel Chemical & Material Co., Ltd.

This segment strives to develop demand for functional products for electronics materials, such as display materials, epoxy resins, circuit board materials and organic EL materials, in addition to needle coke, diverse aromatic products, and other diverse carbon-related original products. Based on materials expertise gained from steelmaking, this segment provides original materials and components that are indispensable to leading-edge technology fields, with primary focus on the three areas — semiconductor and electronics, industrial basics, and environmental and energy area.

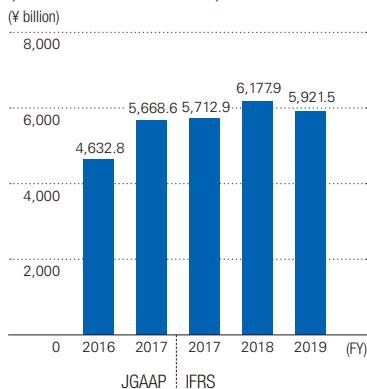
Engineering and construction business

¥340.4 bn

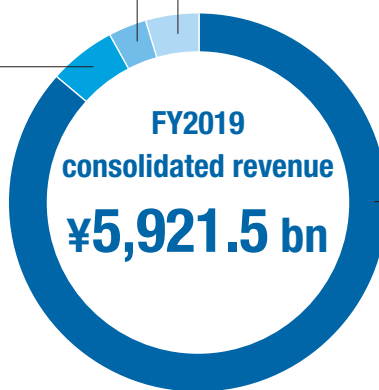
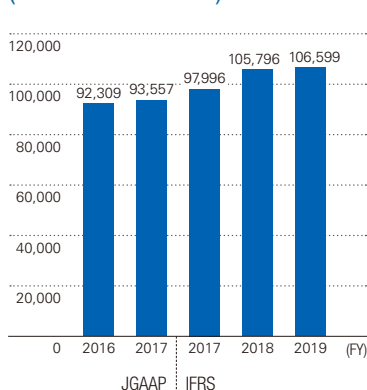
Nippon Steel Engineering Co., Ltd.

Based on long-accumulated steelmaking and other technologies, Nippon Steel Engineering undertakes many projects worldwide in six fields: steelmaking plants; environment; energy; offshore steel structures; building construction and steel structures; and pipelines.

Net sales/Revenue (consolidated basis)

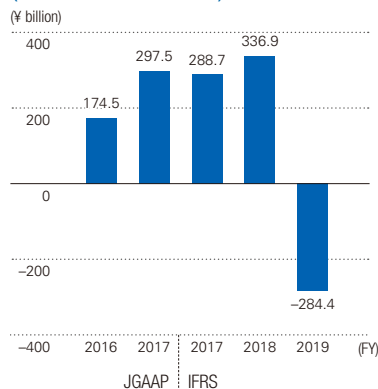


Number of employees (consolidated basis)

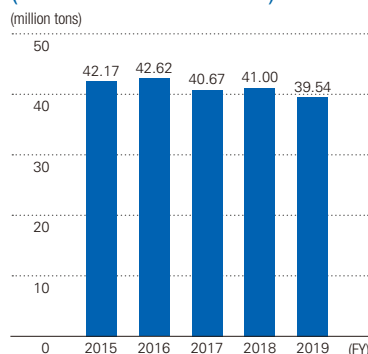


(Elimination of intra-company transactions, etc. ¥165.2 bn)

Ordinary profit/Business profit (consolidated basis)



Crude steel production volume (non-consolidated basis)



System solutions business

¥273.2 bn

NS Solutions Corporation

In keeping with the advent of widespread use of digital innovations in IT for business, NS Solutions provides IT business solutions, including uses of the cloud, IoT, and AI, to a wide range of sectors by applying its extensive insight and advanced practical IT capabilities acquired in the steel manufacturing business.

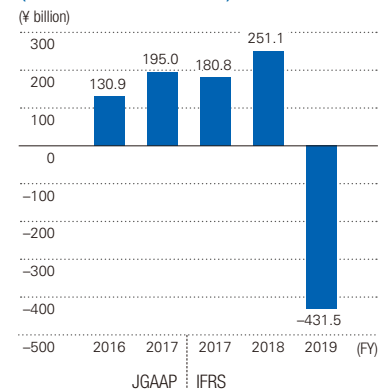
Steelmaking and steel fabrication business

¥5,257.3 bn

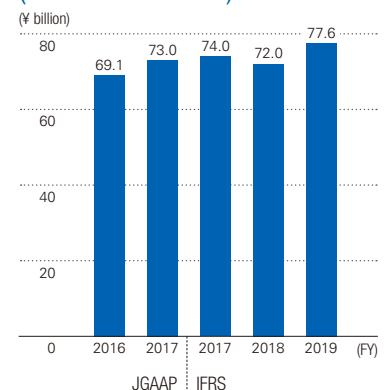
Nippon Steel Corporation

Enhancing technological superiority, Nippon Steel provides a variety of high-grade steel products (i.e., steel plates; flat products; bars & wire rods; construction products; pipes & tubes; railway, automotive & machinery parts; and titanium stainless steel) to many customers in Japan and overseas.

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

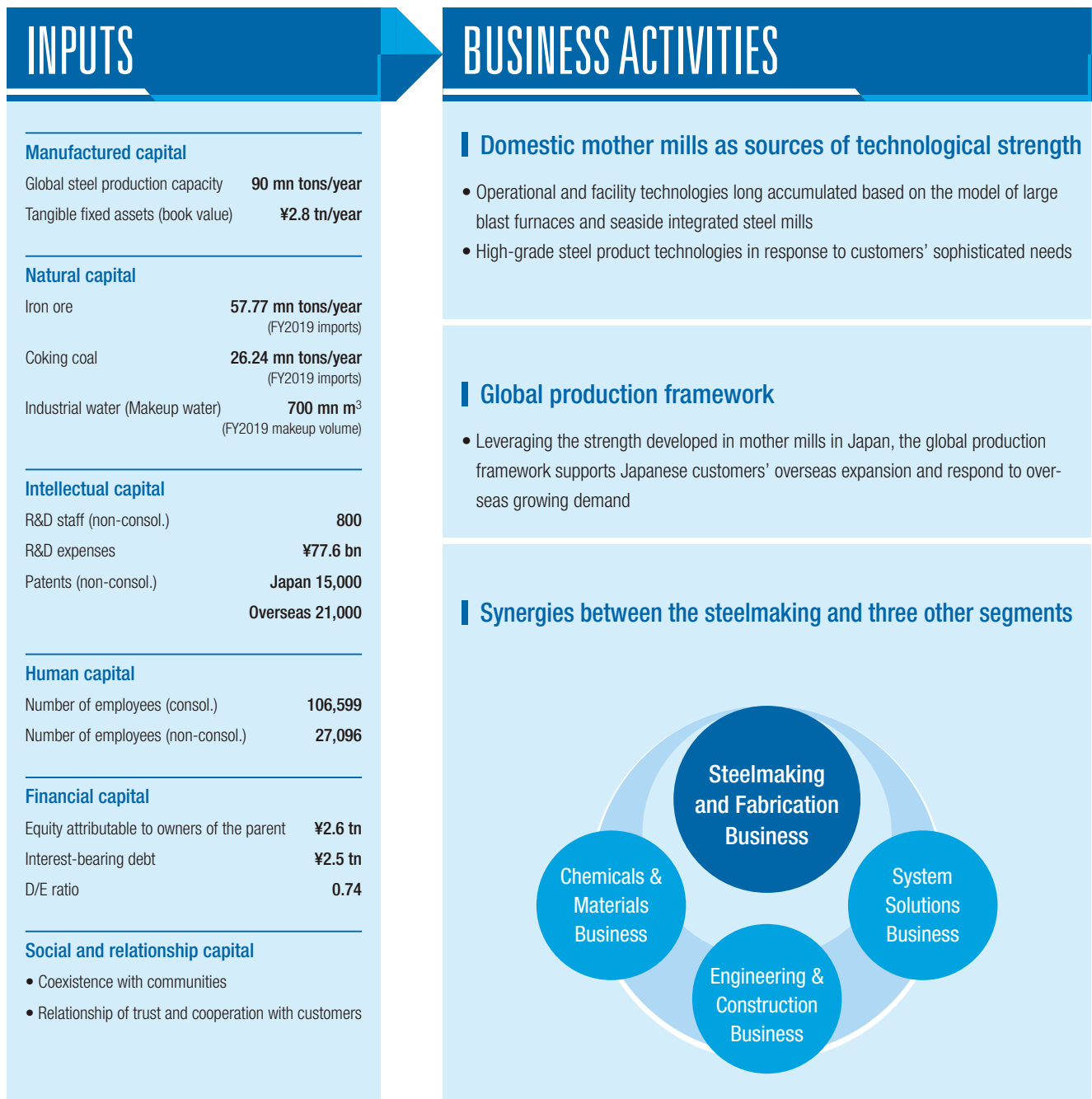


R&D expenditures (consolidated basis)



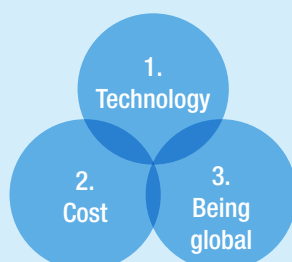
Value Creation Process and Nippon Steel's Strengths

BUSINESS MODEL



Nippon Steel's Strengths

Toward becoming the world-leading steelmaker with comprehensive strengths



① Technology

Products and solutions that contribute to customers' value creation

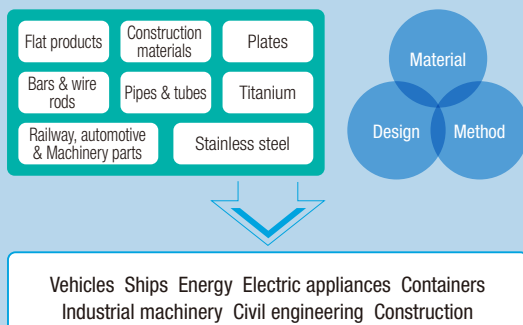
- A global steelmaker's top-level R&D resources
- Practical use of advanced technologies by R&D Centers and Steelworks R&D divisions
- Joint development based on long-term relationships of trust with customers
- A wide variety of products
- Stable mass production technology of high-grade steel
- Synergy with non-steel business segments

The Nippon Steel Group creates value by long-term stable provision of diverse products and solutions through its business activities that harmonize with stakeholders and the natural environment in its mother mills in Japan, which are a source of its development and technological prowess, and its overseas manufacturing bases, which support Japanese customers' overseas expansion and respond to local customer demand.

The Group thereby contributes to industrial and social development.

OUTPUTS

Diverse steel products for and solution proposals for various applications



ECO PRODUCTS What we produce is "eco-friendly"

Products using by-products

Steel slag products, coal chemical products

Non-steel business products and services

Environment and energy; urban infrastructure, steelmaking plant, chemicals, functional materials, composite materials; IT consulting; DX promotion; IT outsourcing; modernization



ECO SOLUTION Sharing our "eco-solutions"

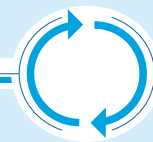
Minimal emissions

Curbing of CO₂ emissions; 99% recycling of by-products; air, water, soil contamination risk management

OUTCOMES

Contribution to SDGs in society

- Jobs for employees (incl. subcontractors) and growth in community
 - 1 No poverty
 - 5 Gender equality
 - 8 Decent work and economic growth
- Safe, reliable living (steel for key auto parts, railway, bridges, buildings, etc.)
 - 7 Affordable and clean energy
 - 8 Decent work and economic growth
 - 9 Industry, innovation and infrastructure
 - 11 Sustainable cities and communities
 - 12 Responsible consumption and production
- Energy preservation, climate action, recycle-oriented society
 - 3 Good health and well-being
 - 6 Clean water and sanitation
 - 7 Affordable and clean energy
 - 12 Responsible consumption and production
 - 13 Climate action
 - 14 Life below water
 - 15 Life on land
- Disaster prevention and reduction, National Resilience
 - 9 Industry, innovation and infrastructure
 - 11 Sustainable cities and communities
 - 12 Responsible consumption and production
- Infrastructure to build in emerging countries and to rebuild in developed countries
 - 1 No poverty
 - 2 Zero hunger
 - 3 Good health and well-being
 - 6 Clean water and sanitation
 - 7 Affordable and clean energy
 - 8 Decent work and economic growth
 - 9 Industry, innovation and infrastructure
 - 11 Sustainable cities and communities
- Products and technological solutions in growth areas
 - 8 Decent work and economic growth
 - 9 Industry, innovation and infrastructure
 - 11 Sustainable cities and communities
 - 13 Climate action
 - 14 Life below water
 - 15 Life on land
- Education for employees and communities
 - 4 Quality education
 - 8 Decent work and economic growth



Economic value creation

Enhancement of sustainable corporate value and return of profit

- Securing of sustainable profit
- Return of profit
- Investment for further growth
- Corporate value enhancement

② Cost

Cost competitiveness, enabled by our process technology and operational

- The world's top-class energy efficiency
- The Top Runner method with multiple steelworks
- Large blast furnace operational technologies

③ Being global

Global expansion in response to Japanese customers' overseas expansion and local demand

- Global production framework
- Alliances with the world's major steelmakers
- A presence in growing Asia
- High domestic shares; No.3 in the world in production volume

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.

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.

SUSTAINABLE DEVELOPMENT GOALS



Examples of specific initiatives

 <ul style="list-style-type: none"> Pursuit of Eco Processes to help raise resource/energy efficiency and reduce environmental impacts ▶ pp. 20–21, 28 Introduction of advanced technologies through bilateral cooperation (India, ASEAN, etc.) ▶ p. 30 Use of steel slag in road materials and materials for civil engineering ▶ p. 36 	
 <ul style="list-style-type: none"> Job creation through establishment of operating companies in emerging countries ▶ p. 8 Reduction of vulnerability to disaster based on use of Nonframe method (construction method to stabilize slopes without damaging the natural environment) 	 <ul style="list-style-type: none"> Thorough compliance training, such as for the Anti-Monopoly Act Eliminating unfair discrimination, based on the respect on human rights ▶ p. 48 Expanded hiring of women and non-Japanese ▶ p. 49
 <ul style="list-style-type: none"> Use of converter slag fertilizer, a by-product of steelmaking, to improve farming productivity and salt damage in farmland ▶ p. 43 Provision of titanium and stainless steel, which have excellent seawater corrosion resistance, for seawater desalination plants, securing agriculture water 	 <ul style="list-style-type: none"> Provision of various indispensable Eco Products for daily lives ▶ p. 29 Provision of earthquake-resistance steel products ▶ p. 27 Development of Nonframe method, which protects houses from disaster while maintaining views of nature
 <ul style="list-style-type: none"> Promotion of air, water, soil risk management and chemical substance management ▶ pp. 38–41 Development and provision of steel products that contain no substances of concern, such as lead and hexavalent chromium ▶ p. 7 	 <ul style="list-style-type: none"> Promotion of air, water, soil risk management and chemical substance management ▶ pp. 38–41 Full recycling of by-products, including slag, dust, and sludge ▶ pp. 36–37 Promotion of recycling of waste plastics and waste tires ▶ p. 37
 <ul style="list-style-type: none"> Promotion of employee training to raise skills (i.e., OJT, Off-JT, sending trainees to Junior College for Industrial Technology), hosting technology triathlon ▶ p. 50 Study sessions for teachers, internship for students ▶ p. 52 	 <ul style="list-style-type: none"> Pursuit of Eco Processes at the world's highest-level energy efficiency ▶ pp. 22–23 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 ▶ p. 29
 <ul style="list-style-type: none"> More hiring of women in production and other workplaces ▶ p. 49–50 Establishment of infrastructure in manufacturing worksites for women to work comfortably Increase in the number of female employees in managerial positions ▶ p. 49 Awareness raising to prevent power harassment and sexual harassment in the workplace 	 <ul style="list-style-type: none"> Regeneration of seaweed beds with the use of steel slag ▶ pp. 13, 24, 42 Promotion of sea area environmental improvement with the use of steel slag ▶ p. 33 Voluntary clean-up activities at seashore nearby steelworks Collaboration with an NPO, "Mori wa Umi no Koibito" (participation in treeplanting, etc.) ▶ p. 52
 <ul style="list-style-type: none"> Recycling and reuse of limited water resources ▶ p. 21 Promotion of water quality risk management ▶ p. 38 Provision of titanium and stainless steel for seawater desalination plants Provision of lining steel pipes for delivery of clean water 	 <ul style="list-style-type: none"> Promotion of air, water, soil risk management and chemical substance management ▶ pp. 38–41 "Creation of Hometown Forests" to promote greenery within steelworks ▶ pp. 6, 42 Site cleaning activities around steelworks
 <ul style="list-style-type: none"> Efficient use of energy, such as 100% use of by-product gas ▶ pp. 20–21, 28 Provision of materials for fuel cells that produce energy from hydrogen Development and provision of steel materials for high-pressure hydrogen to support a hydrogen-oriented society ▶ p. 29 	 <ul style="list-style-type: none"> Bribery prevention guidelines to be established and made well known ▶ p. 53 Elimination of antisocial forces Thorough confirmation of no use of conflict material ▶ p. 47 Thorough management of security export control
 <ul style="list-style-type: none"> Taikan Program (an experience-based safety education program) ▶ p. 44 Promotion of health management programs for employees ▶ p. 51 Enhanced measures to support the work-life balance, such as for the leave system and life support ▶ p. 49 	 <ul style="list-style-type: none"> Eco solutions to transfer and spread environmental, energy-saving technologies to emerging markets ▶ p. 31 Japan-India and Japan-ASEAN regular exchanges among public and private steel-related parties ▶ p. 30 Support for human resources development to build an energy management system in emerging countries

PICKUP2019

1 Received the 2019 Steel Sustainability Champion Award (June 2020)

from the World Steel Association for comprehensive evaluation of sustainability-related actions

Nippon Steel's comprehensive sustainability-related actions, including actions based on strong commitment to the environment, measurement and disclosure of diverse data based on the company's environmental policy, and sending of information to stakeholders via a sustainability report, were highly recognized.



2 Received the EcoPro Award and Ichimura Prize in Industry against Global Warming (September 2019 and March 2020)

for the Vivary™ Unit, a marine fertilizer made of steel slag

Nippon Steel developed and commercialized technology to help curb global warming through 1) provision of diverse ecological services and 2) absorption and fixation of CO₂ in the "Blue Carbon" ecosystem by a marine fertilizer Vivary™ Unit.



3 The 16th LCA Japan Forum Award (Encouragement Award) (January 2020)

for the promotion of the LCA approach and thinking of environmental impact over the entire life cycle

Nippon Steel is undertaking various initiatives, including production and website disclosure of an LCA-related video, donation of a cartoon "Secret of Steel" to elementary schools and libraries across Japan, and distribution of a workbook on steel as a novelty souvenir of a plant visit, with the aim of conveying to people of all generations the importance of thinking that spans the product life cycle, and to present steel as an eco-friendly, sustainable product.



4 Introduction of a telework program (November 2019)

Toward the realization of a healthy, efficient, and creative workstyle

We are promoting diversity & inclusion and striving to become a vital empowered company. As a part of initiatives in Workstyle Innovation, we have introduced a telework program to fully utilize optimized work time and to allow all employees to use their full capacity.



5 Biggest Adoption of designing titanium TranTixxii™ (March 2020)

for roofing tiles of Pure Land Buddhism Temple Zojo-ji Daiden (Great Hall)

Use of Nippon Steel's inhouse-designed titanium TranTixxii™ for roof tiles helps enhance quake-resistance due to its light weight. Further, the tiles retain their pleasant appearance throughout their product life due to their high corrosion resistance.



6 Proposal on efficient recycling of waste plastics (February 2019)

With the aim of contributing to forming a circular economy through material recycling and reduction in energy consumption and CO₂ emissions, Nippon Steel's steelworks have installed pre-treatment equipment (non-plastic sorter, crusher, volume reduction molding machine, etc.) and an injection machine for a coke oven, and have been recycling waste plastic containers and packaging in a coke oven since 2000.



Nippon Steel's ESG Materiality

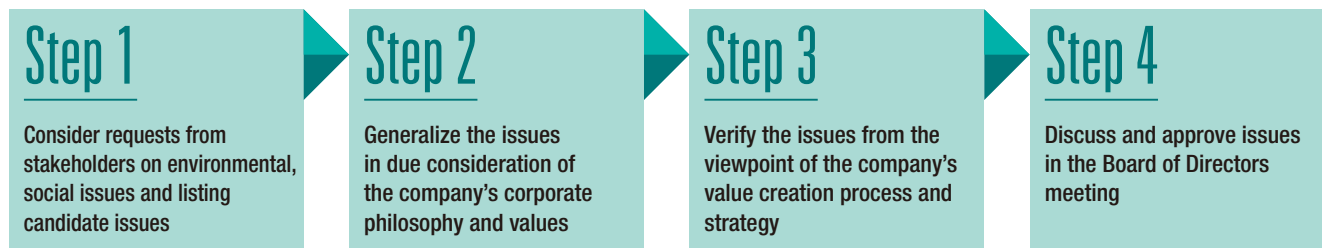
Nippon Steel recognizes that ESG initiatives are one of the priority issues and form the base that supports the very existence and growth of the company. Among these initiatives we have identified our materiality in due consideration of requests from stakeholders, the corporate philosophy and values, as well as growth strategy.

We express our ESG materiality in and out of the company, steadily promote its execution and follow-up by checking the Key Performance Indicators (KPI) to assess outcome, and strive to contribute to sustainable social development, as well as maintenance and improvement of our corporate value.

Materiality KPIs and status of major initiatives

Materiality		Key Performance Indicator (KPI)	
1. Safety, environment, and disaster prevention			
(1) Safety and health		<ul style="list-style-type: none"> • Accident frequency rate of 0.10 or less • Zero fatal accident 	
(2) Environment	1) Promotion of countermeasures to prevent global warming	<ul style="list-style-type: none"> • Three ecos to reduce CO₂ emissions 	<ul style="list-style-type: none"> • JISF's Commitment to a Low-Carbon Society's CO₂ emission reduction target (down 3mn tons-CO₂ from Business As Usual (BAU) in FY2020 vs. 2005)
		<ul style="list-style-type: none"> • Implementation of "Eco Process" 	<ul style="list-style-type: none"> • Maintaining high-level effective use of energy • Promotion of adopting advanced energy-saving technology
		<ul style="list-style-type: none"> • Enhancement of "Eco Products" 	<ul style="list-style-type: none"> • Supply of high-performance steel products to help reduce CO₂ emissions through use of their end products
	2) Contribution to construction of a circular economy	<ul style="list-style-type: none"> • Contribute with "Eco Solutions" 	<ul style="list-style-type: none"> • Transfer and dissemination of the world-leading energy-saving technology to help CO₂ emission reduction globally
		<ul style="list-style-type: none"> • Realization of zero emissions within the company • Recycling of waste generated in society 	<ul style="list-style-type: none"> • Reduction in final disposal amount (down 70% vs. FY2000; less than 273,000 tons/year in FY2020, including former Nippon Steel Nisshin) • Contribution to constructing of a recycle system of plastic containers and packaging
	3) Promotion of environmental risk management	<ul style="list-style-type: none"> • Air environment preservation 	<ul style="list-style-type: none"> • NO_x and SO_x; Keep low-level emissions • Maintaining of lower discharge levels than voluntary targets in chemical substances VOC (volatile organic compounds): 1,106 tons/year (down 30% vs. FY2000, including former Nippon Steel Nisshin) Benzene: 172 tons/year (voluntary target, along with the government target, including former Nippon Steel Nisshin)
<ul style="list-style-type: none"> • Water environment preservation 		<ul style="list-style-type: none"> • Recycling of water; high-level stable use of recycled water 	
(3) Disaster prevention	1) Elimination of disaster risks and group-wide sharing of effective measures	<ul style="list-style-type: none"> • Zero serious disaster-related accident 	
2. Quality			
(1) Quality control and guarantee		<ul style="list-style-type: none"> • Systemization and automation aimed at more credibility in testing and inspection 	
(2) R&D and intellectual property management		<ul style="list-style-type: none"> • Strategic R&D, aimed at sustainable growth • Protection and use of intellectual property 	
(3) Solution that result in customer satisfaction		<ul style="list-style-type: none"> • Number of awards from customers, government, and institutions 	
3. Production			
(1) Stable production and supply		<ul style="list-style-type: none"> • Initiatives for more stable production and supply (hardware and software) 	
4. Securing and fostering of personnel			
(1) Respect for human rights, diversity & inclusion		<ul style="list-style-type: none"> • Number of women as managers (2x by 2020 and 3x by 2025 vs. 2014) • Number of women appointed in managerial positions (assistant managers and above) [of which non-union members]: 48 [21] in 2014 → 96 [42] in 2020 → 144 [63] in 2025 	
(2) Utilization and fostering of personnel		<ul style="list-style-type: none"> • Promotion of measures to develop human resources 	
(3) Health enhancement		<ul style="list-style-type: none"> • Enhancement of health promotion measures for wellness of employees, and encouragement of employees' own efforts for wellness improvement 	
5. Harmony with local communities and society			
(1) Environmental preservation/creation activities in communities		<ul style="list-style-type: none"> • Green space development to contribute to the local environment 	
(2) Activities mainly in the support of education, sports, and arts		<ul style="list-style-type: none"> • Ongoing promotion of hosting plant visits • Continual execution of corporate philanthropy in the support of music via Nippon Steel Arts Foundation 	
6. Corporate value enhancement and profit distribution			
(1) Securing of profit and enhancement of corporate value		<ul style="list-style-type: none"> • ROS of 10% (2020 Mid-Term Management Plan) • ROE of 10% (2020 Mid-Term Management Plan) 	
(2) Profit distribution	1) Payment of salary to employees of the company and related/subcontracting companies	<ul style="list-style-type: none"> • Bonus payment amount • Revised amount of salary 	
	2) Appropriate tax payment	<ul style="list-style-type: none"> • Tax payment (consol.) 	
	3) Dividend payment to shareholders	<ul style="list-style-type: none"> • Dividend payment according to the dividend policy of about 30% in consolidated payout ratio (2020 Mid-Term Management Plan) 	
Thorough implementation of compliance			
Adhering to laws and regulations as a base of all activities			

Process to identify materiality



Major Initiatives and Achievements in FY2019		Page
<ul style="list-style-type: none"> Prevention and risk reduction of accidents, based on safety risk evaluation 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) Acquisition of ISO45001 for management systems of occupational health and safety (OH&S) to enhance safety level 	<ul style="list-style-type: none"> Accident frequency rate: 0.09 Number of fatal accidents: 3 	p. 44
<ul style="list-style-type: none"> Promotion of Eco Process (enhancement of energy efficiency) 	<ul style="list-style-type: none"> Down 2.21mn tons-CO₂ from BAU* (JISF result in FY2018) 	p. 22
<ul style="list-style-type: none"> Effective use of byproduct gas (coke oven gas, blast furnace gas etc.) and waste gas 	<ul style="list-style-type: none"> Use of byproduct gas: 100% Use of waste gas in steam generation: 83% In-house generated energy use in in-house power generation: 81% 	pp. 20–21
<ul style="list-style-type: none"> Adoption of high-efficiency power generation equipment and oxygen plant; regeneration burner in reheating furnace 	<ul style="list-style-type: none"> Investment cost for energy-saving: ¥5.2bn 	p. 19
<ul style="list-style-type: none"> Acquisition of the EcoLeaf Environmental Label for ten H-shaped steel products, including the newly-launched Mega NS Hyper Beam™ Proposal of a next-generation vehicle structure concept, "NSafe™-AutoConcept" Development of the CLEANWELL™ DRY ST, which further enhanced the strength and anti-corrosion properties of OCTG fastening screw joints 		pp. 27, 29
<ul style="list-style-type: none"> Growing cumulative CDQ delivery record by Nippon Steel Engineering in the group 	<ul style="list-style-type: none"> 106 CDQ cumulative units (contributing to 20.74mn tons-CO₂ reduction, FY2018) 	pp. 30–31
<ul style="list-style-type: none"> Promotion of recycling of byproducts (slag, dust, sludge, etc.) in and out of the company 	<ul style="list-style-type: none"> Final waste disposal: 289,000 tons 	p. 36
<ul style="list-style-type: none"> Aggressive promotion of recycling treatment, according to the Chemical Recycling Act 	<ul style="list-style-type: none"> Packaging/container plastic waste treatment: 210,000 tons (equivalent to 32% of Japan's total plastic waste) 	p. 37
<ul style="list-style-type: none"> Installation of equipment that reduces SO_x and NO_x emissions; shifting to low-sulfur fuel; adoption of low NO_x regenerating burners 	<ul style="list-style-type: none"> SO_x: 14mn Nm³ NO_x: 27mn Nm³ 	p. 38
<ul style="list-style-type: none"> Continual efforts based on the voluntary reduction plan 	<ul style="list-style-type: none"> VOC: 639 tons Benzene: 88 tons 	p. 40
<ul style="list-style-type: none"> Water treatment, recycling and reuse of freshwater used by the company 	<ul style="list-style-type: none"> Use of recycled water: app. 90% 	p. 38
<ul style="list-style-type: none"> Prevention of recurrence via corporate-wide implementation of measures against risks emerged from the accidents Risk assessment to detect new disaster risks; execution of measures from hard/soft aspects to reduce risk and control residual risk Self-monitoring (auditing) by those in charge of disaster prevention in steelworks; and management by the head office management through interviews 	<ul style="list-style-type: none"> Serious disaster-related accidents: 0 	p. 45
<ul style="list-style-type: none"> Automatic input of inspection results from testing/analytical devices and measurement devices 		pp. 45–46
<ul style="list-style-type: none"> Creation of the Digital Innovation Division as a planning division to tackle company-wide issues of utilization of information telecommunication technologies (ICT) (April 2020) The eighth consecutive year of being named as one of the world's most innovative companies in the Top 100 Global Innovator 2020; award in intellectual property and patent areas 	<ul style="list-style-type: none"> R&D expenditures: ¥77.6bn (consolidated) Number of patents: app. 36,000 (15,000 in Japan and 21,000 overseas) 	Integrated Report pp. 25–28
<ul style="list-style-type: none"> The 66th Okochi Memorial Production Prize; the 52nd Ichimura Prize in Industry for Distinguished Achievement and in Industry against Global Warming for Distinguished Achievement; 2019 Minister of MEXT Award (Prize for Science and Technology, Development Division); the 8th Monodzukuri Nippon Grand Award (METI Minister's Prize and Excellence Prize), etc. 	<ul style="list-style-type: none"> Number of awards from customers, government, and institutions: 15 	pp. 13, 57
<ul style="list-style-type: none"> Start of operation of a leading-edge continuous casting facility in the Kyushu Works; coke oven refurbishment in the East Nippon Works Kimitsu Area and the Muroran Works Standardization of operational skills of veteran workers and active use of experts 		pp. 46–47
Details in the section "Initiatives for Human Resources Development"	<ul style="list-style-type: none"> Number of women appointed in managerial positions (assistant managers and above) [of which non-union members]: 123 [39] in 2020 Ratio of women in hired staff: 34% in staff, 14% in operation and maintenance, and 20% in overall hired staff (average of FY2018-2020) Hours of training and education: 1.54 million hours/year (57 hours/person, year) 	pp. 48–49 p. 50
<ul style="list-style-type: none"> Review of subject age and frequency for each type of cancer test, aimed at early cancer detection and a higher response rate to cancer test 	—	p. 51
<ul style="list-style-type: none"> Tree planting activities by new employees in steelworks Funding for green space development and maintenance 	<ul style="list-style-type: none"> Greenery space: 830ha Expenses for green space development and maintenance: ¥2.9bn 	pp. 42–43 p. 19
<ul style="list-style-type: none"> Proactively accepting plant visits by shareholders, investors, and junior high/elementary school students 	<ul style="list-style-type: none"> Number of plant visitors: app. 130,000 	p. 52
<ul style="list-style-type: none"> Support of music activities via presentation of Nippon Steel Music Awards and operation of the Kioi Hall 		p. 53
Refer to the sections "Financial Capital" and "Financial Results and Outlook" of the Integrated Report for further information	<ul style="list-style-type: none"> ROS of 1.3% (4.8% in case including impairment loss, etc.) ROE of -14.7% Base bonus amount: ¥1.00mn Salary revision: ¥3,700 (¥0 in wage revision + ¥3,700 in periodic wage increase) Tax payment (consol.): ¥92.5bn Dividend per share: ¥10/year 	Integrated Report pp. 31–34 pp. 55–60 Fact Book p. 54
Details in the section "Corporate Governance" in the Integrated Report		Integrated Report pp. 85–98

Nippon Steel's Environmental Management

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.

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

Three ecos and innovative technology development to contribute to SDGs

Nippon Steel is promoting environmental management centered around four pillars of the three ecos and the company's innovative technology development, as stipulated in the Basic Environmental Policy. We have developed the 2020 Mid-Term Environmental Management Plan for the three years from FY2018 and have been working on responses to diverse environmental challenges in five main areas. We believe promotion of these initiatives also contributes to achieving Sustainable Development Goals (SDGs). Going forward, from the perspective of SDGs, we will keep identifying and working on issues for which we can contribute through our business.

Three ecos and innovative technology development

	<p>ECO PROCESS The way we manufacture is “eco-friendly”</p> <p>Nippon Steel uses world-leading resources and world-leading energy efficiency to manufacture steel products and aims to develop eco-friendly steelmaking processes by further improving efficiency.</p>		<p>ECO SOLUTION Sharing our “eco-solutions”</p> <p>We contribute to the reduction of CO₂ emissions and other environmental impact on a global scale by diffusing our Group's world-class environmental and energy-saving technologies in Japan and overseas.</p>
	<p>ECO PRODUCTS What we produce is “eco-friendly”</p> <p>We produce and offer eco-friendly “products” using our world-leading technological capabilities, thus conserving resources and energy and thereby contributing towards building a sustainable society.</p>		<p>Innovative Technology Development</p> <p>Based on the objective of offering to society technologies and products that contribute to the saving of resources and energy and the reduction in environmental impact, we are developing innovative advanced technologies from a medium- to long-term perspective.</p>

2020 Mid-Term Environmental Management Plan

Under the Basic Environmental Policy, we have developed a mid-term environmental management plan for three years from FY2018 to FY2020 and are tackling many environmental challenges accordingly.

Environmental management system

- Enhance the environmental administrative system (i.e., environmental audits, plant audits)
- Conduct environmental management in coordination with group companies
- Promote standardization in manufacturing
- Promote environmental education for employees (i.e., improved environmental education tools)

Creation of a recycling-based society

- Expand effective use of in-house generated resources; promote zero emission
- Promote recycling of outside waste (waste plastics and waste tires)

Environmental relationship activities

- Communicate actively with stakeholders on environmental issues
- Appropriate, timely disclosure of environmental information, so as to be continually trusted by society
- Secure bio-diversity and work for harmony with nature
- Provide opportunities to study the environment to people outside the company (i.e., sending lecturers)

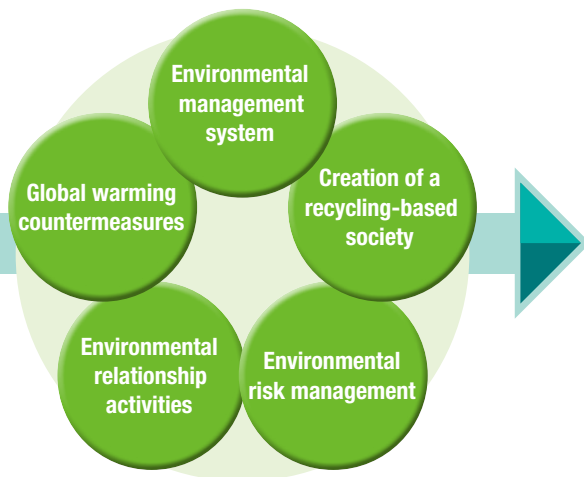
Measures against climate change problems

- Promote the Initiatives for Achieving a Low Carbon Society
- Promote next-generation technology development
- Promote international alliances based on the policies and activities of the Japan Iron and Steel Federation
- Consider to set up long-term targets

Environmental risk management

- Promote companywide discussion on environmental risk issues
- Respond to new environmental regulations

2020 Mid-Term Environmental Management Plan



Sustainable Development Goals (SDGs)



Raising challenges from the viewpoint of SDGs

Promotion and Enhancement of Environmental Management

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.

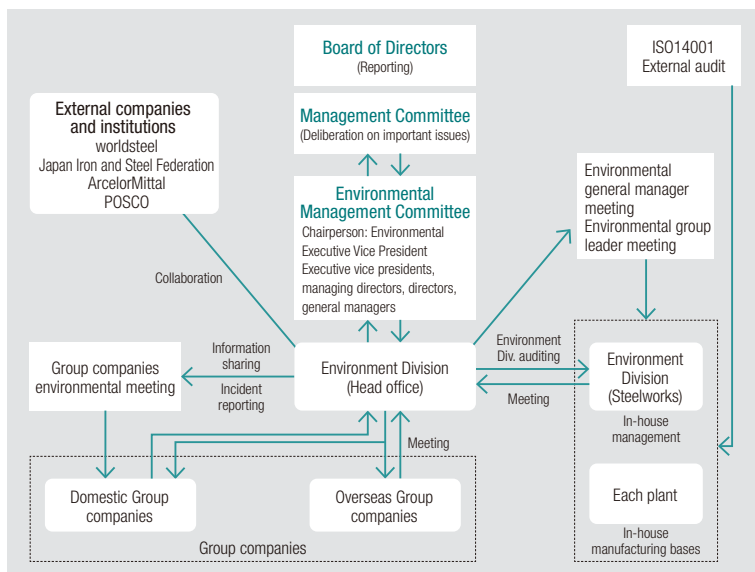
Environmental management structure

Nippon Steel routinely follows the management cycle of PDCA, primarily through the work of the Environmental Management Committee, which is held twice a year, to promote improvement of management. Positioning environmental risks as management issues, we have deployed a procedure 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.

* The Environmental Management Committee consists of four Executive Vice President in charge of Corporate Planning, General Administration, Legal, Human Resources, Environment, Technical Administration & Planning, Plant Engineering and Facility Management, Energy Technology, Research and Development, and Global Business; one Managing Director; one Managing Executive Officer; 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, periodic 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)

Environmental conference participated in by group companies

From the group companies in Japan, Nippon Steel has identified 59 companies (as of April 2020) 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.

Environmental preservation costs

For FY2019, capital expenditures for environmental preservation amounted to 13.9 billion yen in total, or approximately 5% of the company's capital expenditures. Investment in equipment for environmental measures of 11.7 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 2.2 billion yen comprises measures to improve the efficiency of reheating furnaces as well as overall energy-saving measures in each manufacturing process.

Environmental preservation costs totaled 99.6 billion yen, including 46.9 billion yen in air pollution prevention costs, 14.6 billion yen in water pollution prevention costs, 3.0 billion yen in energy-saving measures, and 11.5 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 22; water consumption volume, on page 38; and various resources spent, on page 20. For atmospheric substances, SO_x and NO_x 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.

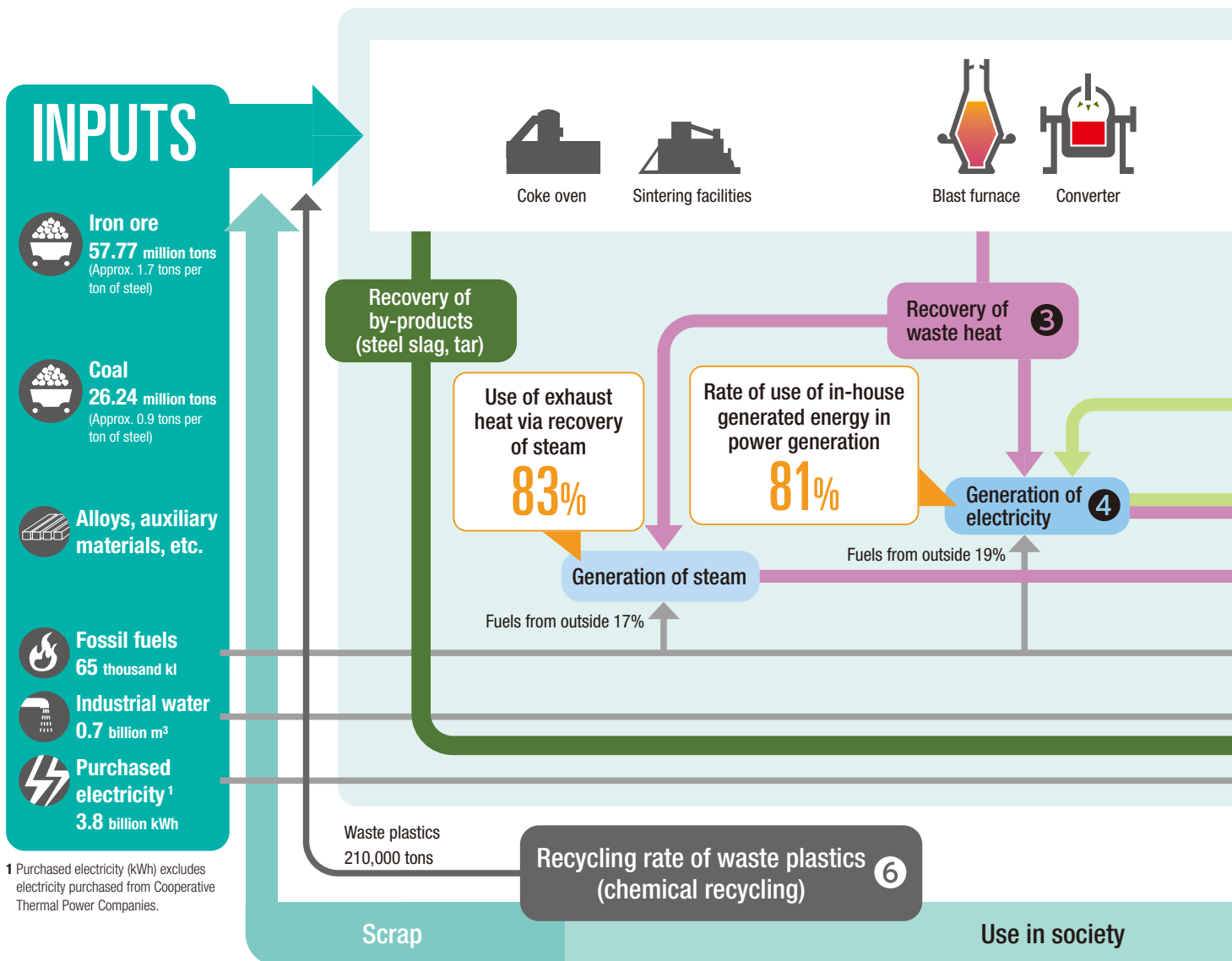
Environmental preservation costs

(¥ billion)

Item	Definition	FY2019		
		Capital investment	Expense	Total
Pollution Prevention Costs	Countermeasures against air pollution	9.8	46.9	11.7
	Countermeasures against water pollution	1.8	14.6	
Global Warming Prevention Costs	Energy saving measures	2.2	3.0	
Costs of Recycling Resources	Treatment of by-products and industrial waste	—	11.1	
	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	—	1.5	
	Personnel expenditures related to environmental measures	—	2.8	
Research and Development Costs	Development of Eco Products	—	5.8	11.5
	Development of products which have low environmental impact during manufacture	—	5.7	
Social Activity Costs	Creating green areas at steelworks	—	2.9	3.0
	Supporting environmental organizations, and advertising	—	0.1	
Other Environmental Costs	SO _x levy	—	4.6	
Total		13.9	99.6	
Reference: Net income (consolidated basis)		-431.5		

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.



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.

▶ p. 38

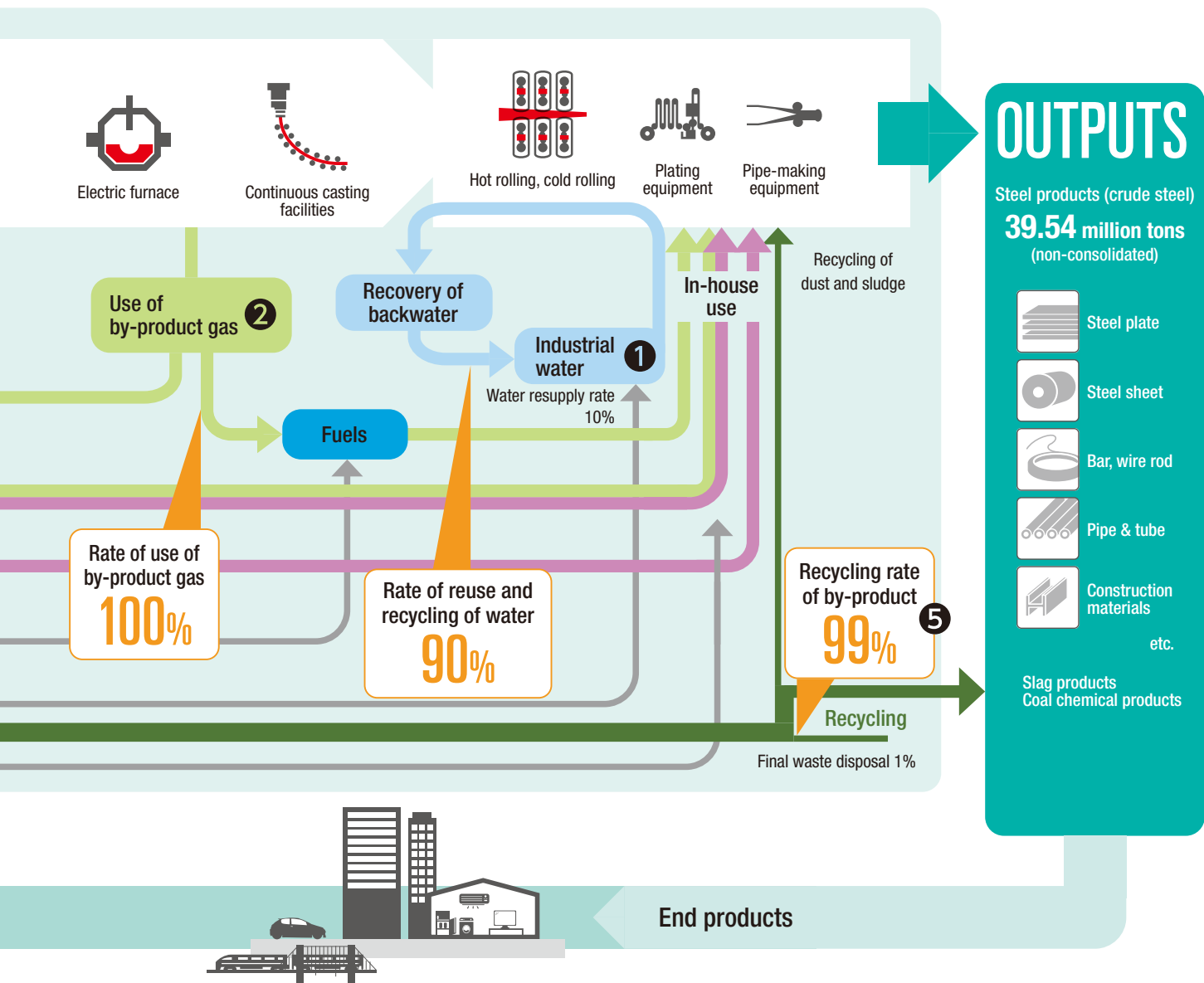
② By-product gas

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.

③ Use of exhaust heat

Exhaust heat, generated in the blast furnaces, incineration facilities, coke ovens, converters, and other facilities, is recovered and used in steam generation and power generation.

Numbers represent FY2019 performance



④ Electricity

Nippon Steel itself generates 89% of the electricity it uses at steelworks, 81% of which is from internally generated energy sources such as exhaust heat and by-product gases. As much as 37% of the generated electricity is provided to local communities via electric power companies.

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.

▶ p. 37

⑥ Recycling of waste plastics

Nippon Steel recycles 100% of plastic containers and packaging used and collected from households, using a coke oven and a chemical recycling method. We are in alliance with local governments across Japan and handle about 200,000 tons per year, equivalent to roughly 30% of waste plastics collected all over Japan.

▶ p. 37

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. In order to make our operation sustainable, we strive to curb impacts of climate change by promoting energy conservation, CO₂ emission reduction, and improvement in energy efficiency throughout the entire supply chain, from manufacturing to transportation, and at the stage of final use of products.

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 steel-making 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; conversion to regenerative burners in reheating furnace. As a result of these continual efforts, the Nippon Steel Group consumed 1,089 petajoules (PJ) of energy in fiscal 2019, down about 13% vs. the volume in fiscal 1990. CO₂ emissions intensity increased from the previous year to 2.06 t-CO₂/ton in fiscal 2019 as production output declined partly due to COVID-19, however CO₂ emission dropped by about 12% relative to fiscal 1990 to 94 million tons (preliminary).³

As a core member of the Japan Iron and Steel Federation (JISF), we are actively involved in the JISF's Action Plans for a Low-Carbon Society by promoting our "three ecos" and further CO₂ emission reduction.

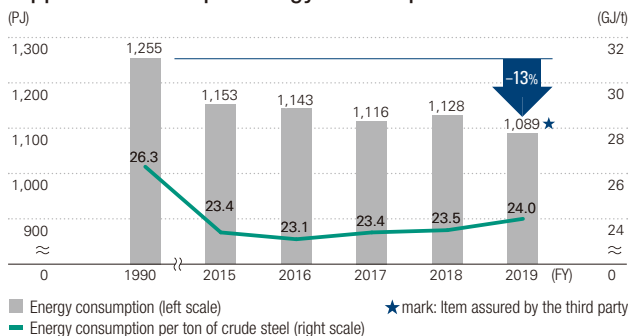
Japan Iron and Steel Federation's Action Plans for a Low-Carbon Society ("Three ecos and innovative technology development")

	Eco Process	Eco Products	Eco Solution
CO ₂ emission reduction plans	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
FY2018 results	2.21 million t-CO ₂	31.06 million t-CO ₂	65.53 million t-CO ₂
Phase I FY2020	3 million t-CO ₂ + α ^{1,2}	34 million t-CO ₂	70 million t-CO ₂
Phase II FY2030	9 million t-CO ₂ ¹	42 million t-CO ₂	80 million t-CO ₂

¹ The target reductions in CO₂ emission volume are set for FY2005 as the base year and based on a certain crude steel production assumption.

² The primary focus is on a 3 million ton reduction in CO₂ 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 FY2005 is counted as the amount of reduction in emissions.

Nippon Steel Group's energy consumption



[Calculation method]

Based on the Action Plans for a Low-Carbon Society

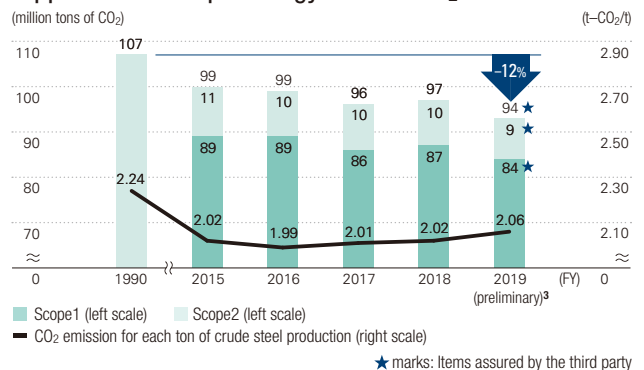
[Conversion factor]

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 Steel⁴, associated EAF mills (Osaka Steel, Sanyo Special Steel, Nippon Steel Stainless Steel, Oji Steel, and Tokai Special Steel), Nippon Coke & Engineering and three Sanso Center companies⁵

Nippon Steel Group's energy-derived CO₂ emissions⁶



³ Preliminary figure: The amount of CO₂ per unit of purchased electricity from a General Electricity Utility in fiscal 2019 is assumed to be the same amount as in fiscal 2018.

⁴ Excluding energy consumption and CO₂ emission associated with the IPP operation by the steelworks

⁵ For these four companies, equivalent energy consumption required to manufacture materials purchased by the Nippon Steel Group is included.

⁶ CO₂ emissions associated with the use of electricity purchased from Cooperative Thermal Power Companies are included in Scope 2 from fiscal 2019. Accordingly, past figures are retroactively revised.

Contributing with eco-friendly products (Eco Products)

Nippon Steel has expertise in high-function steel products that help customers save energy when using final products made of materials supplied by Nippon Steel. Eco Products are numerous and include high-tensile steel and electromagnetic steel sheets. Making these high-function products emits a little more in CO₂ but use of these materials contributes to significantly higher emission reduction when used in final products.

Contribution in the global value chain (Eco Solution)

Japanese steel industry's energy-saving technologies are spreading globally, contributing to worldwide CO₂ emission reduction. In particular, Nippon Steel Engineering in our Group has transferred technology of its Coke Dry Quenching (CDQ) facilities, which had the result of reducing CO₂ emission in FY2018 by 20.74 million tons.

Promotion of innovative technology development

Nippon Steel's R&D divisions are engaged in R&D aimed at CO₂ emission reduction and recycling and fixation of CO₂ as top-down projects. As a core member of the JISF, we also participate in the COURSE50 project — “Environmentally Harmonized Steelmaking Process Technology Development” — which aims at reducing CO₂ emissions from a blast furnace by converting a part of reduction by carbon in the furnace to reduction by hydrogen. Moreover, we are taking up the challenge of developing hydrogen reduction steelmaking technology, which enables zero CO₂ emission during steelmaking; we are doing so by participating in the public-private cooperation project for technology development to realize zero-carbon steel.

We are also actively engaged in development of technology to fixate and utilize CO₂ such as by converting recycled CO₂ to use as raw materials of plastics or fuels, and to extend sea forest development that

uses slag and further develop Blue Carbon technology that is effective in absorbing CO₂. Many of these diverse innovations toward a decarbonized society are registered in “Challenge Zero,” an initiative of the Nippon Keidanren (Japan Business Federation). ▶ p. 34

Development of technologies specific to iron & steel sector

		2010	2020	2030	2040	2050	2100
COURSE50	H2 reduction ironmaking in BF (internal H2)		R&D	Introduction			
Super COURSE50	H2 reduction ironmaking in BF (external H2)			R&D	Introduction		
H2 reduction ironmaking	H2 reduction ironmaking without using BF			R&D	Introduction		
CCU	Utilization of CO ₂ from steel plant			R&D	Introduction		
CCS	Recovery of CO ₂ from BF gas, etc.		R&D	Introduction			

Prepared by Nippon Steel based on the JISF's Long-Term Vision for Climate Change Mitigation

Setting of individual companies' goals on CO₂ emission reduction

Amid the intensifying awareness on the climate change issues worldwide, Nippon Steel has established a “Zero Carbon Steel Committee,” attended by all five Executive Vice Presidents. The committee began discussion on subjects, such as individual companies' scenarios (targets for

2030 and 2050 vision) toward a decarbonized society and R&D related to low CO₂ emission technologies. We plan to disclose individual companies' specific scenarios within the current fiscal year.

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.

Work to achieve CO₂ emission reduction by raising efficiency in logistics

Nippon Steel maintains a high modal shift rate⁷ of 96.6%, improves transportation efficiency by using large vessels (changing from 700-ton vessels to 1,500-ton vessels) in domestic coastal transport and taking other measures, and improve fuel economy by introducing energy-saving tires, lightweight vehicles, etc. As a new measure, we introduced “Utashima” - a hybrid-type cargo vessel, equipped with lithium-ion batteries. The Utashima was awarded the Small Cargo Vessel Award of the Ship of the Year 2019⁸ for realizing energy saving, low vibration, low noise, reduction in labor burden, and improved living quarter for crew members.



Logistics sector's ton-kilometer achievements for FY2019⁹

	Transportation quantity: 10,000 tons/year		Million ton-kilometers/year		g-CO ₂ / ton-kilometers
Ship	1,814	(54%)	12,827	(91%)	21
Railway	6	(0%)	41	(0%)	22
Truck and trailer	1,530	(46%)	1,233	(9%)	103
Total	3,350	(100%)	14,101	(100%)	

⁷ 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.

⁸ Award by the Japan Society of Naval Architects and Ocean Engineers

⁹ Ton-kilometer: Total sum of the weight of load (ton) transported multiplied by transport distance (km). The reference amounts (in grams) of CO₂ emissions per ton-kilometer travelled are the average for all industries (Ministry of Land, Infrastructure, Transport and Tourism)

CO₂ emissions in the value chain

★ mark: Item assured by the third party

In addition to CO₂ emissions originated from energy source and generated in Nippon Steel's manufacturing process (Scope 1¹ and Scope 2²), CO₂ emissions in the value chain (Scope 3³) are also calculated by using the Green Value Chain Platform of the Ministry of the Environment and other methods.

Category		CO ₂ emissions (thousand tons-CO ₂)	Calculation method ⁴
1	Purchased goods and services	13,834 ★	[Amount purchased of procured iron ore and coal ⁵] X [Emission factor]
2	Capital goods	1,656	[Amount of capital expenditures] X [Emission factor]
3	Fuel and energy related activities not included in Scope 1 or 2	305	[Amount of electric power procured and fuel used] X [Emission factor]
4	Transportation and delivery (upstream)	683	[Transportation distance reported in the Energy Saving Law document] X [Emission factor]
5	Waste generated in operations	5	[Amount of waste] X [Emission factor]
6	Business travel	4	[Number of employees] X [Emission factor]
7	Employee commuting	13	[Number of employees] X [Emission factor]
15	Investments	1,119	[Emissions by subsidiaries and affiliates that emit GHG of over 10,000 tons] X [Equity stake of each company]

[Boundary of data collection] Nippon Steel

1 Scope 1: Direct emissions from owned sources associated with use of fuel

2 Scope 2: Indirect emissions from the generation of purchased energy

3 Scope 3: All indirect emissions (not included in scope 2) that occur in the value chain of the reporting company

4 Source of emission factors: the Ministry of the Environment's emissions unit value database for accounting of greenhouse gas emissions throughout the Supply Chain (ver. 3.0)

5 CO₂ emission associated with the purchased coking coal is calculated by using wet weight

Other initiatives (use of by-products and waste in CO₂ reduction)

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 CO₂ a year. ▶ pp. 13, 37

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 320kg in CO₂ emission per one ton of cement (over 40% reduction compared to ordinary cement production). ▶ p. 36

Blue carbon

A basic research project was launched on the impact of the carbon capture and storage by using steel slag in Nippon Steel's initiatives to create sea forests. Our unique marine simulator (sea laboratory) is used for this.

▶ pp. 13, 33, 42

Blue Carbon Initiatives

COLUMN

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 (CO₂ absorption and fixation in the marine ecosystem), which is getting more attention as a global warming measure. We started to collect basic data on how much CO₂ can be fixated by using steel slag and creating shallow bottoms, tideland, and seaweed beds. A massive amount of data collection is required as there are many research challenges concerning the evaluation method of carbon fixation capacity in the blue carbon ecosystem, including understanding of the biomass amount, the ratio of the amount to be fixated for a long time without being dissolved, and the dynamic of carbon in the complicated coastal ecosystem. Those challenges stem from the fact that types of species and geographical differences substantially vary in the marine ecosystem.

Nippon Steel's approach is to use our own large water tank (sea laboratory), collect potential data of carbon fixation by type of species (i.e., kelp seaweed bed, sargassum bed, and eelgrass bed) and by area, and establish an evaluation method. By doing so, we can launch a large-scale experimental project aimed at social implementation of blue carbon. Such is how we intend to contribute to creation of a blue carbon system with the sea area utilization technology that uses steel slag.

Our initiatives to improve the marine environment by use of steel slag is expected to be effective as a climate change measure that fixates CO₂, in addition to contribute to the preservation of biodiversity and the protection of the bounty of the sea.



Large water tank Sea Laboratory

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
[Governance] Disclose the organization's governance related to climate-related risks and opportunities.	
a) Describe the board's oversight of climate-related risks and opportunities.	p. 18
b) Describe management's role in assessing and managing climate-related risks and opportunities.	p. 18
[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.	
a) Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term.	p. 26
b) Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.	p. 26
c) Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.	p. 26
[Risk Management] Disclose how the organization identifies, assesses, and manages climate-related risks.	
a) Describe the organization's processes for identifying and assessing climate-related risks	p. 18
b) Describe the organization's processes for managing climate-related risks.	p. 18
c) Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management.	p. 18
[Metrics and Targets] Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material.	
a) Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process.	pp. 14–15
b) Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.	pp. 22, 24
c) Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.	pp. 14–15

Scenario analysis

- Medium- to long-term growth in global steel demand is projected (from 1.62 billion tons in 2015 to 2.68 billion tons in 2050), 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. In contrast, as generation of end-of-life scrap increases in proportion to an increase in steel stock, use of scrap will increase in steelmaking (from 0.56 billion tons in 2015 to 1.55 billion tons in 2050). This increase is not enough to satisfy the entire steel demand. It is therefore indispensable to make steel from natural resources. Pig iron production in the blast furnace route is also 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 CO₂ emissions; (2) changing trends of steel users, including the automobile sector (i.e., increase in electric vehicles, shift to non-steel lightweight materials prompted by tightened environmental regulations); 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 analyzed two scenarios (2°C scenario and 4°C scenario⁶) for a long-term span to 2050, while referring to the transition scenario of the International Energy Agency (IEA), so as to utilize them for devising future business strategies.

⁶ The 2°C scenario is a case that much-needed measures will be implemented to keep global average temperature increase below 2°C compared to pre-Industrial Revolution era. The 4°C 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	Transition factor 1 Advance in electric vehicles (EVs); decline in powertrain-related steel demand	Estimates for 2050 ¹ EVs: 342mn units (17% of total) Internal combustion engine vehicles (ICEVs): 1656mn units (83%)	↑ Opportunities in demand growth of steel	<ul style="list-style-type: none"> ■ Potential decline in the ratio of powertrain-related steel demand, but potential increase in demand for the global cumulative number of vehicles (ICEVs incl. HVs, PHVs). ■ Increase in demand for high-performance steel for EVs. 	<ul style="list-style-type: none"> ■ 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).
	Transition factor 2 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.	↑ Opportunities in demand growth of high-strength steel; capturing demand for other materials	<ul style="list-style-type: none"> ■ Switch to other lightweight materials is possible but should not be significant as steel remains superior in environmental impact from the LCA viewpoint. ■ Increase in demand for high-strength steel, carbon fiber reinforced plastics (CFRP), titanium steel, etc. 	<ul style="list-style-type: none"> ■ Penetration of the LCA concept ■ Advance in strength of high-strength steel and provision of total solutions (NSafe™-AutoConcept) to compete with other lightweight materials ■ Cooperation with Group companies (Nippon Steel Chemical & Material) to capture demand for CFRP, etc.
	Transition factor 3 Shift to the electric arc furnace (EAF) route	Progress in shift from the blast furnace (BF) route to the EAF route, which has lower environmental impact in manufacturing	↑ Opportunities in demand growth for steel	<ul style="list-style-type: none"> ■ Increase in the ratio of use of scrap (25% to 47%²), 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 	<ul style="list-style-type: none"> ■ Penetration of the LCA concept (the same LCA-based evaluation including the recycling impact for steel products made by the BF route and by the EAF route) ■ Outstanding low-carbon operating technology to help capture the BF steel demand (promotion of innovative technology development including top-level energy efficiency; COURSE50 aimed at commercial application by 2030, CCJ, and hydrogen reduction steelmaking) ■ High-grade steel made by the EAF route by the Group companies to capture demand
	Transition factor 4 Increase in operating cost caused by adoption of carbon pricing	Adoption of carbon pricing	↓ Possibility of loss of competitiveness if an increase in cost cannot be passed on to product price	<ul style="list-style-type: none"> ■ Significant impact for steel being an international product if carbon pricing is adopted. 	<ul style="list-style-type: none"> ■ Hydrogen reduction steelmaking and use of scrap to reduce CO₂ emission ■ Carbon pricing impact to be alleviated by securing pricing advantages, realized by our higher value-added product strategy, based on our technological strength and solution proposals ■ Need to discuss with customers on passing cost increase on product price
	Transition factor 5 Heightened needs for products and solutions associated with a hydrogen-oriented society	Increase in demand for hydrogen-related infrastructure and facilities	↑ Opportunities in demand growth for products of the Group	<ul style="list-style-type: none"> ■ 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) 	<ul style="list-style-type: none"> ■ Enhancement of the Group's product menu and expanding sales in Japan and overseas
	Transition factor 6 Higher needs for energy-efficient products and technology in the world	Eco-friendly technology solution to boost demand	↑ Opportunities in demand growth for eco-friendly technology	<ul style="list-style-type: none"> ■ Profit growth, driven by our Group's long-proven technology solutions [Ex] Dissemination of CDQs, all of which are handled by Nippon Steel Engineering, into emerging countries 	<ul style="list-style-type: none"> ■ Expansion in provision of Eco Products in the world ■ Government-private cooperation; Technologies customized list; and steel plant diagnosis to provide energy-saving technologies to emerging countries (contribution to the global value chain)
4°C	Physical factor 1 Suspension of operation by raw material suppliers, due to abnormal weather	Difficulty to procure raw materials, caused by abnormal weather	↓ Limited impact by taking measures on risk of suspended operation by raw material suppliers	<ul style="list-style-type: none"> ■ Limited assumed risk in securing stable procurement of raw materials by taking the following measures, despite some possibility in temporary procurement cost increase caused by a deterioration in supply/demand balance <ul style="list-style-type: none"> • Material sourcing from multiple regions in the world • Keeping raw material inventories in steelworks and ships 	<ul style="list-style-type: none"> ■ Continual procurement from multiple sources ■ Appropriate days of inventory; risk management
	Physical factor 2 Suspension of operation and shipment, due to abnormal weather	Difficulty in operation, caused by a natural disaster	↓ Limited impact by taking appropriate measures	<ul style="list-style-type: none"> ■ BCP measures have been adopted. Limited risks in production disruption caused by natural disaster. Excessively abnormal weather may result in suspension of operation, etc. 	<ul style="list-style-type: none"> ■ 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.)
	Physical factor 3 Heightened needs for solutions for "National Resilience" against natural disasters	Natural disaster caused by abnormal weather	↑ Opportunities in demand growth of steel for national land resilience	<ul style="list-style-type: none"> ■ Profit growth by providing products and solutions for National Resilience against earthquakes, tsunamis, heavy rain, typhoons, etc. 	<ul style="list-style-type: none"> ■ Enhancement of the Group's product menu and expanding sales in Japan and overseas

¹ Source for EV-related data: IEA ETP2017

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

² 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 PICKUP

Transition factor 1

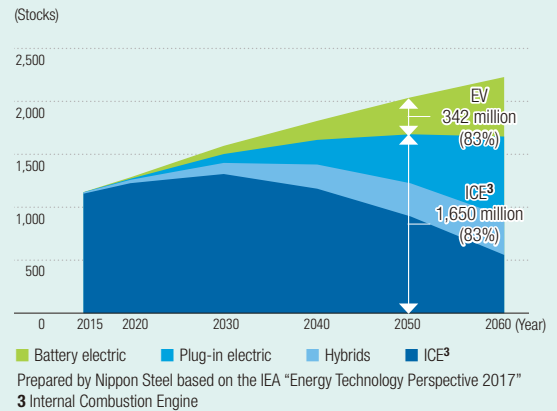
Response to advance in electric vehicles (EVs)

According to the International Energy Agency (IEA), the ratio of vehicles with an internal combustion engine 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 EVs is expected to increase demand for non-oriented electrical steel sheets for motors of hybrid vehicles and promote development of higher-grade ones. Due to such demand growth potential, we have decided to devote capital spending for electrical steel sheets in the Kyushu Works Yawata Area (approx. ¥46 billion investment, as announced on August 1, 2019) and the Setouchi Works Hirohata Area (approx. ¥14 billion investment, as announced on November 1, 2019).

Facing automakers' request for even higher efficiency in motors, so as to lengthen vehicle operation distance, we target in material development efforts to reduce iron loss by 10% compared to the current electrical steel sheets by 2025.

Global technology penetrations in LDV stock by 2DS 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 CO₂ 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 tsunamis

NS ECO-PILE™ method

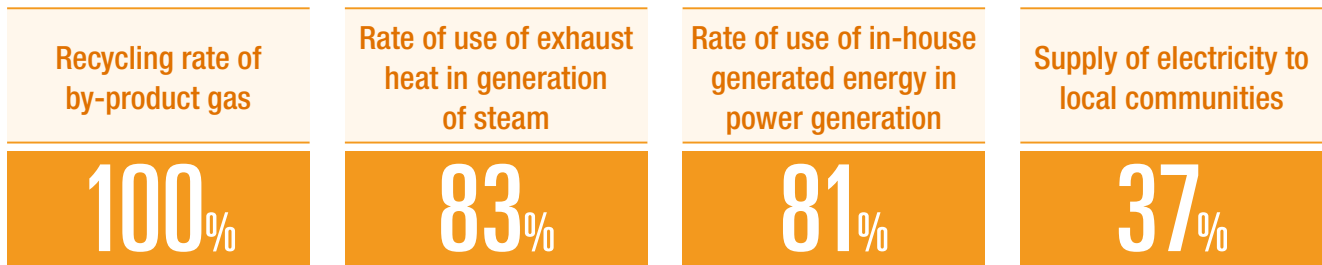


Construction with no waste soil, and high pull-out strength



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.



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

83% of steam used as various heat sources within steelworks is generated by exhaust heat, with no use of fuel.

In-house generated energy, such as exhaust heat and by-product gas, is used for 81% of in-house power generation.¹

Supply of self-generated electricity¹ to regions via electric power companies

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.

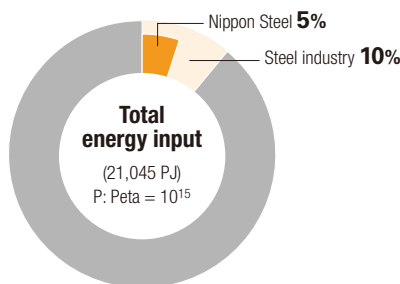
In addition, Nippon Steel itself generates 89% of the electricity it uses at steelworks, 81% of which is from internally generated energy

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 CO₂ emissions.

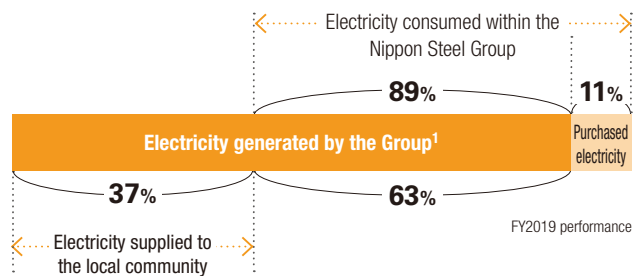
We are also engaged in the recycling of various types of by-products generated by society or other industries by utilizing our steelmaking processes that are carried out at high temperature and high pressure. In recent years, we have been actively recycling waste plastics and other waste materials. Reuse of these waste, which are traditionally landfilled or incinerated, as raw materials or energy in steelmaking processing is another way that we reduce CO₂ emissions.

Energy inputs

Nippon Steel's share in Japan's total energy input (FY2018)



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



Nippon Steel internally generates **89%** of the electricity it uses.

Nippon Steel supplies **37%** of internally-generated electricity to the local community.

¹ Including electricity purchased from cooperative thermal power companies

Blast furnaces are huge reactors, using coal

In the blast furnace, a chemical reaction called reduction, which removes oxygen from iron oxides, occurs, and the carbon in the coke functions as a reducing agent. Coal is not burned as a fuel but rather is the ingredient used to cause a chemical reaction.

We are engaged in R&D activities aimed at using hydrogen as a reducing agent partially replacing coal.

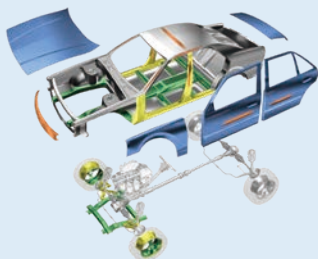


Kansai works No. 2 blast furnace



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 CO₂ emissions at the point of use at our customers, thereby contributing to lessening the environmental impact.



Enhanced strength and formability of steel sheets for automobiles

Achieving both vehicle safety and weight reduction (enhanced fuel efficiency)

High-tensile steel sheets for automobiles

Achieving both the strength and the formability, high-tensile, easy-to-form steel sheets contribute to vehicle body weight reduction and higher fuel performance as well as assurance of safety of the driver and passengers at the time of collision of a vehicle. We aim at developing and commercializing even higher-strength steel sheets.



Stainless steel for hydrogen infrastructure with enhanced strength and workability

Contributing to social dissemination of next-generation energy use

Photo by Iwatani Corporation

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.

Awards received from outside institutions in FY2019 [▶ p. 57](#)

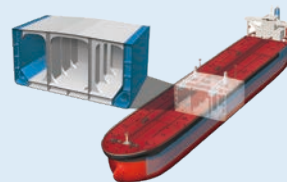


High-strength, lead-free steel product for bridge construction

Longer spanned bridges
Reduction in resource consumption

Ultra-high-tensile wires with low environmental impact

By using its proprietary process, Nippon Steel developed wire rod for bridge cable that is global top-class in strength (2,000MPa class) in order to respond to requirements for customers in bridge construction. By eliminating need for lead for this wire, consumption of resources during manufacturing is reduced.



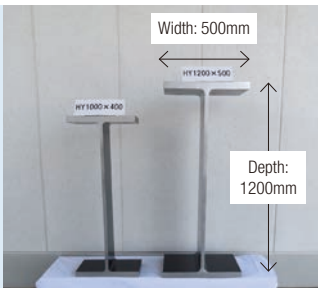
Enhanced impact-absorption performance of steel plates for shipbuilding

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 or stranding, 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 FY2019 [▶ p. 57](#)



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.



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 CO₂ 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.

Contribute to reduction of CO₂ emission on a worldwide scale

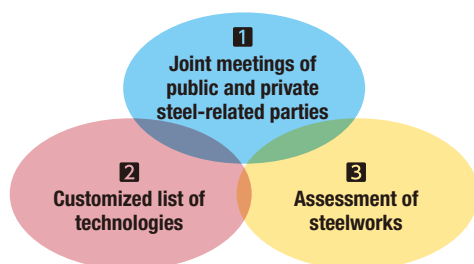
Japan’s steel industry, including Nippon Steel, plays a leading role in the Global Sectoral Approach¹, a worldwide initiative to preserve the environment and conserve energy based on technologies accumulated in the steelworking industry. Japan’s steel industry can contribute to reduction of CO₂ emission on a worldwide scale by transferring its advanced energy-saving technologies to emerging countries where there is the potential to improve energy efficiency. The reduction effects of CO₂ emission by transfer of Japanese steelmakers’ energy-saving technologies have amounted to 65.53 million ton reduction in CO₂ emissions per year in total. This is equivalent to about one-third of CO₂ emissions of Japan’s entire steel industry.

¹ Global Sectoral Approach is a method to help solve global warming problems by seeking CO₂ reduction potential based on sector-specific technologies and adopting the world’s best energysaving technologies.

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.

The three pillars of international cooperation in energy conservation



1 Joint meetings of public and private steel-related parties

In the bilateral meetings of public and private steel-related parties of an emerging country and JISF, information, ideas, and comments on various conditions of the country and Japan are shared. Based on the results of preparation of the list of technologies and on the assessment of steelworks, activities have been undertaken to facilitate transfer of Japan’s energy-efficient technologies to the country at an early stage. The JISF also provides detailed technical information and financial aspects of steelmaking. By FY2019, joint meetings have been held 9 times in India and 12 times in six ASEAN countries.



Government-Private Workshop in Indonesia (FY2019)

2 The technologies customized list

The technologies customized list is a list of energy-efficient technologies, which are identified as appropriate for the target country or region, and the provided information included a technology outline and supplier information. The list was prepared for the purpose of promoting Japan’s energy-efficient technology transfer and is used as reference in doing assessment of steelworks. In FY2018 the technologies customized list was updated into the fourth version for India and into the third version for the ASEAN countries.



3 Assessment of steelworks

In the assessment of steelworks specifically regarding their energy saving status, experts in this field in Japan’s steel industry visit the foreign steelworks in order to make proposals on technology based on the list and to give advice on operational improvement according to the utilization status of facilities. The experts also analyze the status of energy usage by using an international standard, ISO14404, which specifies calculation methods for the CO₂ intensity of steelworks. Up to FY2019, the JISF has conducted assessment of 12 steelworks in India and 14 steelworks in six ASEAN countries.

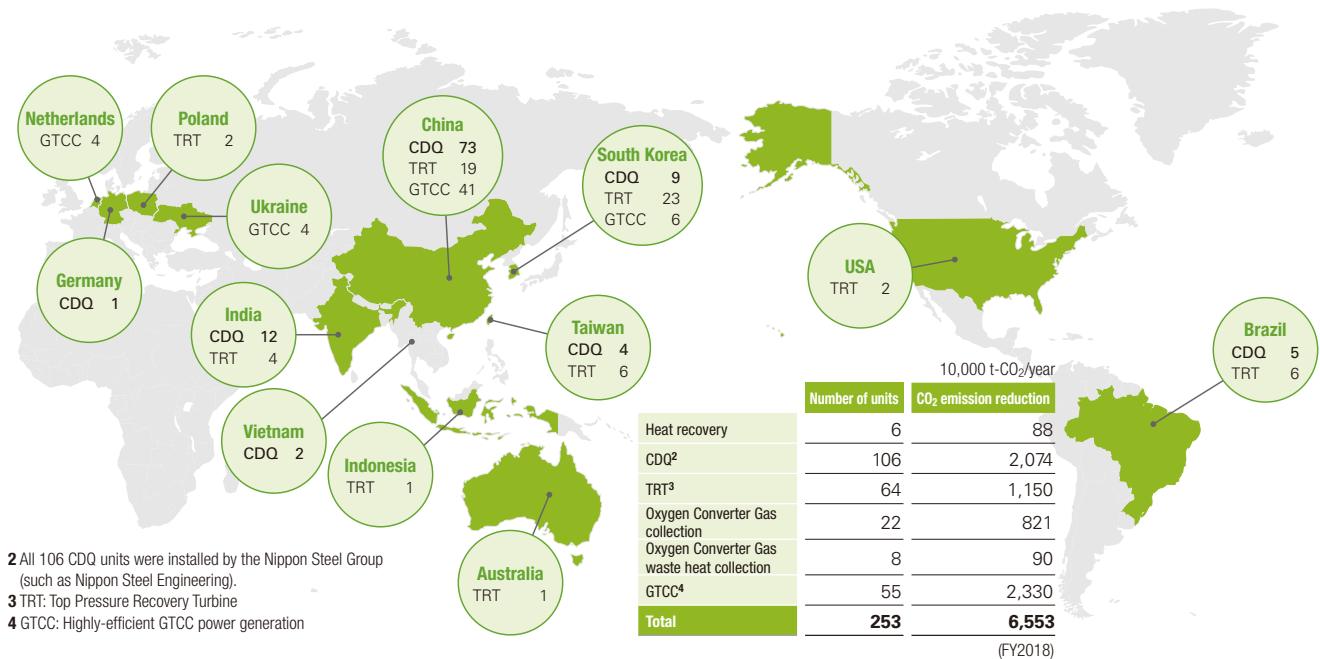


Nippon Steel also participates in the Climate Action Program of the World Steel Association, which uses universal methods to calculate and report on the CO₂ emitted by steelworks. We have been selected as a Climate Action member. Recently, quite a few customers have sought confirmation that their steelmakers are Climate Action members.

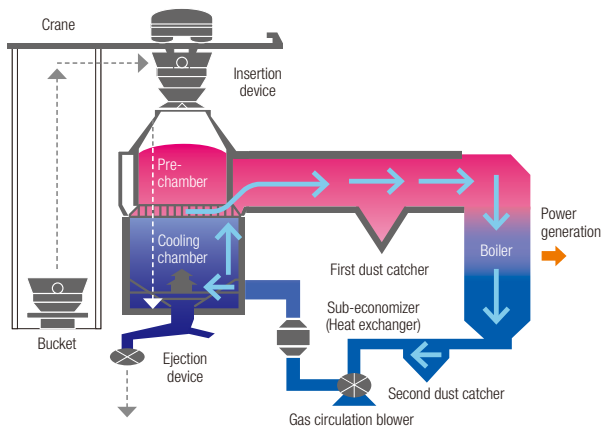


Climate Action member certificate

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



Coke Dry Quenching (CDQ): system and features

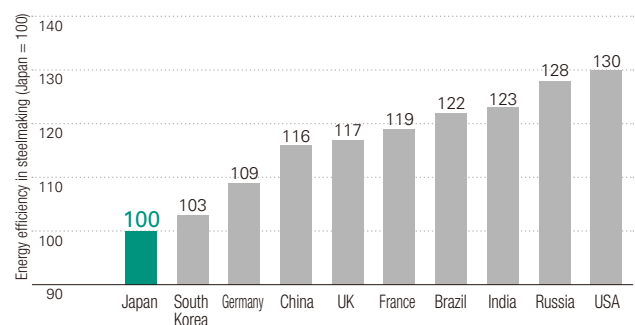


Hot coke made in the coke oven is transported in a bucket to the CDQ equipment where it is injected from its top part down to the chamber. The coke is quenched with inert gas, while the hot gas (approx. 950°C) from the exhaust heat is collected, and transferred to the boiler where it generates steam for power generation. The hot gas can be fully recycled by being quenched and circulated back to the chamber. By not using water as a cooling medium, the CDQ method raises the strength of the coke and contributes to stable operation of the blast furnace, an increase in tapping quantity, and reduction in consumption of the reducing agent.

Realizing the world's top-class energy efficiency

Since the first oil crisis in 1973, Nippon Steel and Japan's steel industry have intensively invested in technology for better energy conservation in production processing, and in technology to collect energy. Specifically, we promoted innovation in processing, by introducing continuous casting machines and continuous annealing furnaces, and improvement in processing such as by direct hot charging and automatic burning control. Regarding energy collection, by-product gas generated in processing of coke ovens, blast furnaces, and other areas have been collected and reused highly efficiently; exhaust heat and exhaust pressure from Coke Dry Quenching (CDQ), regenerative burners, and Top Pressure Recovery Turbines (TRT) have also been collected; and use of waste plastics and other waste substances have been promoted. These steady efforts have led to Japan's steel industry achieving significant energy conservation and the world's top-class energy efficiency.

Energy efficiency in steelmaking by country (2015)



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.)

Innovative Technology Development

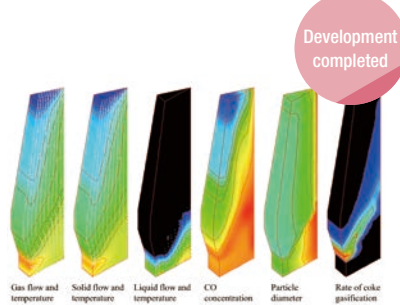
Since the 1970s, Nippon Steel has been striving for energy saving and reduction of CO₂ emission. At present, we are developing innovative technology that will enable us to make zero-carbon steel¹ by 2100. This effort has the four aspects of 1) reducing CO₂ emission, 2) separating and recovering CO₂, 3) recycling CO₂, and 4) storing CO₂.

¹ Zero-carbon steel is produced from iron ore without using carbon (= zero carbon) but by using hydrogen. Aside from ultimately aiming at zero carbon, our research and development teams are also working on reduction in use of carbon, as well as separation, recovery, reuse and storing of CO₂.

CO₂ emission reduction

Development of blast furnace mathematical modeling

We properly adjust gas flow, solid flow, and liquid flow, burden distribution, and other basic factors in blast furnace route with the result that we have reduced the ratio of coke and other reducing agents, and this has reduced CO₂ emissions.



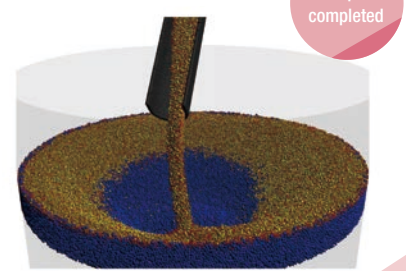
Next generation coke oven Scope21

We developed the next-generation coke oven that uses an advanced coke-making technology, including prior rapid heat treatment of coal, and enabled significant energy saving. The first commercial models started operation in the Kyushu Works Oita Area in 2008 and the Nagoya Works in 2013.



Burden distribution three-dimensional DEM model

Distribution of charged materials from the top of a blast furnace is precisely shown by using a three-dimensional discrete element method (DEM) model, with the aim of arranging the burden distribution that enhances reaction efficiency, which leads to reduction in CO₂ emission.



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

Hot coke made in the coke oven is quenched with inert gas, and the heat is used to generate steam for power generation. Compared to wet quenching, 40% energy saving has been achieved. The first CDQ unit was installed in the Kyushu Works Yawata Area in 1976.



CO₂ separation and recovery

Commercializing ESCAP™ (Energy Saving CO₂ Absorption Process)

This technology for recovering CO₂ by using a particular liquid is used as the first step in CO₂ recycling, with the world's top-class performance. Two units are currently in commercial operation in Muroran City and Niihama City.



1970

2010

2020

Under development

The COURSE50 Project (Technological Development and Innovative Steelmaking Process)²

Since 2008, the COURSE50 has been developing technologies to lower CO₂ emissions by 30%: a 10% cut in CO₂ emissions from a blast furnace by adopting technologies to reduce iron ore by use of hydrogen and a 20% cut in CO₂ emissions by adopting technologies to capture — separate and recover — CO₂ contained in blast furnace gas. Concerning the former case, a 10% cut has been verified at a 12m³ 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.

² Commissioned project by the New Energy and Industrial Technology Development Organization (NEDO)



2030

A new hydrogen production process, which contributes to reduction in CO₂ emissions

By developing a proprietary high-performance photocatalyst material, we aim at hydrogen production with zero emission through use of solar energy.

Under development

Under development

2050

Toward development of a hydrogen reduction steelmaking process that takes blast furnace production into a new phase

Project for the "Development of Zero-Carbon Steel Technologies^{2*}" — hydrogen reduction steelmaking technologies

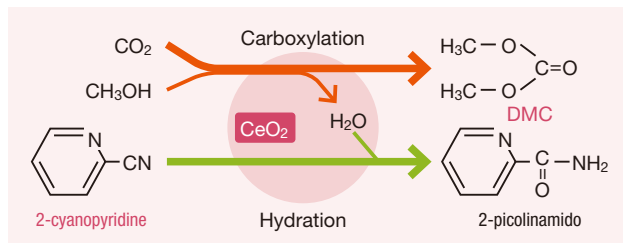
With the aim of achieving net zero emission in steelmaking process, we are taking up a challenge of developing hydrogen reduction steelmaking technologies that replace coal with hydrogen as reducing agent. This was adopted as a national project and we are getting engaged in this public-private cooperative project.

CO₂ recycling

Research on producing raw materials for plastics from CO₂

Technology to synthesize a carbonate ester (shown as DMC, or dimethyl carbonate in the figure below) from CO₂ and alcohol. Polycarbonate and other compounds are made from carbonate ester.

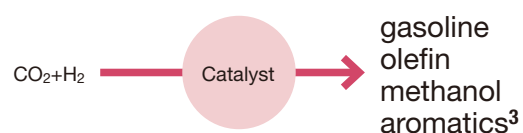
Under development



Research on producing basic chemical compounds and fuel from CO₂

Technology to make basic chemical compound and fuel from CO₂ by using a new catalytic technology. This is to realize a process that does not use fossil fuel as raw material.

Under development



³ Aromatics include para-xylene and other compounds, which are used to produce polyester fiber and resin for PET bottles.

Carbon fixation

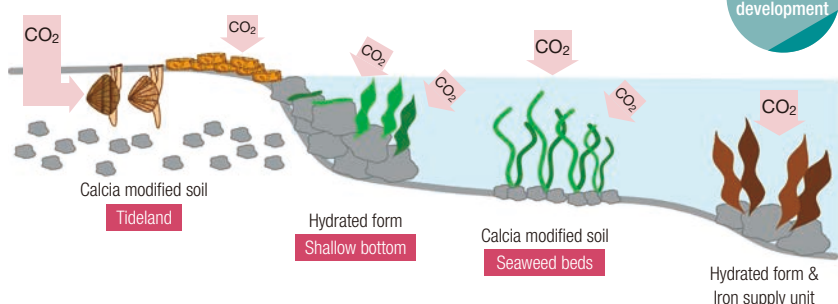
From "Creation of Sea Forests" to "Blue Carbon"

Technology to remediate the sea by increasing the growth of seaweed, which absorbs CO₂. Steel slag is used to create a rich ecosystem, which contributes to development of fisheries.

Under development

Contribution to expanded absorption of CO₂ in farmland

Fertilizers made with inclusion of steel slag promote growth of agricultural products and help sequester CO₂ in farmland.



Innovative technology development for “Challenge Zero”



URL: <https://www.challenge-zero.jp/en/>

We recognize the urgent need to tackle climate change issues, the importance of boldly taking up the challenge for innovation toward realizing a decarbonized society, and the significant role that Nippon Steel plays as a major innovator. We therefore stated our agreement with the Challenge Zero declaration, announced by Keidanren in June 2020. Through this, we disclosed the following 10 specific challenges.

Nippon Steel’s ten challenges

Name of challenge	Type of innovation			Pages
	Net zero emission technology	Transition	Adjustment and resilience	
Achieving zero emission in the hydrogen reduction steelmaking process	●			p. 34
Development of CO ₂ emission reduction technology that uses hydrogen in blast furnace reduction steelmaking		●		p. 35
Development of chemical absorption method technology that enables separation and collection of CO ₂ at low cost	●			p. 35
Contributing to hydrogen infrastructure establishment via diffusion of HRX19™ for hydrogen stations	●			p. 29
Development and diffusion of Eco Products that help reduce CO ₂ emission when final products are used (Nsafe™-AutoConcept, electric steel sheet)		●		p. 27
Improved efficiency in recycling of waste plastics		●		pp. 13, 37
Establishing a manufacturing method of dimethyl carbonate (DMC) from CO ₂	●			pp. 33, 35
Zero-emission hydrogen manufacturing technology via artificial photosynthesis	●			p. 33
CO ₂ fixation by Blue Carbon, which uses steel slag	●			pp. 24, 33, 42
Provision of “National Resilience” solutions toward adapting to climate change			●	p. 27

(1) Net zero emission technologies	Technologies of not emitting greenhouse gas (GHG) or technology to absorb or use GHG
(2) Transition technologies	Innovative energy-saving and other technology that contributes to significant GHG reduction in the world, including emerging countries. This technology is needed in the course of realizing a decarbonized society
(3) Technology for adaptation, resilience, etc.	Innovative technologies against climate change that contribute to adaptation (preparation to curb the climate change impact), resilience, etc. in areas other than mitigation (GHG reduction)

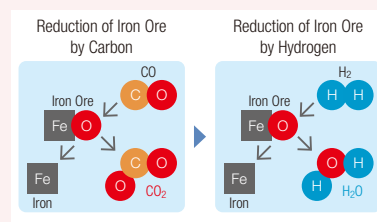
Examples of Nippon Steel’s taken-up challenges

Achieving zero emission in the hydrogen reduction steelmaking process

Roughly 70% of CO₂ emission in the steelmaking industry are generated in the blast furnace pig iron making process (reduction reaction to remove oxygen from iron oxides to make steel). As the thermodynamic efficiency of Japan’s blast furnace technology has improved close to a theoretical value, further reduction in CO₂ emission is extremely difficult. That is why we are taking up the challenge in hydrogen reduction steelmaking process, in which hydrogen is used for reduction of iron ore, replacing coal as a reducing agent. Strengths in insights and element technology for hydrogen reduction steelmaking, which have been accumulated in the COURSE50 project since 2008, are our strength in this challenge.

As hydrogen reduction reaction of iron ore is endothermic reaction, what we need at this stage is to establish technologies to supply heat to a reaction furnace from outside and to stably supply a massive amount of hydrogen gas to a reaction furnace with due consideration to hydrogen’s combustion characteristics. Moreover, hydrogen is carbon-free but its stable supply at low cost in massive volume is an important requirement. We must therefore cooperate with the government and other companies.

Nippon Steel, JFE Steel, Kobe Steel and the Japan Research and Development Center for Metals (JRCM), all being members of the Japan Iron and Steel Federation, applied for participation in a public offering project on “technology development toward realizing zero carbon steel,” sponsored by the New Energy and Industrial Technology Development Organization (NEDO) and was accepted in June 2020. As this is an R&D project in the frontier field efforts toward zero carbon steel, our objective is to identify multiple promising innovative technologies focused on decarbonization in the steelmaking process. We further aim at drawing a road map for technology development that could be used by Japan’s steel industry.



COURSE50¹ — Environmentally Harmonized Steelmaking Process Technology Development

Since fiscal 2008, three Japanese blast furnace steelmakers, including Nippon Steel, and Nippon Steel Engineering have carried out the COURSE50 project for development of process technology for environmentally harmonized steelmaking and hydrogen reduction. The objective is to mitigate CO₂ emissions. This project, sponsored by NEDO (New Energy and Industrial Technology Development

Organization) in Japan, aims at 30% CO₂ emission reduction by developing technologies 1) that use hydrogen in the reduction process of steelmaking in the blast furnace and 2) that apply the chemical absorption method for separation and recovery of CO₂ at low cost.

¹ COURSE50: Abbreviation for CO₂ Ultimate Reduction System for cool Earth 50

Development of CO₂ emission reduction technology, using hydrogen in the blast furnace reduction process

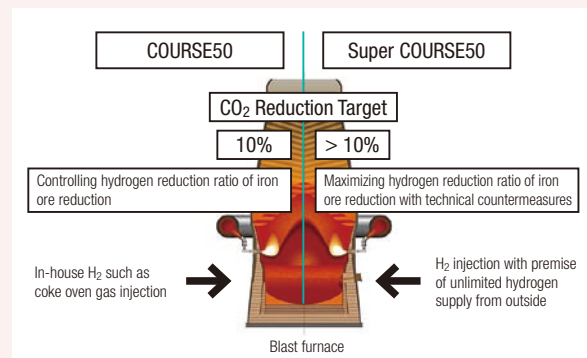
In the COURSE50, hydrogen gas (coke oven gas) generated in a steel mill partially replaces carbon in the reduction process (a chemical reaction, which removes oxygen from iron oxides), in order to reduce CO₂ emissions from a blast furnace by 10%.

In the immediate future, the blast furnace method is expected to remain a mainstay ironmaking method technically and economically. We therefore need to move ahead further to establish a lower-carbon technology as transition technology leading up to the establishment of a 100% hydrogen reduction technology.

By using an independently-developed three-dimensional mathematical model and a 12m³ experimental blast furnace at the Kimitsu Area of the East Nippon Works, Nippon Steel has advanced development from both theoretical and experimental aspects to achieve a 10% CO₂ emission reduction from the blast furnace.

The concept of the COURSE50 is to feed coke oven gas (hydrogen content of 60%) through tuyeres in the shaft of a blast furnace so as to raise the ratio of iron ore reduction by hydrogen. However, the amount

of hydrogen gas or coke oven gas generated in the steelworks is limited. The next step therefore is to establish outsourcing of a large supply of hydrogen gas and to substantially raise the share of reduction by hydrogen, a change equivalent to taking up the challenge of "Super COURSE50" or substantial CO₂ emission reduction of over 10%.



Development of a chemical absorption method that enables CO₂ separation and recovery at low cost

The chemical absorption method under development in the COURSE50 project is appropriate to separate and recover CO₂ from large-scale emission sources, such as a blast furnace and a thermal power plant. The method achieved the world's top-class performance and has been commercialized as ESCAPTM (Energy Saving Chemical Absorption Process) by Nippon Steel Engineering. In the meantime, in order to promote social implementation and dissemination of Carbon dioxide Capture and Utilization (CCU) and Carbon dioxide Capture

and Storage (CCS), the cost to separate and recover CO₂ must come down. We therefore aim at substantial reduction in this cost by developing an innovative absorption solvent, which reduces to an absolute minimum the energy required for removal of CO₂ from the absorption liquid, which represents a substantial cost. In addition, use of unused exhaust heat within the plant waste is under consideration for reducing the cost of separation and recovery, so as to develop absorption liquid that enables CO₂ dissipation at lower temperature.

Establishment of a manufacturing method of dimethyl carbonate (DMC) from CO₂ as a carbon source

Carbon dioxide Capture and Utilization (CCU) has recently been highlighted as a way to recycle CO₂ as a useful carbon resource. Through joint research with Tohoku University and chemical companies, we are developing a process to produce dimethyl carbonate (DMC) from CO₂.

DMC is an organic compound widely used as raw material for high-performance plastics and as electrolyte for lithium batteries. While the conventional production method used phosgene, a

poisonous gas, we have developed cerium oxide catalyst as well as a de-hydration agent called 2-cyanopyridine, which enable low-pressure, low-temperature, high-efficiency reaction, resulting in an effective use of CO₂. That there is no use of phosgene has also enhanced safety substantially. We will continue to vigorously seek for effective use of CO₂ generated from the steelworks.

Contributing to Creation of a Circular Economy

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.

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

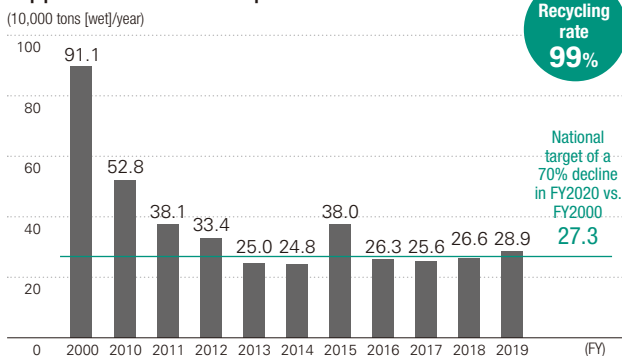
Nippon Steel's steelworks use 100% of by-product gas generated in the steelmaking process, as fuel for heating of steel or as energy for an onsite power plant. Concerning water resources, 90% of water used in cooling and cleaning of products and manufacturing facilities are reprocessed and repeatedly 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 FY2019, Nippon Steel produced 39.54 million tons of crude steel and generated 24.93 million tons of by-products. The majority of these by-products were recycled inside and outside the company and our final disposal of industrial waste amounted to 290,000 tons, partly due to a one-off factor. Nevertheless, we have maintained a very high recycling rate of 99%. We intend to continue reduction of final disposals.

Nippon Steel's final disposal amounts



The amount in fiscal 2019 includes discarded bricks and other waste (26,000 tons) generated by a construction project.

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

Effective use of steel slag

Steel slag is almost entirely utilized. Approximately 70% of blast furnace slag is used for cement, while steelmaking slag is used for materials for road bases, 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 CO₂ emissions during manufacturing, since the cement-making process can

be omitted. It also exhibits superior long-term strength and is registered as an Eco Mark product. Due to the effects of reduction in mining of natural crushed stone and less energy consumption in the cement making process, steel slag products are designated as a "designated procurement item" under the Green Purchasing Law, and included in the Common Specifications for Civil Engineering Work compiled by the Ministry of Land, Infrastructure, Transport and Tourism.

Nippon Steel's pavement materials, KATAMA™ SP, taking advantage of characteristics of steel slag, 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 controls CO₂ emissions, and is less expensive, enabling reduction of construction cost. The remediated soil is outstanding in compacting and can also be easy to be dug again, without being excessively solidified.

Calcia modified soil — a mixture of steelmaking slag and dredged soil — has been used to improve the marine improvement, such as by backfilling 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. 33](#)

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

Recycling of dust and sludge

To recycle the dust¹ and sludge² 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 Kyushu Works Oita Area (Hikari). 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 (FY2019)

By-product	Amount generated (wet weight – million tons)	Recycling application	Recycling rate
Blast furnace slag	12.78	Blast furnace cement, fine aggregate, road base, etc.	100%
Steelmaking slag	5.65	Road base, civil engineering materials, fertilizer, etc.	99%
Dust	3.13	Raw materials for use in-house and also zinc refining	100%
Sludge	0.43	Raw materials for in-house use	88%
Coal ash	0.52	Cement raw materials, construction materials	100%
Waste furnace materials	0.35	Reuse, etc.	68%
Others	2.07	In-house use, others	100%
Total	24.93	Total recycling rate	99%

¹ Fine dust collected with a dust collector

² Semi-solid slurry recovered from industrial wastewater or sewage treatment

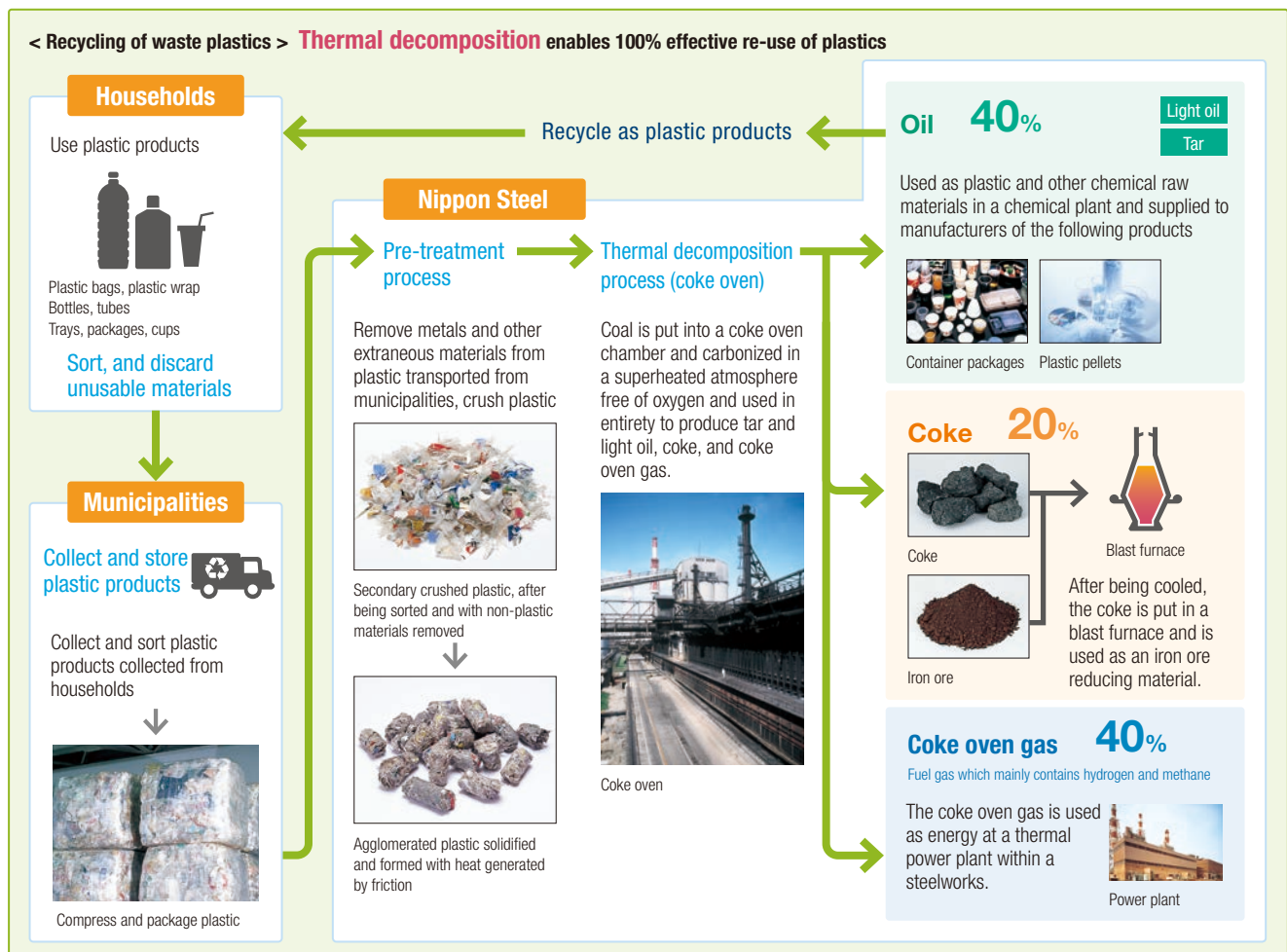
Contributing to worsening waste plastic problems

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 ironmaking 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 FY2000–2019 was approximately 3.28 million tons, equivalent to 10.50 million tons in terms of reduction in CO₂ emissions. Recently, we have begun to recycle chemical fibers and food trays mainly into plastic products, under the same recycling method. We intend to work on technology development such as efforts to increase processing capacity, in order to satisfy growing needs for plastic processing for environmental objectives.

Moreover, our plastic recycling plant in each steelworks is open for visits by the public. The East Nippon Works Kimitsu Area, being located close to the Tokyo Metropolitan Area, welcomed 8,650 visitors in FY2019, contributing to environmental education in the community.



Promotion of Environmental Risk Management

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.

Activities for reducing environmental risks

Atmospheric risk management

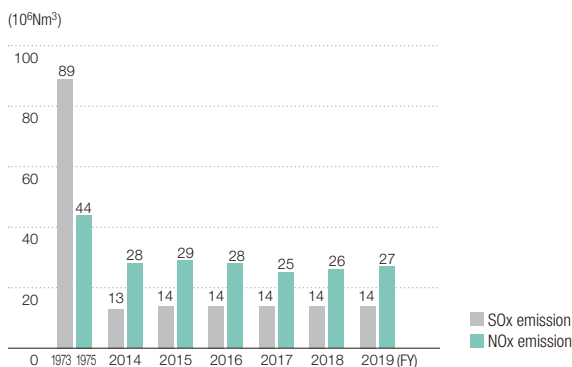
In order to reduce emissions of sulfur oxides (SOx) and nitrogen oxides (NOx), Nippon Steel is taking measures such as using low-sulfur fuel, adopting low NOx generating burners and installing effective equipment, including equipment that reduces SOx and NOx emissions. To curb emissions of soot and dust 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.

In April 2018, the Amended Air Pollution Control Act became effective in Japan; it regulates the mercury concentration in emission gas for waste incinerators. At our facilities mercury contained in waste gas is effectively captured by dust collectors or is absorbed by activated carbon so as to reduce the release of mercury in the atmosphere. We routinely measure the regulated mercury concentration in emission gas for waste incinerators and ensure that our facilities 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, formulated by the Japan Iron and Steel Federation (JISF) in April 2018. We confirmed conformity with the voluntary management standard at all facilities subject to the voluntary initiatives in FY2019 as we did in FY2018. These results and evaluations are disclosed on the JISF's website every year. Through such efforts, we strive to prevent mercury emission into the air.

Water risk management

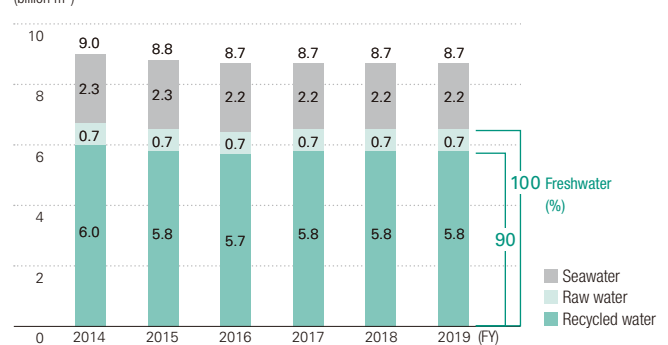
We use about 6.5 billion m³ of freshwater a year, of which approximately 90% is derived from recycled or reused water to reduce wastewater discharge, at all of our steelworks and factories combined. We try not to waste precious water resources, and to control wastewater discharge. To achieve this, we 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 preventing water pollution, we have installed devices such as detectors, control valves, and emergency water storage pits. 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



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

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



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

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.

Windbreak net at yards



A windbreak net is installed to reduce the strength of wind and 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



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

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



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).

Countermeasures against air pollution

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.

Water purification; prevention of abnormal waste water

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.

Promotion of Environmental Risk Management

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 FY2018, 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 Law¹, Chemical Substance Evaluation and Regulation Law², 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, and disposable amount. Similarly, we take care in managing the Volatile Organic Compounds (VOC³), 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 FY2019, there were 53 target substances for notification and the emission amount was 424 tons into the atmosphere and 31 tons to public water areas, while the disposal amount of mostly manganese, chrome, other metals, and their compounds to outside of the steelworks was 6,694 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 FY2009, the 30% reduction target relative to FY2000 was achieved. Since then, low discharge levels have been maintained.

Voluntary priority control of select chemical substances

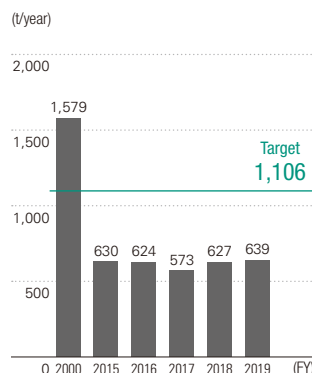
• Dioxin

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 FY1997.

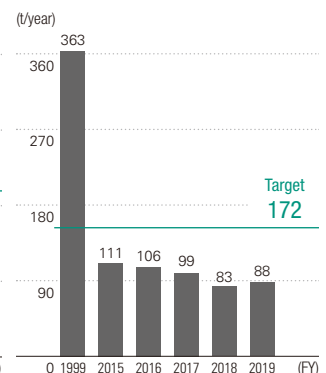
• Benzene, tetrachloroethylene, dichloromethane

We developed a voluntary reduction plan of hazardous air pollutants specified in the environmental standard, with the exception of trichloroethylene which we did not handle. As a result of our undertaking, we have already reached the targets for all three pollutants and have maintained the target levels.

Emission of VOC



Benzene



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.

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

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

Prevention of scattering of dust

In the steelworks, road sweepers collect dust and dirt, and moisten road surfaces, in order to restrain the scattering of dust and dirt, piled on the road or in a vacant site, by movement of vehicles or by wind.

As an example, the Kyushu Works Yawata Area currently has seven road sweepers and seven road sprinklers in operation day and night. These 14 vehicles sweep and sprinkle about 450km of road every day. This is equivalent to the distance between Tokyo and Kyoto. We are further improving the effect of road cleaning by introducing washing-and-suction type cleaning vehicles, which clean better than conventional road sweepers, and small road sweepers for narrow space.



A road sprinkler cleans the road in a steelworks

Noise reduction measures

Nippon Steel conducts the surveys of noise source via noise frequency analysis, forecasts sound propagation, and implements appropriate noise reduction measures. The measures include airtight sealing of noise source, application of noise absorption materials, and installation of noise insulation boards. In addition to daily management of potential noise-source equipment, we regularly make a noise measuring test to confirm that the noise level is below the regulatory standard stipulated by the government and municipality.

Further, the forest we cultivate at the property line of steelworks site has the effect to depress noise, in addition to its role to prevent the scattering of dust and to absorb CO₂.



Transparent plates installed at the border in the East Nippon Works Kamaishi Area

Introducing other initiatives in the website https://www.nipponsteel.com/en/csr/env/env_risk/index.html



Atmospheric risks

Measures against risks of abnormal generation of NO_x
Reduction in emissions of SO_x and NO_x, 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 taken initiatives on biodiversity preservation under the following policy.

Policy for the future

- 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 CO₂.



“Creation of Sea Forests”

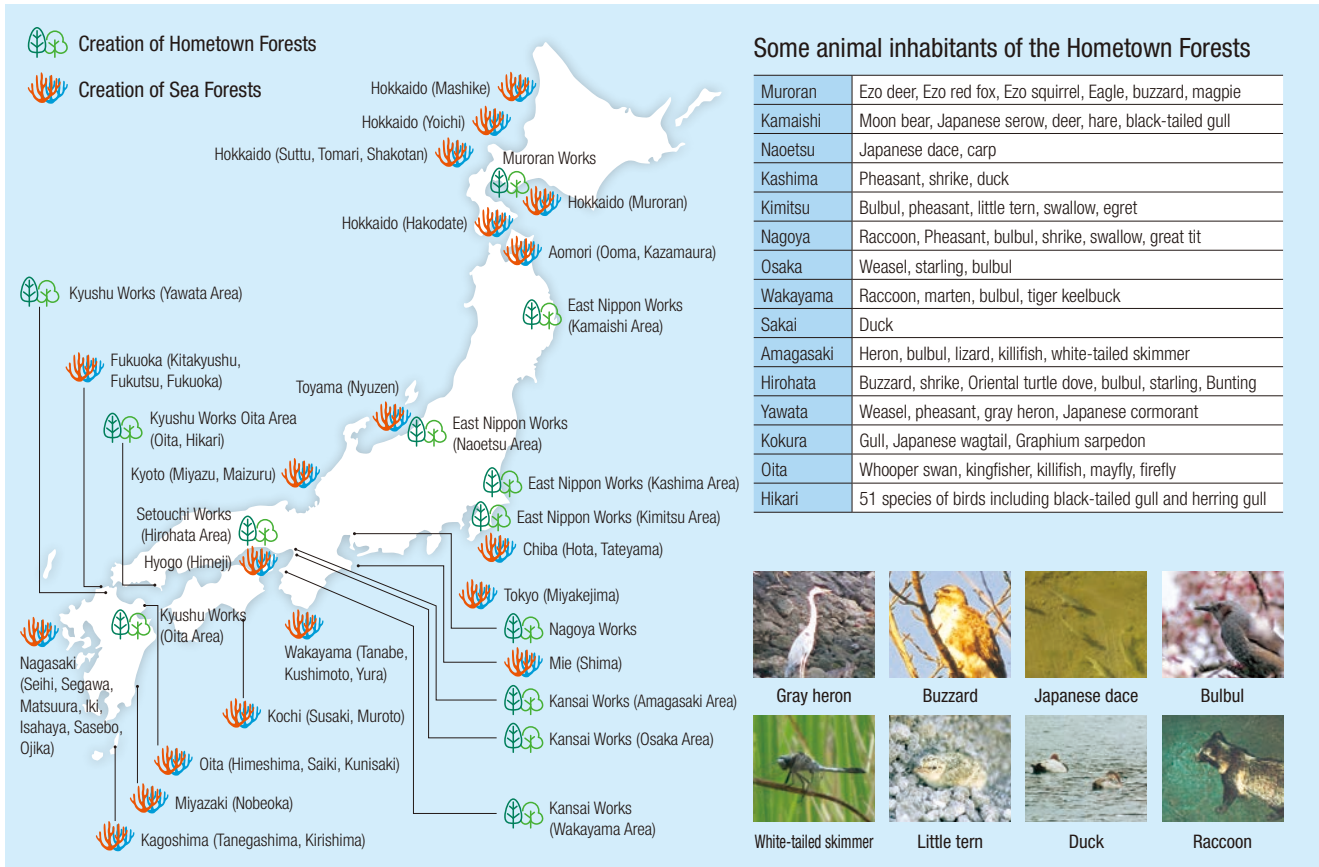
Implemented in 38 spots in Japan to improve sea desertification

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 Tokyo University 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.





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 link 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.



Social Initiatives

With the aim of contributing to growth of a sustainable society and to maintenance and improvement of corporate value, Nippon Steel has identified our ESG materiality and has been working on its initiatives. Some of our social initiatives in each materiality are presented below.

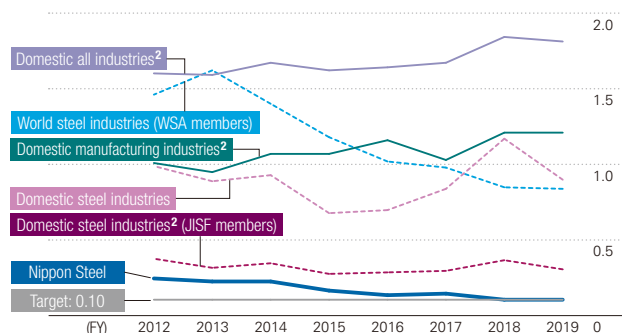
Safety and health initiatives

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 kept our manufacturing priorities in all of our activities. We have been improving our Occupational Safety and Health Management System (OSHMS) and strive at making safe and secure workplaces. The Basic Policy on Safety and Health is applied to Nippon Steel as well as to related or subcontracting companies.

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 compile and make known effective examples of accident-preventive measures and measures based on analysis of actual accidents. As a result of continuous execution of these measures, safety improved in FY2019. There were 8 accidents for Nippon Steel’s employees¹ and 10 for employees of subcontracting companies (including two fatal accident for Nippon Steel and one in subcontracting companies) The accident frequency rate was 0.09 (compared to Japan’s steel industry average of 0.89) and the accident severity rate was 0.08 (vs. 0.21). We will continue to strive for a safe work environment with the safety wellness targets for FY2020 that are zero fatalities/severe accidents and less than 0.10 as the accident frequency rate.

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, 2018”

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

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 workplaces to obtain the ISO (JIS Q) 45001 Health and Safety certification (published in March 2018) by the end of fiscal 2021. The Kansai Works Wakayama Area became the first steelmaker in Japan to obtain it in December 2019, followed by the Amagasaki District of the same works.



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 (108 managers in FY2017, 91 in FY2018 and 42 in FY2019). 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

Nippon Steel finds that the harmonious coexistence with customers, communities, and society is most precious. Prevention of disaster, which may harm our credibility, is important for continuation of our company. We therefore aim at enhancing disaster prevention management by establishing a structure of autonomous, continual activities, and taking measures to reduce disaster risks and prevent disaster occurrence.

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.

Specific disaster prevention initiatives

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)
- 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; manage residual risks; promote drafting of 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 workforce
- 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

- Promote measures in order of 1) human damage prevention, 2) area damage prevention, and 3) production measures
- When a Nankai Trough earthquake emergency warning or alert is announced and act under the policy. Devise measures based on the assumption of subduction zone earthquake and tsunami around Japan Trench and Chishima Trench

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

Target

Zero serious disaster-related accidents

Quality-related initiatives

Quality management is one of the most important aspects in obtaining the trust and satisfaction of customers in the provision of products and services. All of our relevant employees are responsible for thorough quality management. In coordination with product units and individual steelworks, the Company's Quality Assurance Department promotes measures to cope with Groupwide quality control and assurance issues.

Concrete measures to enhance the quality management system

Nippon Steel's quality management system is based on autonomous, voluntary quality management activities of each product type business division of a Group company, including overseas ones and each steelworks. The status of each is checked through auditing of the Quality Management Division in the Head Office. The key points of this inspection include compliance with the guidelines¹ of the Japan Iron and Steel Federation; compliance with standards and specifications; and confirmation of continual improvement activities for quality internal control. The auditing plan is written once a year for each steelworks and areas and once every three years for each office of group companies, in order to reduce quality risks. We also receive external reviews, such as ISO9001 and JIS certifications to raise the credibility of the quality management system.

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, to raise the credibility of identification as well as testing and

inspection of actual products. In addition, diverse opportunities to acquire basic knowledge on quality compliance and quality management are provided internally and for group companies, and an e-learning program is offered to those in charge of quality compliance and quality management every year, to assist them to expand knowledge. For overseas group companies, the e-learning program is developed and delivered in each local language. We thus strive to raise quality awareness of all group employees. Using leverage of our quality management organization, we will continue our daily efforts to improve customer satisfaction and further raise our branding power of trust.

¹ Guideline Toward the Enhancement of Quality Management System (JISF, revised August 2016)



Basic training on quality management

Toward More Stable Production (continued enhancement of strength in manufacturing)

Nippon Steel has been implementing diverse measures toward continued enhancement of strength in manufacturing to make production more stable. In fiscal 2019, the number of unscheduled events declined steadily. Despite the current harsh business environment, we continue to do what is needed to realize more stable production.

Working for stabilizing production

Many of our steelworks are passing a 50-year milestone since the start of their operation. Our workforce is also undergoing drastic generation changes. Against such a background, occurrence of too many unscheduled events have forced us to cut back production in the past few years.

That is why we are implementing diverse measures toward continued enhancement of strength in manufacturing to realize more stable production.

Measures in hard aspects

Continued enhancement of strength in manufacturing

- 1 Start of operation of a leading-edge continuous casting facility in the Kyushu Works Yawata Area
Closed a blast furnace and steelmaking facility in Kokura of the Yawata Area in the first half of 2020.
- 2 Coke oven (CO) refurbishment
Refurbished Kimitsu No. 5 CO in February 2019 and Muroran No. 5 CO in September 2019. Plan to refurbish Nagoya No. 3 CO in the first half of 2021.
- 3 Relining of blast furnaces
Plan to reline two blast furnaces in Muroran in the second half of 2020 and three blast furnaces in Nagoya in the first half of 2022.
- 4 Renovation of the cold steel melting process in the Hirohata District of the Setouchi Works
The present cold steel melting process from a melting furnace to a converter will be renovated to use of the electric furnace process, which enables more flexible production with excellent energy efficiency.



Muroran Works No. 5 coke oven (CO) refurbishment

Measures in soft aspects

Initiatives to standardize manufacturing

We have carried out activities to visualize and standardize the know-how of our veteran workers in each workplace, and have so far standardized 74,000 points. By FY2018 we completed documentation of technical standards, which will be used throughout the company. We have also investigated the causes of problems at production facilities, and shared what we found out. Going forward, we intend to raise our ability to pursue causes of problems and draft countermeasures, and standardize those steps, as a part of operational processes. At the same time we promote activities to prevent problems and their recurrence, which contribute to more stable production.

Initiatives for stable procurement

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 toward realizing a sustainable society. We purchase around one million product items of equipment and materials from gigantic facilities such as blast furnace 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. Based on our basic policy, our aim is to realize a top-flight purchasing strategy, with a focus on dialogues with suppliers. Aiming at enhancing dialogue with suppliers, we have organized a Material/Equipment Procurement Partners Meeting, to be held once every three years with an objective to share our purchasing policy, which was set in FY2018, the first year of the new med-term management plan, in light of our new management strategy. In FY2018, about 1,300 suppliers joined our first Partners Meeting, where we agreed to share our purchasing policy that emphasizes thorough compliance; product safety, ensuring of quality, cost, and delivery (QCD), advancement of technology development capability; consideration of human rights, labor environment, safety and health; environment conservation; and thorough information

In addition, we strive to enhance the managerial ability of line managers in operation (doing so through human resources development activities) and to implement smart workstyles consistent with becoming the world's best steelmaker with world-leading capabilities.

Activities by corporate-wide experts

We strive to use insights and know-how of experts in the group to promptly solve specific issues, such as related to capital expenditures and operational or facility issues. Experts who have advanced knowledge and experiences in processing or element technologies are being mobilized for work beyond organizational or area-based boundaries.

management, with the aim to deepen the partnership for enhanced manufacturing competitiveness and to promote purchasing that contributes to a more sustainable society. Under the policy, we strive to enhance risk management of the entire supplier chain by undertaking more initiatives, such as ESG initiatives (including the enhancement of governance structure), survey on minerals from conflict-affected and high-risk areas, and business continuity planning (BCP). In addition, we began to compile a Partner Questionnaire to survey suppliers once a year.

The Partner Award System has also been implemented to express our gratitude to suppliers who have greatly contributed to our advancement in manufacturing competitiveness.

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

Supply chain management that reduces environmental impact

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>

Respect for human rights and promoting diversity & inclusion

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

(1) Respect for human rights

Respect for human rights

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 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.

Dealing with human rights risks and labor risks

Nippon Steel holds a corporate-wide human rights anti-discrimination promotion forum every year, adopted the policy of dealing with human rights issues, and conducts workshops and other awareness-raising activities for employees. 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.

In case of abuse of human rights, including harassment, or a labor-related problem that became known through a whistleblow contact to our Compliance Consulting Room, for example, we are prepared to handle the issue appropriately upon investigation of the facts. In case of executing a new business, we take appropriate actions in order to prevent occurrence of human rights or labor issues.

Communication on human rights with stakeholders within and outside the company

Nippon Steel considers it important to communicate with stakeholders within and outside the company to deal with human rights risks. We have set up a Compliance Consulting Room to receive notifications or inquiries concerning harassment and other abuse of human rights from the Group's employees and family members, and from business

partners. Notification and consultation from other stakeholders are accepted in the form of responses to an inquiry menu on Nippon Steel's website. Each of these whistleblowing and consultation matters are given appropriate attention, including our providing guidance or training to the related parties, consistent with advice from lawyers and other professionals when needed.

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.

Respect the rights to organize and to bargain

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.

Labor union membership and ratio (as of March 31, 2020)

25,765 (Membership ratio: 100%)

Compliance concerning salaries

In compliance with laws and regulation concerning salary and wages payment, Nippon Steel has set up pay at a higher level than minimum wage stipulated by the country, region, and type of work where we do business. With regard to bonuses, we regularly survey related matters, including the status of each country, region, and type of work, and hold meetings with labor representatives, to appropriately reward employees with due consideration given to business conditions and financial performance.

Promotion of balanced work-life

Nippon Steel complies with labor laws and regulations of each country where it operates, and strives to create a work environment that allows each and every employee to do best. We promote balanced work-life by encouraging employees to fully use their paid holidays and to control the number of hours worked, and to keep the time worked at a suitable level. This is done with cooperation by labor unions. As a part of initiatives on Workstyle Innovation, we are expanding the working system from the viewpoint of fully utilizing the optimized work time and to help enable all employees to realize their full capacity. In fiscal 2019 we began a telework program. In addition to being concerned with workstyle and

operation management that leads to more efficient, higher-value-added output, the program is proactively utilized to cope with the COVID-19 infection problem.

Nippon Steel also has diverse welfare programs to support employees' personal life: provision of housing, including dormitories and company housing, and a cafeteria plan (work-life support program).

Achievement related to balance in work-life

The ratio of paid holidays taken (result in FY2019) **81.3%**

(2) Diversity & inclusion

Diversity & inclusion

In an aging society that has a declining birthrate, Nippon Steel has promoted diverse measures aimed at establishing such a work environment, whether at clerical, manufacturing, or maintenance work sites, that empowers diverse people, including elderly persons and women.

We have introduced programs such as a childcare leave system which is more generous than legally required, a leave program to assist overseas relocation of the spouse, and a temporary exempting program for employees who have difficulty in relocation for child or elderly care and other reasons. Moreover, we have opened 24-hour childcare centers for use by shift work employees in steelworks. We are thus enhancing programs to support employees' work-life balance.

At present, the ratio of women in overall hiring is about 20%. We are committed to steadily implementing various measures toward our target to double the number of women in managerial positions from the level in 2014 by 2020 and triple it by 2025.

Concerning promoting the empowerment of elderly, we have decided to raise the retirement age from 60 to 65 in fiscal 2021. This change reflects the decline in the working population and the raising of pension eligibility age, and was made also from the perspective of maintaining and enhancing our on-site manufacturing capacity.

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



Childcare center (Nagoya Works)

Achievement related to diversity & inclusion

Achievement related to childcare support system (result in FY2019)	Number of users of the childcare leave system	265
	Ratio of returnees after childcare leave	96.3%
	Number of users of the short-work hour system for childcare	108
	Internal childcare centers	5 centers
	Users of internal childcare centers	100

The ratio of women in overall hiring (Average ratio from FY2018 to FY2020)

Office staff and engineers **34%**
Operators and maintenance personnel **14%**
Overall hiring **20%**

Number of women appointed in managerial positions

(assistant managers and above) [of which non-union members]

48 [21] in 2014
123 [39] in 2020

Target

Target to double the number of women in managerial positions by 2020 and triple it by 2025, compared to that of 2014

Number of those re-employed (FY2019)

2,927

Disabled-person employment rate (as of June 2020)

2.26%

Respect for human rights and promotion of diversity & inclusion

For further information, please visit our website, "Sustainability - Partnerships with Employees."

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.

(1) Utilization and development of human resources

Personnel development policy

Nippon Steel’s basic approach to personnel development is on-the-job (OJT) training – supervisors transfer to their subordinates knowledge and operational skills as well as how to do the job and think about it. This is done through everyday dialogues. The Personnel Development Basic Policy has been developed in order to express the policy and apply it to all employees. It is summarized below.

- 1 Personnel development is nothing but one aspect of business.
- 2 OJT training is a basic of personnel development and is complemented with off-the-job training.
- 3 A supervisor shares clear objectives and outcomes of personnel development with his/her subordinates.
- 4 Every employee ceaselessly strives to develop skills and knowledge.

The core of the Basic Policy is based on supervisor-subordinate dialogues for personnel development.

For employees in office positions, diverse types of off-the-job training sessions are conducted for acquisition of specific skills or themes which are not covered in OJT, and to acquire required training geared to specific career levels.

With regard to employees in manufacturing and maintenance who have acquired a clear understanding of the skill to be acquired through supervisor-subordinate dialogue, a specific development plan is drafted and carried out. The status of development and skill transfer is evaluated by using a skill map – a list of skills for each individual, and confirmed or modified as needed. Off-the-job training includes training by career level and length of service, and designated training by role of work.

Number of training/learning hours (FY2019)

1.54 million hours/year (57 hours/year per employee)

Objective Promote measures to develop human resources who serve the enhancement of workplace strength and technological advancement

Development of personnel who support 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.

In order to develop employees who promote our overseas business expansion we put efforts into international education, such as training of young executives, intercultural learning programs and study abroad, aimed for acquiring knowledge and skills needed for business management and for nurturing a global mindset.

Personnel treatment system

Nippon Steel’s administering of personnel policies aim at encouraging our employees to grow and develop their overall capabilities, from the time they join the company until they retire. We also find it important to ensure consistent, fair treatment of all employees regarding their capability and achievement, by methods including through dialogue between supervisors and subordinates.

Securing of personnel

Nippon Steel carries out fair and impartial hiring activities, based on the Keidanren (Japan Business Federation) Charter for Good Corporate Behavior. Our activities for securing the number and kinds of new hires includes an internship program and welcoming young students entering the job market to plant visits.

Status of employees (non-consolidated basis)

Number of employees (number of women in parenthesis)	27,096 (2,670) (March 31, 2020)
Number of new hires (number of women in parenthesis)	1,438 (228) (FY2020)
Average years of service	15.1 years (March 31, 2020)
Rate of voluntary termination	1.6% (FY2019)

Utilization and development of human resources

For further information, please visit our website, "Sustainability - Partnerships with Employees."

(2) Promotion of the health of employees

To help ensure we are an energetic company where all employees work at their best and stay healthy from joining the company until retiring it, we promote health promotion measures with a focus on disease prevention. Specifically, the company is committed to providing a full health checkup menu and enhanced aftercare to benefit the mental and physical wellness of employees, while employees are expected to also be committed to implementing measures for their own health maintenance. We believe that these measures will be sources of willingness to work, contributing to balancing work with health by staying healthy and, in case of illness, by continuing to work while being treated, when conditions permit.

Physical wellness

Using the corporate-wide medical checkup system which focuses on serious disease risks, Nippon Steel thoroughly manages health guidance on the basis of managing risks, and decides the frequency of medical checkup as part of that health maintenance effort. In addition, as a measure against lifestyle-related diseases, a recurring event to promote specific health guidance and lifestyle modification named the Health Challenge Campaign is conducted in cooperation with the health insurance association. In addition, cancer screening tests are broadly conducted for stomach cancer and bowel cancer, or for breast cancer and uterine cervix cancer, depending on age and gender of employees, with the aim of early detection.

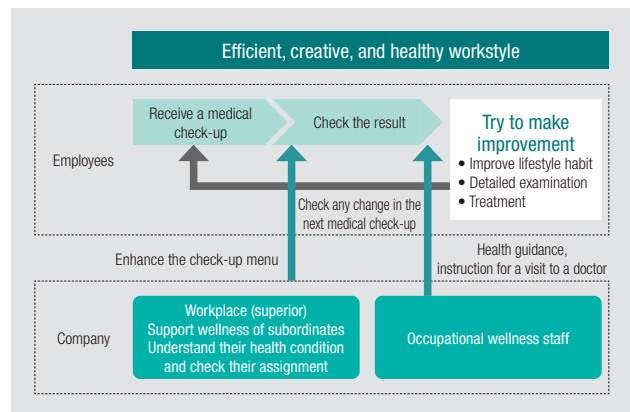
Mental wellness

Aiming for each employee 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. 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 team, and how to use or coordinate with the corporate physician, nurses, and other staff. Using an annual stress check result to approach teams and individuals to give guidance for improvement, workplaces coordinate with the personnel department and the health department in contributing to a vigorous work environment, and implement necessary measures according to the issues of a team or an individual.

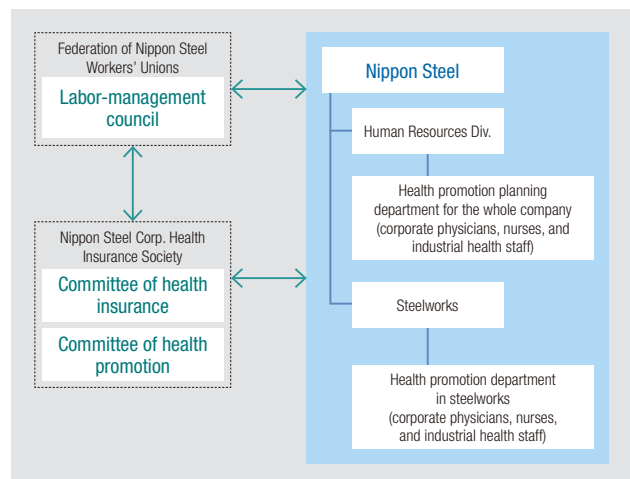
Support to employees who work overseas

In order to enable employees who work overseas to work without 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 specialized medical assistance programs is provided. Under the policy of providing continuous health management support during overseas assignments, interviews with occupational health staff are conducted via a video-conference system and other means, in addition to regular medical checkups. Moreover, one of the company's physicians periodically visits overseas offices, researches local medical institutions and the daily-life environment, and meets with employees to offer advice.

Commitment to wellness by both the company and employees



Organization chart for health promotion



Together with local communities

Having many manufacturing bases all over Japan, Nippon Steel has a long history of being engaged in business activities rooted in local communities and supported by local residents. In accordance with our attitude of maintaining harmony with local communities and society, we have implemented distinctive social contribution programs, mainly through promotion of environmental preservation, and through education, music, sports, and international exchange.

Environment preservation activities, jointly with local communities

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 Kesennuma 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 FY2019, 64 of Nippon Steel's employees and family members joined the 31st tree-planting activity.

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

Collaboration with an NPO, “green bird”

Nippon Steel has conducted four garbage pickup events in Harajuku & Omotesando, Shibuya, Nagoya, and Kawasaki jointly with an NPO “green bird,” which was created based on the concept of “a clean city will make people's hearts clean.” Green bird's eco-friendly activities were linked to steel as an eco-friendly, highly-recyclable material used in steel containers from the LCA viewpoint, leading to our collaborative

action. This has become a major project of 90 teams in Japan and abroad, with 33,000 participants per year.



Providing education on manufacturing and the environment

Training programs for educators at private companies

We support the “Training Programs for Educators at Private Companies”, so that teachers can better understand how the steel industry is contributing to society and can better appreciate the fascination of product-manufacturing. In 2019, we hosted 128 teachers for the tours of our facilities and our human development activities.

Demonstrating the joy of product-manufacturing through “Tatara Ironmaking”

With the aim of showing children the joy of product-manufacturing, Nippon Steel has been holding demonstrations on “tatara ironmaking” — Japan's indigenous ironmaking technique — in Japan every year.

Support of community-based education

Nippon Steel has been engaged in unique community-based environmental education support programs and educational activities on “Monodzukuri (product-manufacturing).” For example, the East Nippon Works organized a scientific display stand and introduced the fascinating properties of steel and how electricity works to primary and secondary school children. Our employees at the Kyushu Works gave a “travelling

scientific lecture” at primary and secondary schools, while Nippon Steel's Head Office staff took part in an Energy and Environmental Workshop held by a secondary school and introduced the steel industry's environmental initiatives, showing an example of recycling of waste plastics. We also donate to the Tohoku University's project which aims at teaching children in the stricken areas of the East Japan Earthquake and Tsunami of 2011 what to do against natural disaster risks.

Internship programs and the endowment of a university course

For many years, Nippon Steel has been offering 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.”

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. About 130,000 people visited our steelworks in FY2018.

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

In addition to contributing to development of society and economy by providing steel, a basic material, as we have done since the company was founded, Nippon Steel has a long history of activities in the support of art, music, and sports, with the aim of helping people realize a healthy, emotionally enriched life and helping society truly develop.

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.



© Tomoko Hidaki

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.



Initiatives for dialogue enhancement

For shareholders, Nippon Steel strives to proactively provide information and cooperatively respond to questions raised by them at the General Meeting of Shareholders. In addition, we regularly hold corporate briefings and plant tours, and publish information brochures to promote shareholders' understanding and enhance communication with them. For institutional investors we host briefings on quarterly results briefings and a mid-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.



Visit to steelworks

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

■ Suggestions on public policies via the Japan Federation of Economic Organizations (Keidanren) and the Japan Iron and Steel Federation (JISF)

- Express opinions on deregulations and institutional reforms for maintenance and enhancement of a vibrant economy in Japan
- Promote measures toward Japan's achievement of the Paris Agreement goals for 2030 via the JISF, in which Nippon Steel plays a leading role
- Advocate needs for inexpensive, stable supply of hydrogen, which is expected to play a critical role in CO₂ reduction efforts

■ Participation in government councils, study groups, etc.

- Participate in the deliberation process of public policy, such as infrastructure development, environment & energy, and economic regulations. (Appointed as a member of the Central Environment Council of Ministry of the Environment, a member of the Steering Committee of the Task Force on Climate-related Financial Disclosures (TCFD) Consortium, hosted by METI, etc.)

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

- Comply with laws and regulations, based on the Nippon Steel Group's Corporate Philosophy and Code of Conduct Code.
- Adopt and adhere to corporate rules and guidelines on prevention of corruption of public officials in Japan and abroad, compliance with anti-monopoly law, environmental regulations, protection of personal information, etc.

■ Appropriate tax payment

- Comply with relevant laws and regulations, and pay tax appropriately
- Eliminate alleged action to evade taxes and bear an appropriate tax burden
- Maintain transparent, constructive communication with tax authorities

Corporate Governance

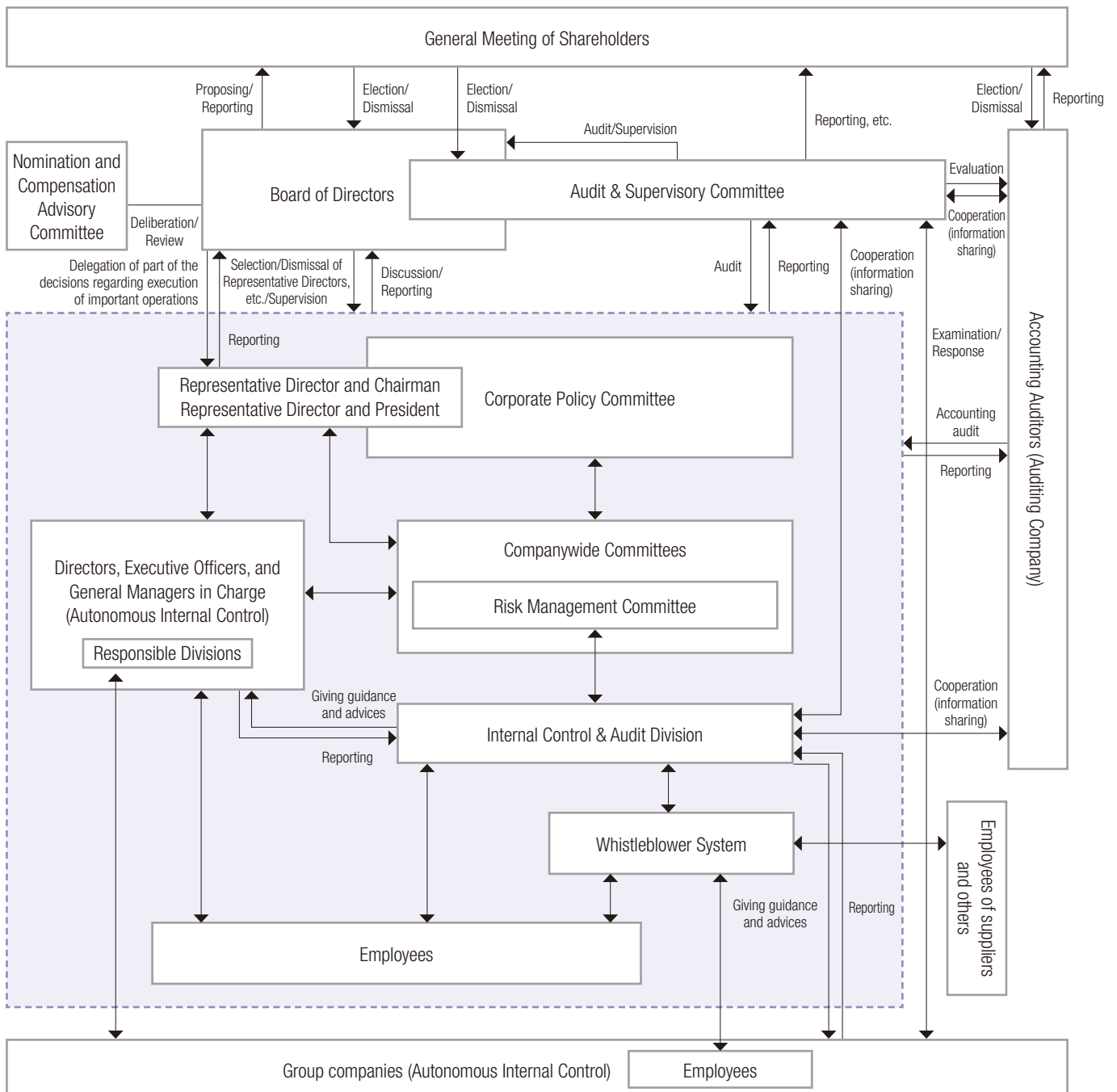
Nippon Steel has established a corporate governance system suited to the businesses of the Nippon Steel Group in order to achieve the sound and sustainable growth of the Nippon Steel Group and increase its corporate value over the medium- to long-term, in response to the mandate delegation of responsibilities by and trust of all stakeholders, including its shareholders and business partners.

Corporate governance structure and internal control system

For the purpose of appropriately responding to greater fluctuation of changes in the surrounding business environment and accelerated speed of change, Nippon Steel made a transition from a Company with an Audit & Supervisory Board to a Company with an Audit & Supervisory Committee in June 2020.

Through this change, Nippon Steel 1) aims to enhance discussions by the Board of Directors relating to matters such as the formulation

of management policies and strategies and strengthen the supervisory function of the Board of Directors over management; and 2) delegates part of the decisions regarding execution of important operations according to the policy and strategy to the Representative Director and Chairman and Representative Director and President, thereby expediting management decision-making.



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) 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 23 company-wide committees in total, including the Ordinary Budget Committee, the Plant and Equipment Investment Budget Committee, the Investment and Financing Committee, the Fund Management Committee, the Technology Development Committee, the Environment Management Committee, and the Risk Management Committee, depending on each purpose and each area.

Corporate governance enhancement activities since 2006

June 2006	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Appointment of Outside Directors (two) Adoption of a limited liability contract with Outside Directors
June 2015	<ul style="list-style-type: none"> Adoption of a limited liability contract with full-time Audit & Supervisory Board Members
October 2015	<ul style="list-style-type: none"> Establishment of the Nomination and Compensation Advisory Committee
June 2018	<ul style="list-style-type: none"> Increase the number of Outside Directors to three (appointment of a female director)
June 2020	<ul style="list-style-type: none"> Transition to a Company with an Audit & Supervisory Committee

2. Internal control system and risk management system

(1) Internal control system based on autonomous internal controls

To comply with applicable laws and regulations, and ensure integrity of financial reporting and effectiveness and efficiency of business, 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 a scheme for check and review, regularly ascertains the status of internal control across the entire Group, and works at continual improvement.

(2) Risk management supervisory system

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.

(3) Whistleblower system

As a whistleblower system, the Compliance Consulting Room (internal contact: the Internal Control & Audit Division; external contact: an external professional organization) 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 Room 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.

For further information, please refer the Integrated Report 2020 pp. 85–98.

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, 2019 to March 31, 2020 included in its Nippon Steel Sustainability Report 2020 (the “Report”) for the fiscal year ended March 31, 2020.

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 Kashima 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

October 9, 2020

Awards Received in FY2019

Award name	Sponsor	Detail
Awards from customers		
Excellent Partners Meeting 2019 ECO-VC Gold Award (10th consecutive year)	Panasonic Corporation	Adoption of high-workability white-color VIEWKOTE™ for residential-use downlight lighting fixture (Nippon Steel)
Equipment Supplier of the Year	Royal Dutch Shell Group	Continued high performance in items, including high-grade product development, achievement of 90+% on-time delivery, cost reduction across the entire supply chain, and joint development of 20+ projects (Nippon Steel, Sumitomo Corporation)
Named Top 100 Global Innovator 2020 (the only steel company for the eighth 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)
Awards from governments and institutions		
2019 MEXT Minister's Award "Prize for Science and Technology (Development Division)"	Ministry of Education, Culture, Sports, Science and Technology (MEXT)	Development of steelmaking process that achieved minimum outside emission of chrome (Nippon Steel)
2019 National Commendation for Invention: Invention Prize	Japan Institute of Invention and Innovation	Invention of eco-friendly oil well pipe connection (Nippon Steel, Nippon Steel Technology)
The 2nd EcoPro Award "Sponsor's Award (Prize for Excellence)"	EcoPro sponsor group	Vivary Unit™ iron supply unit, that uses steel slag (Nippon Steel)
The 8th Monodzukuri Nippon Grand Award (METI Minister's Prize, Excellence Prize, and Prize of the Director of the Kyushu Bureau of Economy, Trade and Industry)	METI, MEXT, Ministry of Health, Labour and Welfare, and Ministry of Land, Infrastructure, Transport and Tourism	Development of processing technology of ultra-high-strength steel sheets, which enable weight reduction in automotive parts and reduction in use of materials (Nippon Steel)
The 54th JSPMI Award (Chairman's Award)	Japan Society for the Promotion of Machine Industry (JSPMI)	Development of low-noise gear device for railways
The 16th LCA Japan Forum Award (Encouragement Award)	LCA Japan Forum	Initiatives such as production and website disclosure of an LCA-related video, donation of a cartoon "Secret of Steel" to elementary schools and libraries across Japan, distribution of a workbook on steel as novelty goods of a plant visit (Nippon Steel)
The 13th IEEJ Prize of Meritorious Deed	The Institute of Electrical Engineers of Japan (IEEJ)	Contribution of non-oriented electrical steel sheets ORIENTCORE HI-B to an energy-saving society (Nippon Steel)
The 66th Okochi Memorial Production Prize	Okochi Memorial Foundation	Development of manufacturing technology of high-ductility steel plates for ships, that ensure collision safety (Nippon Steel)
The 52nd Ichimura Prize in Industry for Distinguished Achievement	Ichimura Foundation for New Technology	Improved safety of large vehicles by development of high-efficiency, light-weight permanent magnetic retarder (Nippon Steel)
The 52nd Ichimura Prize in Industry against Global Warming for Distinguished Achievement	Ichimura Foundation for New Technology	Technology to restore sea forest by use of steel slag, which benefits diverse ecosystems (Nippon Steel, Penta-Ocean Construction)
2019 Minister of MEXT Award "Prize for Science and Technology (Development Division)"	MEXT	Development of manufacturing technology of high-strength hot-rolled steel plates, that uses a new high-precision flatness meter (Nippon Steel)
2019 Steel Sustainability Champion	World Steel Association	Comprehensive sustainability-related actions, including actions based on strong commitment to the environment, measurement and disclosure of diverse data based on the environmental policy, and sending of information to stakeholders via a sustainability report

Corporate profile (as of March 31, 2020)

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 (439,491 shareholders)
Stock listings	Tokyo, Nagoya, Fukuoka, Sapporo
Number of employees	106,599 (consolidated)
Group companies	408 consolidated subsidiaries 118 equity-method affiliates



Nippon Steel's logotype

The central triangle in the logo represents a blast furnace and the people who create steel. It symbolizes steel, indispensable to the advancement of civilization, brightening all corners of the world. The center point can be viewed as a summit, reflecting our strong will to become the world's leading steelmaker. It can also be viewed as depth, with the vanishing point representing the unlimited future potential of steel as a material. The cobalt blue and sky blue color palette represents innovation and reliability.

Contact

Inquiries on the Sustainability Report 2020

Nippon Steel Corporation

Contact: Environment Division

TEL: +81-3-6867-2566 FAX: +81-3-6867-4999

Or go to the "Contact Us" page of Nippon Steel's website: <https://www.nipponsteel.com/en/contact>

©2020 NIPPON STEEL CORPORATION. All rights reserved.



Printed in environmentally-friendly ink that does not contain petroleum solvent.

