



Nippon Steel Sustainability Report 2019



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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.

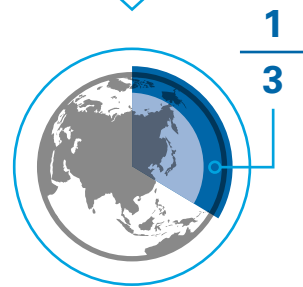
Steel for All of Us and Earth

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, easy to procure, and sustainable material

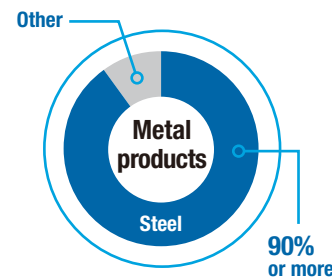
Iron is believed to constitute one-third of the Earth's weight.



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



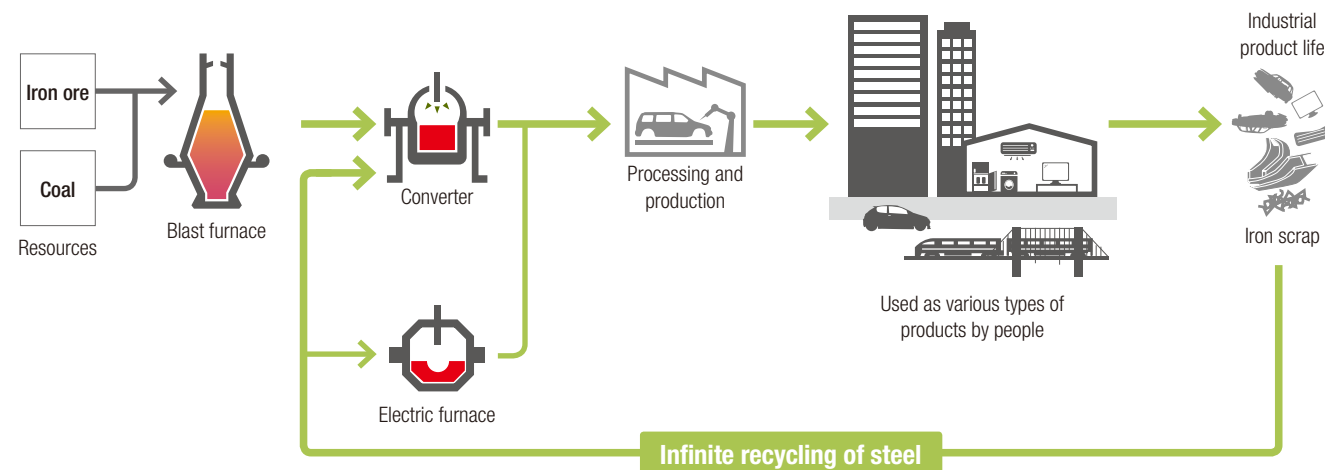
Steel represents 90% or more of metal products, as steel, being abundant, cheap, and having good workability, has a wide range of applications.



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 recycled many times into various products, such as steel scrap from vehicle bodies being recycled into bridges and buildings.

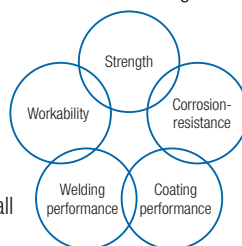
Steel does not end its life even after the end of a life of a product made of steel. It becomes steel scrap to be recycled back to the steelmaking process, and is reused as a new product.



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.



Infinite potential

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

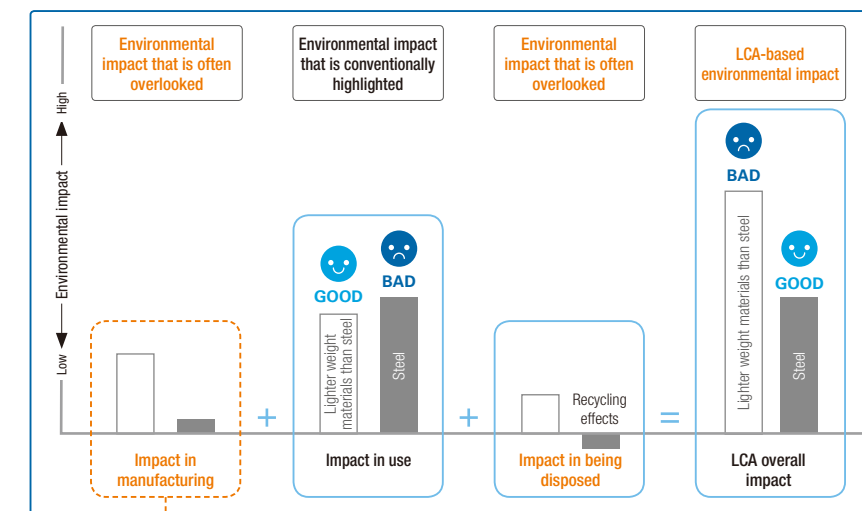
Steel can also be described as a natural composite material to be adjusted for specific uses by controlling the level of carbon content. This also imparts diverse properties to it.

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.

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



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.

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)	2.2	2.3	12.7	22.0

Based on the public data of WorldAutoSteel

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.

BF and EAF routes of steelmaking compared using 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.

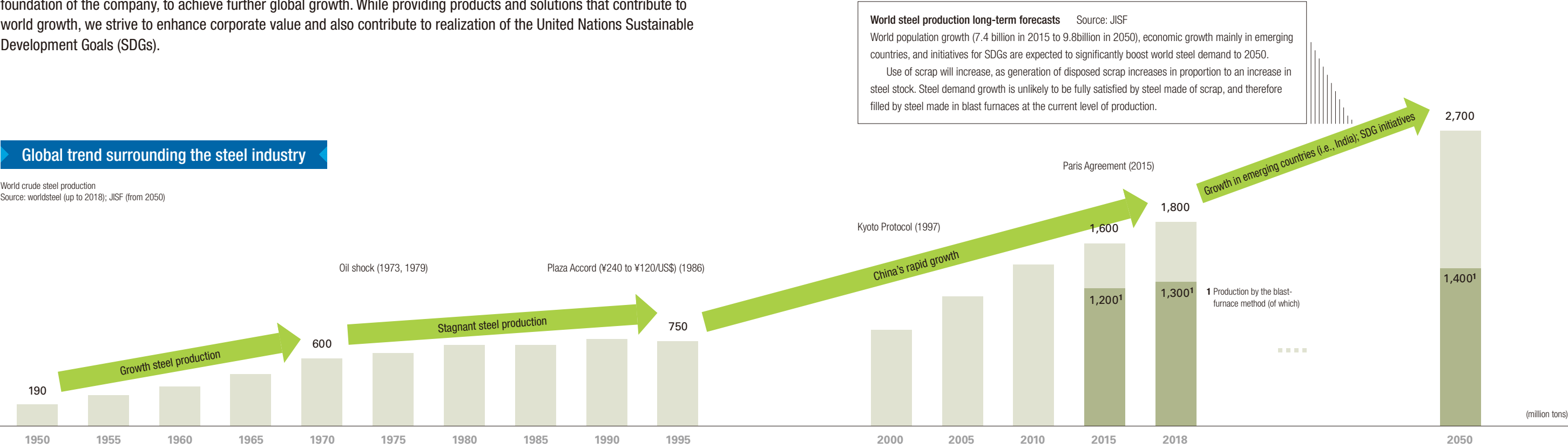
This approach is recognized in the ISO 20915 and the JIS Q 20915. As an example, the amount of CO₂ emission in making 1 kg of hot-rolled steel is about 2 kg in the BF route and 0.5 kg in the EAF route. However, incorporating the recycling effect, the total amount of CO₂ emission is about 0.7 kg for both 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 has been growing as a global leading steelmaker for many decades, overcoming crises many times. Our aim is to advance toward “the best steelmaker with world-leading capabilities” by incorporating a diversity of DNAs of people and companies and taking up the challenges of making major reforms, which can be described as the second foundation of the company, to achieve further global growth. While providing products and solutions that contribute to world growth, we strive to enhance corporate value and also contribute to realization of the United Nations Sustainable Development Goals (SDGs).

Global trend surrounding the steel industry

World crude steel production
Source: worldsteel (up to 2018); JISF (from 2050)



History of Nippon Steel

Yawata Iron & Steel and Fuji Iron & Steel were established (1950)
Sumitomo Metal Industries was established (1952)

Nippon Steel Corporation was formed (1970)
(Yawata Iron & Steel and Fuji Iron & Steel merged)

Nippon Steel & Sumikin
Stainless Steel was formed (2003)

NIPPON STEEL & SUMITOMO
METAL was formed (2012)
(Nippon Steel and Sumitomo Metal merged)

Nippon Steel Corporation (2018)

Sanyo Special Steel to be a subsidiary (2018)

Nisshin Steel to be a subsidiary (2017)

What Nippon Steel has accomplished

- Among the first in Japan to build integrated seaside steelworks to realize efficient imports of raw materials, and production and shipment of raw materials
- Being the frontrunner in the world in automation of steelmaking lines and technologies in energy saving and high-grade steel production
- Moved faster than competitors in overseas expansion, technological cooperation to other countries, and establishment of alliance and JVs with overseas major steelmakers
- Ensured the trust and credibility in society with our history, tradition, and a wealth of human resources who have high worksite capabilities
- Developed Steelmaking, Engineering & Construction, Chemicals & Materials, and System Solutions businesses, generating mutual synergies

Global business development (main cases)

USIMINAS Brazil (1958)	I/N Tek USA (1990)	NS-SUS Thailand (1995)	UNIGAL Brazil (2000)	BNA China (2005)	VSB Brazil (2010)	AM/NS Calvert USA (2014)	OVAKO to be a subsidiary Sweden (2018)	Acquisition of Essar Steel India (Acquisition procedures ongoing as of September 2019)
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Crude steel production (consolidated-base) (million tons/FY)

41.04 (FY1970)	45.36 (FY1975)	43.90 (FY1980)	38.76 (FY1985)	40.24 (FY1990)	36.17 (FY1995)	39.44 (FY2000)	47.26 (FY2005)	47.64 (FY2010)	44.53 (FY2015)	47.84 (FY2018)
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External environment and issues to be addressed

Promotion of energy saving, higher quality, higher grade steel products	Cost reduction measures and business diversification, then to streamlining, such as for restructuring in response to the strong yen-caused recession and the bubble burst	Domestic industry consolidation; promotion of optimal production network and global business development
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Key factors to support growth

- Products and solutions that contribute to sustainable growth
- A supply framework amenable to global growth
- Implementation of advanced IT

Globally, continuously growing Nippon Steel

- Contributing to sustainable global growth on the strengths of advanced technologies, products and solutions, a wealth of human resources, manufacturing capabilities, a global supply network, and trust and credibility accumulated as a responsible leading company
- Committed to profit from global demand in steel, with our blast furnace method with world-leading specific energy consumption, and with scrap usage technologies of electric furnace steelmakers in our group
- Taking up a challenge in the area of super-innovative technologies toward the JISF's goal of realizing "zero-carbon" steel
- Rebuilding our "strength in manufacturing" in our mother mills in Japan, building and maintaining optimal production systems, enhancing "strength in sales and marketing," and grow in the world as the "best steelmaker with world-leading capabilities"

Nippon Steel Group's Businesses

Nippon Steel Group's Businesses

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

¥247.0 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.



System solutions business

¥267.5 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.

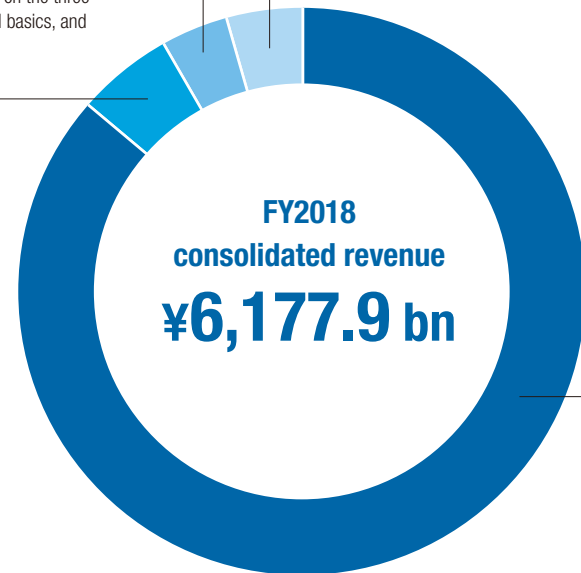


Steelmaking and steel fabrication business

¥5,454.5 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.



(Elimination of intra-company transactions, etc. ¥147.8 bn)

Engineering and construction business

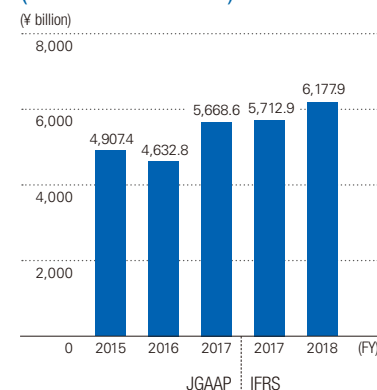
¥356.7 bn

Nippon Steel Engineering Co., Ltd.

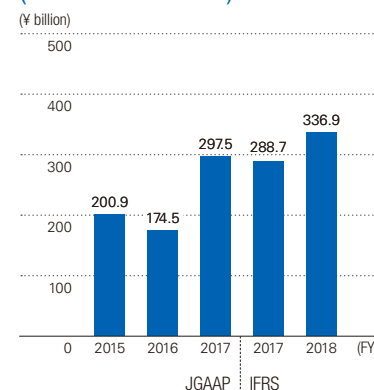
Based on long-accumulated steelmaking and other technologies, Nippon Steel Engineering undertakes many projects worldwide in six fields: steelmaking plants; environment; energy; offshore steel structures; building construction and steel structures; and pipelines.



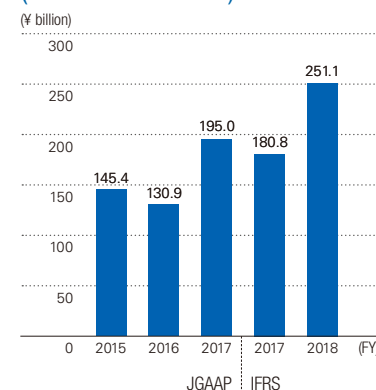
Net sales/Revenue (consolidated basis)



Ordinary profit/Business profit (consolidated basis)



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



The Nippon Steel Group's overseas business is expanding to the extent of having a global supply network of 21 million tons in downstream processing capacity of steel, mainly for use in the three areas of automobiles, resources and energy, and infrastructure.



1 Ovako (Sweden)

Automobile-related

A manufacturing and sales company of specialty steel and secondary processed products, which was acquired by Sanyo Specialty Steel (51% stake owned by Nippon Steel) in 2018



2 BNA (China)

Automobile-related

A manufacturing and sales company of cold-rolled and galvanized steel sheets, which began operation in March 2005



3 NPV (Vietnam)

Infrastructure-related

A manufacturing and sales company of steel pipe piles and sheet piles, which began operation in May 2011



4 Tenigal (Mexico)

Automobile-related

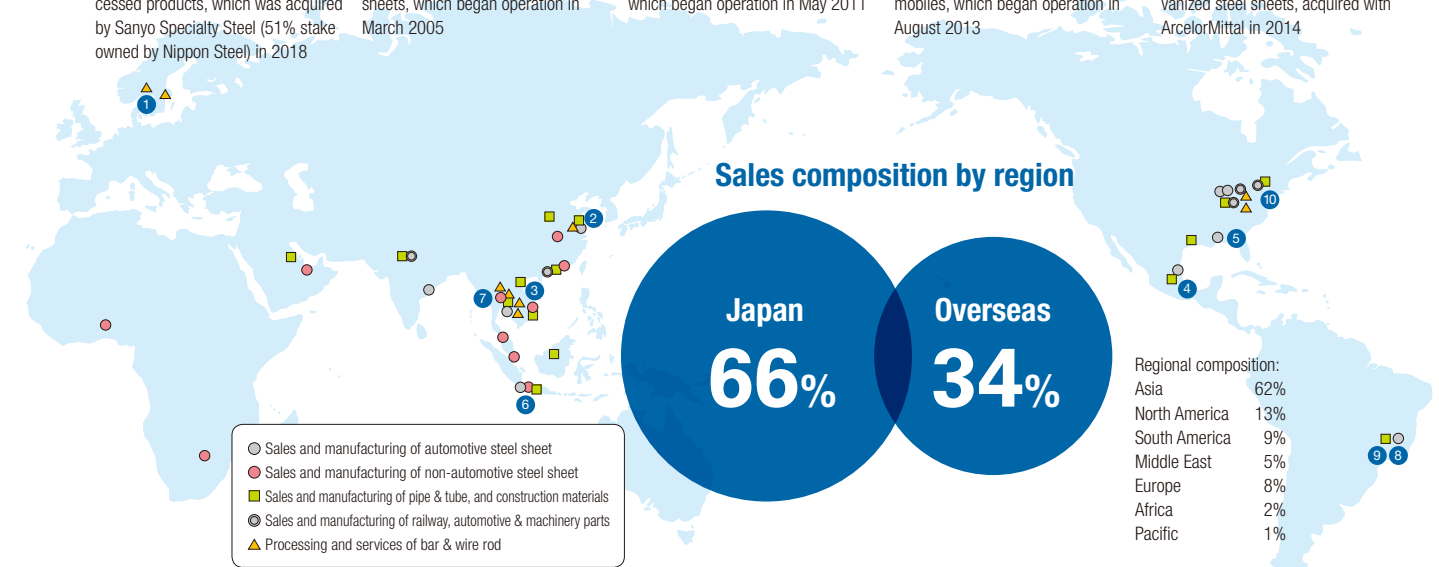
A manufacturing and sales company of galvanized steel sheets for automobiles, which began operation in August 2013



5 AM/NS Calvert (USA)

Automobile-related

A manufacturing and sales company of hot-rolled, cold-rolled, and galvanized steel sheets, acquired with ArcelorMittal in 2014



6 KNSS (Indonesia)

Automobile-related

A manufacturing and sales company of cold-rolled and alloy galvanized steel sheets for automobiles, which began operation in July 2017



7 NS-SUS (Thailand)

Automobile-related

A manufacturing and sales company of cold-rolled steel sheets and galvanized steel sheets, established by merger in September 2016



8 Usiminas (Brazil)

Integrated steelworks of steel sheets and steel plates

Usiminas began operation in 1962 and possesses an integrated steelworks, a mining company, and a manufacturer of galvanized steel sheets for automobiles



9 VSB (Brazil)

Energy and resources-related

A manufacturer of seamless steel pipes in an integrated steelworks, which began operation in September 2011

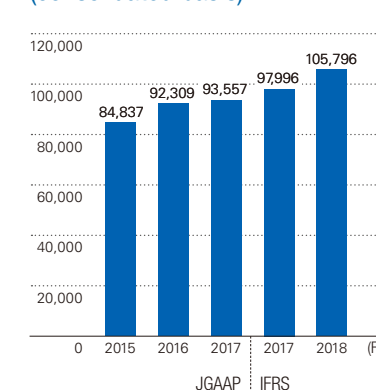


10 ICI (USA)

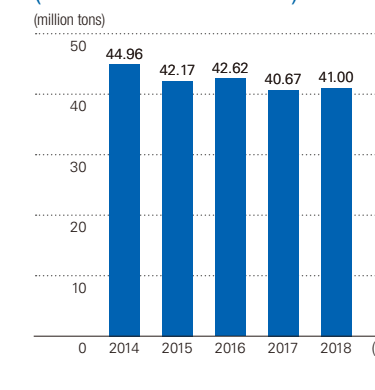
Automobile-related

A manufacturing and sales company of small-sized forged crankshafts, which began operation in April 1992

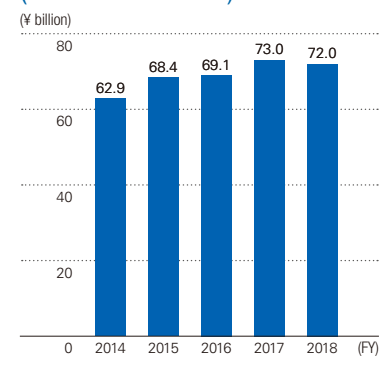
Number of employees (consolidated basis)



Crude steel production volume (non-consolidated basis)

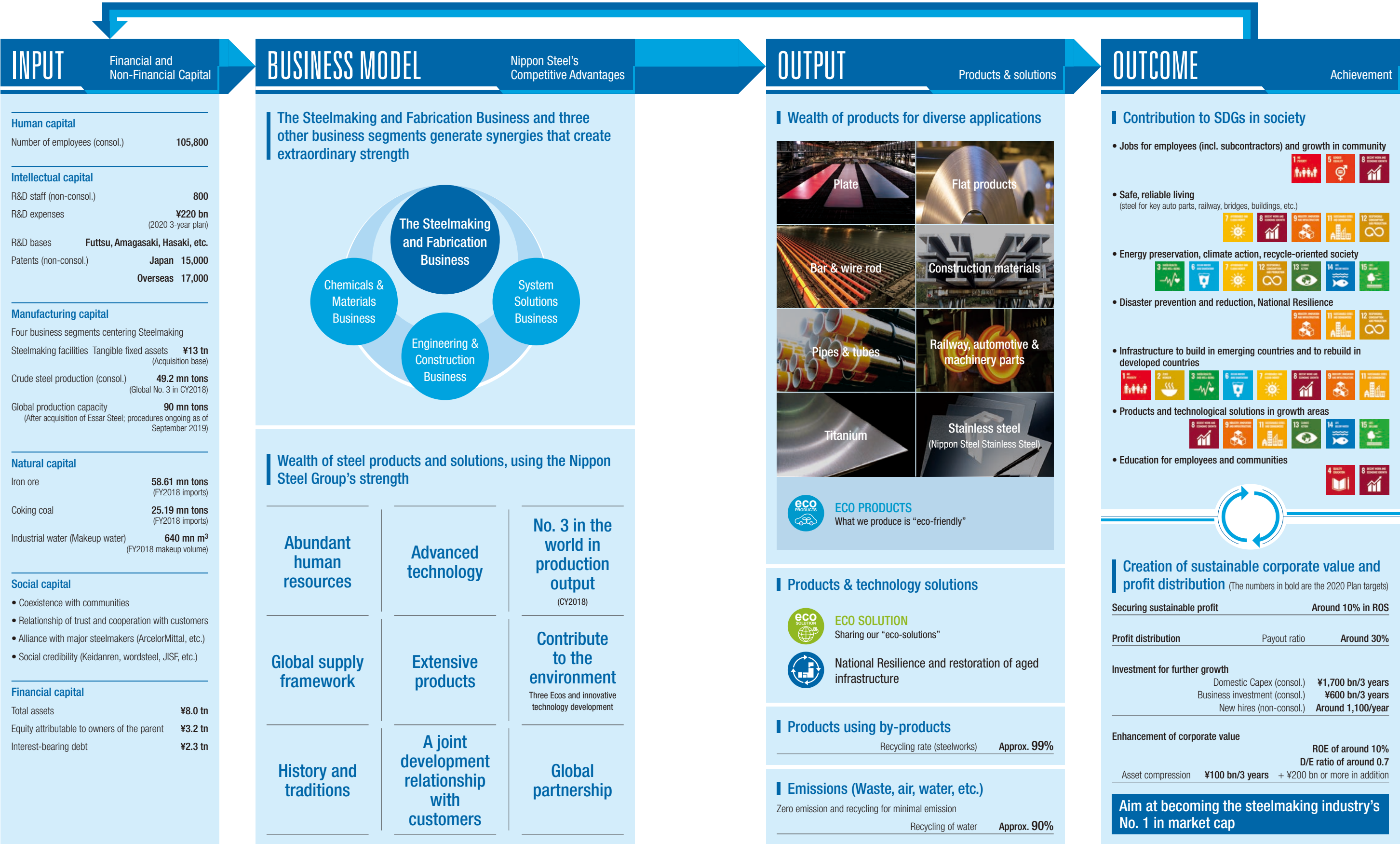


R&D expenditures (consolidated basis)



Value Creating Process

Using its financial/non-financial assets and competitive business model, which have been revised and improved over a substantial period, Nippon Steel provides products and solutions that address climate change issues and other needs of society. The company thereby contributes to achieving sustainable development goals (SDGs) benefiting society, raises its sustainable growth, distributes profits, and strives to secure its position as a best steelmaker with world-leading capabilities now and in the future.



Towards the Realization of a Sustainable Society (SDGs)

We have made a new start since April 1, 2019 when we renamed our companies from Nippon Steel & Sumitomo Metal Corporation to Nippon Steel Corporation. As the first president of Nippon Steel, I am determined to do our best to further enhance the strength of our workplaces, based on our manufacturing prowess accumulated in Japan, and reform ourselves in this “second foundation stage,” with an ultimate goal of prevailing as the best steelmaker with world-leading capabilities.

In the midst of heightened interest in the United Nations' Sustainable Development Goals (SDGs) and Environmental, Social and Governance (ESG) investments, we, the Nippon Steel Group, find it extremely important that we promote business activities that contribute to the realization of a sustainable society. This is also one of major initiatives of our 2020 Mid-Term Management Plan. In this Sustainable Report 2019, we are pleased to present our wide-ranging initiatives in regard to the Environment, Social, and Governance 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. We 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.

We particularly recognize climate change issues as a grave challenge that threatens humanity. We are therefore contributing to these issues with our “Three Ecos” initiatives and “innovative technology development.” The “Three Ecos” consist of Eco Process (taking up the challenge of further improving our already global-highest energy efficiency during manufacturing stage for CO₂ emission reduction), Eco Products (demonstrating energy-efficiency performance as final products made of our steel materials, such as by weight reduction), and Eco Solutions (disseminating our environmental technologies overseas and contributing to global environmental improvement). Our “innovative technology development” is aimed at providing advanced technologies and products that contribute to both preservation of resources and materials and reduction in environmental impact from the mid- to long-term perspective. We believe that those initiatives can be an effective response to climate change risks as well as creation of opportunities. We are therefore eager to contribute to the global environment by continually reducing environmental impact in

steel production and by offering our superior products and technology in Japan and overseas for use by others.

In November 2018, the Japan Iron and Steel Federation formulated a long-term vision for climate change mitigation, “A challenge towards zero-carbon steel.” As a core company in this endeavor, we are taking up the challenge in developing hydrogen reduction steelmaking technology, which enables zero CO₂ emission during steelmaking. We are also promoting the “Creation of Sea Forests” and “Blue Carbon” (the carbon captured and stored by oceans and coastal ecosystems) and the development of technology to recycle and convert CO₂ to materials for plastics and fuel. Bold attempts to non-continuous innovations are also a part of our efforts. Further, in May 2019 we signed a statement of support for the Task Force on Climate-related Financial Disclosures (TCFD). We are thus committed to expanding information disclosed on the impact of climate changes as well as on our initiatives related to sustainability issues. One aspect of this is how it can enhance our corporate value.

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. In this connection, recycling systems for steel have already been established and steel is a material from which impurities can be easily removed and which can be endlessly recycled without causing deterioration in quality. Based on the concept of Life Cycle Assessment (LCA) that evaluates environmental impact of steel products over their whole life cycle, steel is a perfect embodiment of a circular economy, being a sustainable material with less environmental impact than many other materials. Recently, the method of evaluation of environmental impact over a whole life cycle has been standardized for certification by both the International Standards Organization and Japanese Industrial Standards. This kind of LCA concept is expected to become more common in the future. 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 contribute to realize 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 impact. Moreover, we actively promote preservation of biodiversity, through the creation of hometown forests in each steelworks and participation in environmental preservation activities in each community.

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.

Undoubtedly, support of our stakeholders is indispensable in our 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. In accordance with the concept of maintaining harmony with local communities, 12 steelworks and research centers are enhancing various initiatives in their respective community, in addition to the corporate-wide initiatives. We are thereby actively working on fulfilling our social responsibilities.

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 have established a corporate governance structure appropriate for the Group's business and important managerial matters are discussed at the Corporate Policy Committee and then decided at the Board of Directors meetings. ESG initiatives, including environmental and social initiatives, as well as enhancement of governance, are considered 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.



Eiji Hashimoto
Representative Director
and President

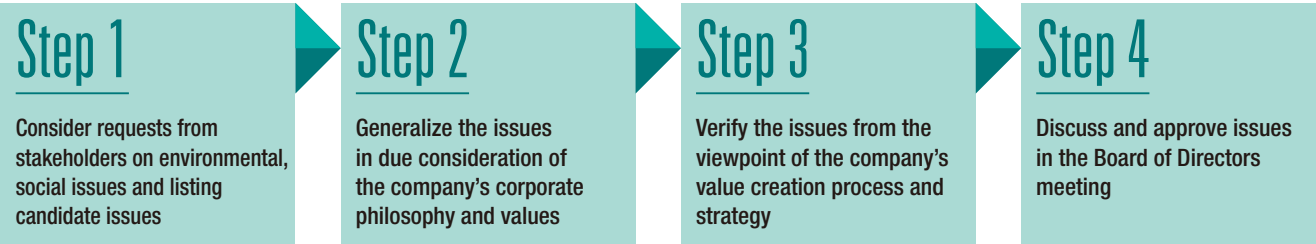
The Base That Supports Sustainable Growth—ESG Initiatives

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 will 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.

Process to identify materiality



Materiality KPIs and status of major initiatives

Materiality			Key Performance Indicator (KPI)	Major Initiatives and Achievements in FY2018		Page
1. Safety, environment, and disaster prevention						
(1) Safety and health			● Accident frequency rate of 0.10 or less ● Zero fatal accident	● Prevention and risk reduction of accidents, based on safety risk evaluation ● Promotion of safer equipment and human error preventive measures (use of IT in safety measures)	● Accident frequency rate: 0.10 ● Number of fatal accidents: 3	p. 42
	1) Promotion of countermeasures to prevent global warming	● Three ecos to reduce CO ₂ emissions	● JISF's Commitment to a Low-Carbon Society's CO ₂ emission reduction target (down 3mn tons-CO ₂ from Business As Usual (BAU) in FY2020 vs. 2005)	● Promotion of Eco Process (enhancement of energy efficiency)	● Down 2.293mn tons-CO ₂ from BAU (JISF result in FY2017)	p. 20
		● Implementation of "Eco Process"	● Maintaining high-level effective use of energy	● Effective use of byproduct gas (coke oven gas, blast furnace gas etc.) and waste gas	● Use of byproduct gas: 100% ● Use of waste gas in steam generation: 76% ● In-house generated energy use in in-house power generation: 81%	p. 26
			● Promotion of adopting advanced energy-saving technology	● Adoption of high-efficiency power generation equipment and oxygen plant; regeneration burner in reheating furnace	● Investment cost for energy-saving: ¥6.0bn	p. 19
		● Enhancement of "Eco Products"	● Supply of high-performance steel products to help reduce CO ₂ emissions through use of their end products	● NSafe™-AutoConcept for next-generation vehicle structure (car body design solution to enable about 30% reduction in weight)		pp. 28, 29, 44
		● Contribute with "Eco Solutions"	● Transfer and dissemination of the world-leading energy-saving technology to help CO ₂ emission reduction globally	● Growing cumulative CDQ delivery record by Nippon Steel Engineering in the group	● 102 CDQ cumulative units (contributing to 19.69mn tons-CO ₂ reduction, FY2017)	p. 31
(2) Environment	2) Contribution to construction of a circular economy	● Realization of zero emissions within the company	● Reduction in final disposal amount (down 70% vs. FY2000; less than 260,000 tons/year in FY2020)	● Promotion of recycling of byproducts (slag, dust, sludge, etc.) in and out of the company	● Final waste disposal: 241,000 tons	p. 34
		● Recycling of waste generated in society	● Contribution to constructing of a recycle system of plastic containers and packaging	● Aggressive promotion of recycling treatment, according to the Chemical Recycling Act	● Packaging/container plastic waste treatment: 180,000 tons (equivalent to 27% of Japan's total plastic waste)	p. 35
	3) Promotion of environmental risk management		● NOx and SOx; Keep low-level emissions	● Installment of equipment that reduces SOx and NOx emissions; shifting to low-sulfur fuel; adoption of low NOx regenerating burners	● SOx: 13mn Nm ³ ● NOx: 24mn Nm ³	p. 36
		● Air environment preservation	● Maintaining of lower discharge levels than voluntary targets in chemical substances VOC (volatile organic compounds): 1,098 tons/year (down 30% vs. FY2000) Benzene: 168 tons/year (voluntary target, along with the government target)	● Continual efforts based on the voluntary reduction plan	● VOC: 615 tons/year ● Benzene: 76 tons/year	p. 38
		● Water environment preservation	● Recycling of water; high-level stable use of recycled water	● Water treatment, recycling and reuse of freshwater used by the company	● Use of recycled water: app. 90%	p. 36
(3) Disaster prevention	1) Elimination of disaster risks and group-wide sharing of effective measures	● Zero serious disaster-related accident	● 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	● Serious disaster-related accidents: 2	p. 43	
2. Quality						
(1) Quality control and guarantee			● Systemization and automation aimed at more credibility in testing and inspection	● Automatic input of inspection results from testing/analytical devices and measurement devices		p. 44
(2) R&D and intellectual property management			● Strategic R&D, aimed at sustainable growth ● Protection and use of intellectual property	● Foundation of the Intelligent Algorithm Research Center (April 2018) ● Internationalization of patent quality; proactive use of overseas-registered patents	● R&D expenditures: ¥72bn (consolidated) ● Number of patents: app. 32,000 (15,000 in Japan and 17,000 overseas)	Integrated Report pp. 43–44
(3) Solution that result in customer satisfaction			● Number of awards from customers, government, and institutions	● The 65th "Okochi Memorial Production Prize," 51st "Ichimura Prize in Industry for Distinguished Achievement" and "Ichimura Prize in Industry against Global Warming for Distinguished Achievement," and 45th "Iwatani Naoji Memorial Award," etc.	● Number of awards from customers, government, and institutions: 14	pp. 44, 54
3. Production						
(1) Stable production and supply			● Initiatives for more stable production and supply (hardware and software)	● Start-up of new upstream process facilities in the Wakayama Works and the Yawata Works ● Standardization of operational skills of veteran workers and active use of experts		p. 45
4. Securing and fostering of personnel						
(1) Respect for human rights, diversity & inclusion			● Number of women as managers (2x by 2020 and 3x by 2025 vs. 2014)	Details in the section "Initiatives for Human Resources Development"	● Number of female managers: 97 (as of April 1, 2019) ● Ratio of women in hired staff: 34% in staff, 17% in operation and maintenance, and 23% in overall hired staff (average of FY2017-2019) ● Hours of training and education: 1.5 million hours/year (56 hours/person, year)	pp. 47, 48
(2) Utilization and fostering of personnel			● Promotion of measures to develop human resources		p. 49	
(3) Health enhancement			● Enhancement of health promotion measures for wellness of employees, and encouragement of employees' own efforts for wellness improvement	● Medical check-up of breast cancer and cervix cancer for female employees	—	p. 50
5. Harmony with local communities and society						
(1) Environmental preservation/creation activities in communities			● Green space development to contribute to the local environment	● Tree planting activities by new employees in steelworks ● Funding for green space development and maintenance	● Greenery space: 830ha ● Expenses for green space development and maintenance: ¥1.3bn	pp. 40, 41 p. 19
(2) Activities mainly in the support of education, sports, and arts			● Ongoing promotion of hosting plant visits	● Proactively accepting plant visits by shareholders, investors, and junior high/elementary school students	● Number of plant visitors: app. 135,000	p. 51
			● Continual execution of corporate philanthropy in the support of music via Nippon Steel Arts Foundation	● Support of music activities via presentation of Nippon Steel Music Awards and operation of the Kiol Hall		p. 52
6. Corporate value enhancement and profit distribution						
(1) Securing of profit and enhancement of corporate value			● ROS of 10% (2020 Mid-Term Management Plan) ● ROE of 10% (2020 Mid-Term Management Plan)	Details in the section "Financial Strategy" in the Integrated Report	● ROS of 5.5% ● ROE of 7.9% ● Base bonus amount: ¥1.53mn ● Salary revision: ¥5,200 (¥1,500 in wage revision + ¥3,700 in periodic wage increase) ● Tax payment (consol.): ¥80.8bn ● Dividend per share: ¥80/year	Integrated Report pp. 15–20 pp. 80–84 Fact Book p. 63
(2) Profit distribution	1) Payment of salary to employees of the company and related/subcontracting companies	● Bonus payment amount ● Revised amount of salary				
	2) Appropriate tax payment	● Tax payment (consol.)				
	3) Dividend payment to shareholders	● 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				Details in the section "Corporate Governance" in the Integrated Report		Integrated Report pp. 51–58

* BAU (Business as usual)

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.



Examples of specific initiatives

	<ul style="list-style-type: none">Job creation through establishment of operating companies in emerging countries p. 7Reduction 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">Pursuit of Eco Processes to help raise resource/energy efficiency and reduce environmental impacts pp. 26–27Introduction of advanced technologies through bilateral cooperation (India, ASEAN, etc.) p. 30Use of steel slag in road materials and materials for civil engineering p. 34
	<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. 41Provision of titanium and stainless steel, which have excellent seawater corrosion resistance, for seawater desalination plants, securing agriculture water		<ul style="list-style-type: none">Thorough compliance training, such as for the Anti-Monopoly Act p. 53Eliminating unfair discrimination, based on the respect on human rights p. 47Expanded hiring of women and non-Japanese p. 48
	<ul style="list-style-type: none">Promotion of air, water, soil risk management and chemical substance management pp. 36–39Development and provision of steel products that contain no substances of concern, such as lead and hexavalent chromium p. 29		<ul style="list-style-type: none">Provision of various indispensable Eco Products for daily lives pp. 28–29Provision of earthquake-resistance steel productsDevelopment of Nonframe method, which protects houses from disaster while maintaining views of nature
	<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. 49Study sessions for teachers, internship for students p. 51		<ul style="list-style-type: none">Promotion of air, water, soil risk management and chemical substance management pp. 36–39Full recycling of by-products, including slag, dust, and sludge pp. 34–35Promotion of recycling of waste plastics and waste tires p. 35
	<ul style="list-style-type: none">More hiring of women in production and other workplaces p. 48Establishment of infrastructure in manufacturing worksites for women to work comfortablyAwareness raising to prevent power harassment and sexual harassment in the workplace		<ul style="list-style-type: none">Pursuit of Eco Processes at the world's highest-level energy efficiency pp. 20–21Development 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 pp. 28–29
	<ul style="list-style-type: none">Recycling and reuse of limited water resources p. 36Promotion of water quality risk management p. 37Provision of titanium and stainless steel for seawater desalination plantsProvision of lining steel pipes for delivery of clean water		<ul style="list-style-type: none">Regeneration of seaweed beds with the use of steel slag pp. 40–41Promotion of sea area environmental improvement with the use of steel slag p. 33Voluntary clean-up activities at seashore nearby steelworksCollaboration with an NPO, "Mori wa Umi no Koibito" (participation in tree-planting, etc.) p. 51
	<ul style="list-style-type: none">Efficient use of energy, such as 100% use of by-product gas pp. 26–27Provision of materials for fuel cells that produce energy from hydrogenDevelopment and provision of steel materials for high-pressure hydrogen to support a hydrogen-oriented society p. 28		<ul style="list-style-type: none">Promotion of air, water, soil risk management and chemical substance management pp. 36–39"Creation of Hometown Forests" to promote greenery within steelworks p. 40Site cleaning activities around steelworks p. 51
	<ul style="list-style-type: none">Taikan Program (an experience-based safety education program) p. 42Promotion of health management programs for employees p. 50Enhanced measures to support the work-life balance, such as for the leave system and life support p. 48		<ul style="list-style-type: none">Bribery prevention guidelines to be established and made well known p. 52Elimination of antisocial forcesThorough confirmation of no use of conflict material p. 46Thorough management of security export control
			<ul style="list-style-type: none">Eco solutions to transfer and spread environmental, energy-saving technologies to emerging markets p. 31Japan-India and Japan-ASEAN regular exchanges among public and private steel-related parties p. 30Support for human resources development to build an energy management system in emerging countries

ESG Report

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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

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)

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

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 risk management

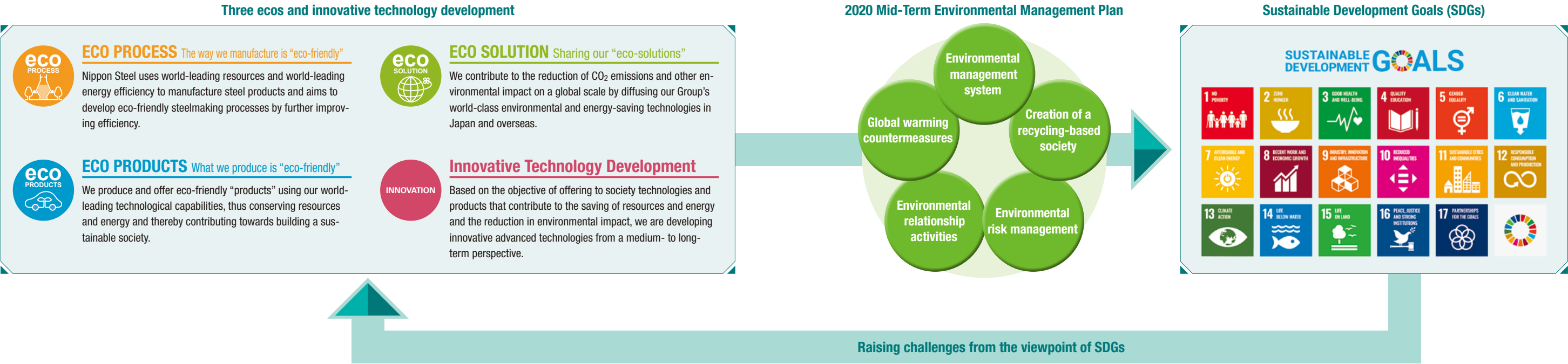
- Promote companywide discussion on environmental risk issues
- Respond to new environmental regulations

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)

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.

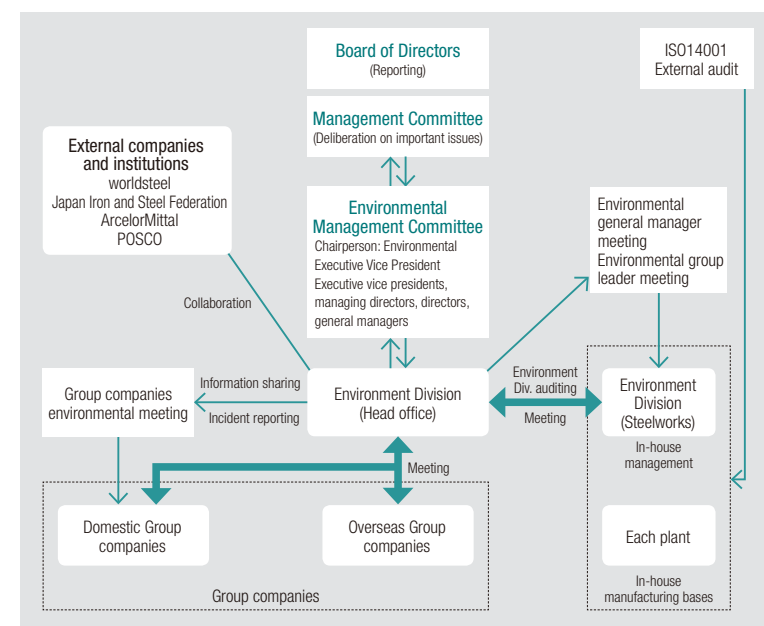


Environmental management structure

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.

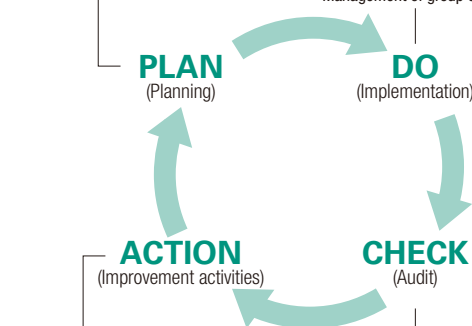
* The Environmental Management Committee consists of four Executive Vice President in charge of Corporate Planning, General Administration, Legal, Human Resources, Environment, Technical Administration & Planning, Plant Engineering and Facility Management, Energy Technology, Research and Development, 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 Management Committee
- Drawing up of an annual policy
- Drawing up of a half-year action plan
- Execution of environmental risk management activities by each steelworks and each group company
- Management of group companies



- Environmental Management Committee
- Group Companies Environmental Conference
- Environmental Management Committee
- ISO14001 audit
- In-house environmental audit and internal audit
- Meeting on Internal control with group companies

Environmental audits

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 58 companies (as of March 2018) 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 FY2018, capital expenditures for environmental preservation amounted to 28.1 billion yen in total, or approximately 6% of the company's capital expenditures. Investment in equipment for environmental measures of 26.3 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

Environmental preservation costs

Item		Definition	FY2018		
			Capital investment	Expense	
Pollution Prevention Costs	Countermeasures against air pollution	Dust collection equipment running costs, maintenance costs, exhaust gas desulfurization and denitration treatment, raw materials yard dust preventive measures costs, etc.	24.9	Total 26.3	44.2
	Countermeasures against water pollution	Electricity charges incurred for treatment of waste water discharged from steelworks, chemical costs, maintenance costs, working expenses (excluding expenses required for treatment of circulated water)	1.4		11.6
Global Warming Prevention Costs	Energy saving measures	Running costs and maintenance costs of energy-saving facilities	1.8	4.2	
Costs of Recycling Resources	Treatment of by-products and industrial waste	Expenses incurred in landfill work, incineration, and treatment of by-products and industrial waste commissioned to third parties	—	7.8	
	Treatment of general waste from business activities	Expenses incurred in the treatment of general waste from business activities	—	0.6	
Environmental Management Activities Cost	Construction of EMS and acquisition of ISO14001 certification	Expenses required for the construction and maintenance of EMS	—	0.02	
	Monitoring and measurement of environmental loads	Expenses required for monitoring air, water, etc., at steelworks	—	1.3	
	Personnel expenditures related to environmental measures	Personnel expenditures for employees in charge of environmental matters	—	2.7	
Research and Development Costs	Development of Eco Products	R&D costs (including personnel costs) for environment-friendly steel products	—	3.7	Total 10.1
	Development of products which have low environmental impact during manufacture	Development costs (including personnel costs) required for measures for by-products and energy conservation technology	—	6.4	
Social Activity Costs	Creating green areas at steelworks	Expenses required for creating green areas at steelworks	—	1.3	2.9
	Supporting environmental organizations, and advertising	Expenses required for environmental publicity and participation in exhibition	—	1.6	
Other Environmental Costs	SOx levy	Payments to health damage prevention businesses specified by the Law Concerning Pollution-Related Health Damage Compensation and Other Measures	—	4.3	
Total			28.1	89.7	
Reference: Net income (consolidated basis)			251.1		

at steelworks. Investment in energy-saving equipment of 1.8 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 89.7 billion yen, including 44.2 billion yen in air pollution prevention costs, 11.6 billion yen in water pollution prevention costs, and 10.1 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 20; water consumption volume, on page 36; and various resources spent, on page 26. 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.

Nippon Steel recognizes climate change as a priority problem that may threaten survival of the human race. Adverse change of the climate may cause serious damage to the global environment. Our business environment and earnings may also be affected. In order to make our operation sustainable, we promote energy conservation and CO₂ emissions reduction throughout the entire supply chain: manufacturing, transportation, and final use of products. We also undertake initiatives to improve energy efficiency in order to alleviate impact from climate change. From a medium- to long-term perspective to reduce CO₂ emissions, we actively work on innovative technology development and transfer of established technology to overseas steel makers.

What we do as a core member of the Japan Iron and Steel Federation (JISF)

The steel industry in Japan shares the Best Available Technology (BAT) related to measures for environmental preservation and energy saving, while each company seeks to enhance its respective initiatives. At the same time, the entire industry strives to globally disseminate its outstanding technology in order to contribute to CO₂ emission reduction of the overall global value chain. It is included in the JISF's commitment to a low-carbon society, which will contribute to global climate change measures.

As a core member of the JISF, we are actively involved in industry activities and international cooperation activities, sometimes in collaboration with the Japanese government. By means of our "three ecos" initiatives, we are promoting reduction of CO₂ emission.

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
FY2017 results	2.29 million tons	29.73 million tons	62.59 million tons
Phase I FY2020	3 million tons + α ^{1,2}	34 million tons	70 million tons
Phase II FY2030	9 million tons ¹	42 million tons	80 million tons

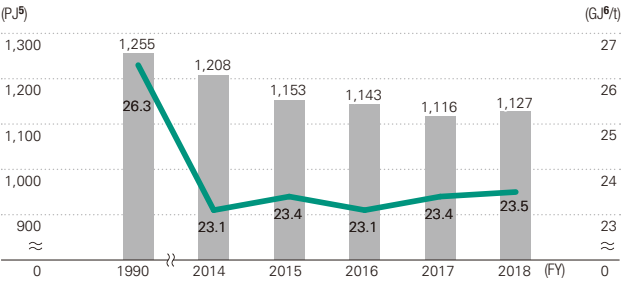
¹ The target reductions in CO₂ emission volume are based on a certain crude steel production assumption.
² The primary focus is on a 3 million ton reduction in CO₂ emissions by steelmakers' own initiatives for efficient use of energy and other ways. Concerning collection of waste plastics and other ways, only an increase in the collected volume compared to FY2005 is counted as the amount of reduction in emissions.

Nippon Steel's current energy-conservation initiatives

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 aged coke ovens and other equipment; introduction of high-efficiency power generation facilities and oxygen plants; conversion to regenerative burners in reheating furnace; and use of waste plastics

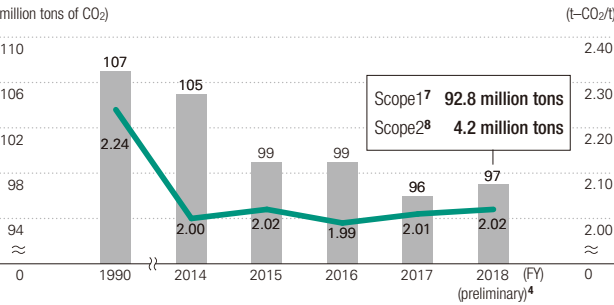
and waste tires. As a result of these continual efforts, the Nippon Steel Group (Nippon Steel, Nippon Steel Nisshin and group electric furnace companies³) consumed 1,127 petajoules (PJ) of energy and emitted 97 million tons (provisional) of CO₂ in FY2018. This performance slightly declined relative to FY2017 due to the impact of the heavy rain and other reasons, but represented reduction of about 10% each compared to FY1990.

Nippon Steel Group's energy consumption



³ Group electric furnace companies, etc.: Osaka Steel Co., Ltd., Sanyo Special Steel Co., Ltd., Nippon Steel Stainless Steel Co., Ltd., Oji Steel Co., Ltd., Nippon Coke & Engineering Co., Ltd., five Cooperative Thermal Power Companies; and two Sanso Centers, etc. (Due to change in companies in 2018, data for prior years were retroactively revised.)
⁵ PJ indicates peta-joules (10¹⁵ joules). A joule is a unit of energy, or amount of heat.
⁶ GJ indicates giga-joules (10⁹ joules)

Nippon Steel Group's energy-derived CO₂ emissions



⁴ Preliminary: A provisional value based on the assumption that the CO₂ level in a unit of purchased electricity in FY2018 is the same as in FY2017.
⁷ Scope 1: Direct emissions from owned sources associated with use of fuel
⁸ Scope 2: Indirect emissions from the generation of purchased energy

Contributing with eco-friendly 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.

Promotion of innovative technology development

Nippon Steel's R&D divisions are engaged in development of innovative technologies as top-down projects in collaboration with universities, public research institutes, and other organizations, for the better future of the earth. In addition to technologies to reduce CO₂ emissions, the projects

Contribution in the global value chain

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 reduction in FY2017 by 19.69 million tons.

Initiatives to achieve the long-term vision for climate change mitigation

As a core member of the Japan Iron and Steel Federation, Nippon Steel played a pivotal role in the development of the Long-Term Vision for Climate Change Mitigation (A challenge towards zero-carbon steel). We have upgraded the COURSE50 project into a SuperCOURSE50 project to take up the challenge of developing hydrogen reduction iron-making which enables zero CO₂ emission in iron and steelmaking.

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)	Stepping up		R&D		Introduction	
H2 reduction ironmaking	H2 reduction ironmaking without using BF		Stepping up		R&D		Introduction
CCS	Recovery of CO ₂ from BF gas, etc.	R&D					Introduction
CCU	Utilization of CO ₂ from steel plant			R&D			Introduction

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

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 public infrastructure. For example, one such product, for embankments, helps protect communities from flooding or high tidal waves generated by torrential

rain or a typhoon. 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

Out of Nippon Steel's cargo volume transported over a distance of 500 km and more, 94.7% are transported by eco-friendly train and ship (not by truck carriers). We also try to improve transportation efficiency by using larger vessels (changing from 700 tons 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 began adopting hybrid-type cargo vessels, equipped with lithium-ion batteries.

Major initiatives in raising efficiency in logistics

	Items of improvement
Reduction in frequency of transportation	Shift to larger transportation means
	Further modal shift (from motor vehicles to vessels and railways)
	Use of larger vessels and vehicles
	Improvement in load capacity
Improvement in fuel efficiency	Improvement in transportation efficiency
	Improvement in actual loading rate
	Reduction for cycle times
	Shortening of transportation distance
Improvement in operation procedure plans	Improvement in engine efficiency
	Shift to fuel-efficient vessels and vehicles
	Adoption of ways to improve fuel efficiency (eco-friendly tires, etc.)
	Turning off of engine when the vessel or vehicle is stopped
	Promotion of economic operation (eco-friendly way of driving, etc.)
	Improvement in productivity in shipment (adoption of two-hanging coil lifters, etc.)

Logistics sector's ton-kilometer achievements for FY2018⁹

	Transportation quantity: 10,000 tons/year	Million ton-kilometers/year	g-CO ₂ /ton-kilometers
Ship	1,897 (54%)	13,388 (88%)	39
Railway	7 (0%)	45 (0%)	25
Truck and trailer	1,641 (46%)	1,873 (12%)	211
Total	3,545 (100%)	15,306 (100%)	

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 Scope 3¹

CO₂ emissions in the value chain are 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
1	Purchased goods and services	17,270	[Amount used of procured iron ore and coal] X [Emissions unit value]
2	Capital goods	1,417	[Amount of capital expenditures] X [Emissions unit value]
3	Fuel and energy related activities not included in Scope 1 or 2	422	[Amount of electric power procured and fuel used] X [Emissions unit value]
4	Transportation and delivery (upstream)	756	[Transportation distance reported in the Energy Saving Law document] X [Emissions unit value]
5	Waste generated in operations	5	[Waste disposal] X [Emissions unit value]
6	Business travel	3	[Number of employees] X [Emissions unit value]
7	Employee commuting	12	[Number of employees] X [Emissions unit value]
15	Investments	848	[Emissions by subsidiaries and affiliates that emit GHG of over 10,000 tons] X [Equity stake of each company]

¹ Scope 3: All indirect emissions (not included in scope 2) that occur in the value chain of the reporting company

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

Waste plastics

Using coke ovens at Nippon Steel's seven 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. ▶ p. 35

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. 34

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. 33, 40, 41

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

Status of climate changes and actions of the steel industry

- Since 2015 when the Paris Agreement that pledged to advance greenhouse gas emission reduction across the world was adopted, institutions in the international community have been required to seek ways to enable sustainable economic and social growth, while restraining impact on the environment.
- Steel is broadly used in our society an indispensable material element for social infrastructure and durable consumer goods, such as road, railway, buildings, automobiles, and home electric appliances. This is because steel has outstanding features required in many aspects as a basic material, such as abundance as a resource, cost advantages, diverse features, low environmental impact in the manufacturing stage, and endless capability for recycling into all kinds of durable products, in addition to having ideal features for building of infrastructure.
- 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).
- In order to achieve goals of the Paris Agreement, the steel industry is required to significantly reduce CO₂ emissions in steelmaking, with an increasing focus on the shift to production by electric furnaces, which have a lower CO₂ emission coefficient than blast furnaces. However, as recognized by international and Japanese industrial standards, namely the ISO and the JIS, the environmental impact is essentially the same for steel products made by the blast furnace (BF) route and by the electric arc furnace (EAF) route. This judgment is based on Life Cycle Assessment that incorporates recycling impact. The BF route remains to be indispensable as discussed above and we thus need to establish technology that realizes lower carbon in its use. Moreover, development of ultra-innovative technology that may break through these routes is also desired for realizing the Paris Agreement's long-term goals.
- In addition to containing CO₂ emission in steelmaking, we are also required to respond to customers' requirements for lightweight, high-strength materials in the automotive area due to tighter environmental regulations and increase in electric vehicles.

Support for TCFD recommendations and Nippon Steel's strategies

- Climate-related risks and opportunities could be significant for many companies' financial positions and the related disclosure could reduce risks of financial destabilization. Because of this, in response to the request from the G20, the Financial Stability Board (FSB) established the industry-led Task Force on Climate-related Financial Disclosures (TCFD or Task Force) to develop climate-related disclosures in December 2015 and the TCFD released its recommendations in June 2017.
- 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.
- Given the international community's commitment to achieving long-term goals of the Paris Agreement, our company 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.
- In order to expand information disclosed as recommended by the TCFD, we analyzed two scenarios (2°C scenario and 4°C scenario²) for a long-term span to 2050 and after. Specifically, we identified our potential risks and opportunities driven by climate change, considered their significance, and organized their impacts and our initiative options related to them. Please see the following page for details on the TCFD scenario analysis.

² 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.

Japan's first lithium-ion battery hybrid cargo ship Utashima goes in service COLUMN

NS UNITED NAIKO KAIUN KAISHA, Ltd. in the Nippon Steel Group launched the Utashima, Japan's first hybrid cargo ship with lithium-ion batteries, in service in February 2019.

The Utashima, a carrier of steel products for Nippon Steel, is equipped with two types of propulsion engines — a conventional diesel engine and an electric-powered propulsion engine, which is also used as a shaft generator. Diesel engine is used to charge batteries by rotating a shaft generator when navigating on the open sea. Inside areas such as the Tokyo Bay, batteries feed power to an electric propulsion engine. This is an energy-efficient hybrid ship that also enables batteries to be charged from the onshore facility and to be used as a power source in harbor. In addition to reducing CO₂ emissions, use of battery power can improve the working environment of crew by being quieter and generating less vibration than when the diesel engine is used, facilitating the rest and work of crew, and eliminating the work of managing a diesel engine.

The Utashima has been furnished with unique, innovative technologies, contributing to solving diverse issues of vessels on domestic routes, and paving a way to realize the next-generation zero-carbon ship, that is friendly to the global environment and ship's crew, and contributing to achieving SDGs.



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* EVs: 342mn units (17% of total) Internal combustion engine vehicles (ICEVs): 1656mn units (83%)	↑ Opportunities in demand growth of steel	■ 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.	■ 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	■ 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.	■ 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	■ Increase in the ratio of use of scrap (25% to 47%*), 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	■ 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, CCU, 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	■ Significant impact for steel being an international product if carbon pricing is adopted.	■ Hydrogen reduction steelmaking and use of scrap to reduce CO ₂ 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	■ 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)	■ 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	■ 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	■ 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	■ 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 ● Material sourcing from multiple regions in the world ● Keeping raw material inventories in steelworks and ships	■ 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	■ BCP measures have been adopted. Limited risks in production disruption caused by natural disaster. Excessively abnormal weather may result in suspension of operation, etc.	■ 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	■ Profit growth by providing products and solutions for National Resilience against earthquakes, tsunamis, heavy rain, typhoons, etc.	■ Enhancement of the Group's product menu and expanding sales in Japan and overseas

- The global steel demand is expected to keep increasing along with mid- to long-term growth of the global economy. Steel production therefore is anticipated to expand toward 2050. In addition, the scenario analysis on the left page has clearly identified expanding needs in steel products and solutions that satisfy demand for lighter weight and higher strength in the automotive area as well as demand associated with electric vehicles and more resilient infrastructure building.
- We have so far promoted what we call the three ecos, namely, Eco Process, Eco Products, and Eco Solution, as well as undertaking innovative technology development, such as COURSE50. Going forward, we will also focus on challenging ultra-innovative technologies, such as Carbon Capture and Utilization (CCU) and hydrogen reduction steelmaking, with the aim of achieving zero carbon steel and carbon recycling.
- By taking these initiatives, we intend to respond to social requests to reduce CO₂ emissions and customers' challenges, while keeping in mind the discussion on carbon pricing. This is our group-wide approach to capture growth opportunities and manage risks. We are committed to make advances along with our mid-term management plan which began in 2018 toward becoming the best steelmaker with world-leading capabilities, by strengthening our superiority in technology, cost, and being global and creating the value of steel.

[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. 24
b) Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.	p. 24
c) Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.	p. 24
[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.	p. 13
b) Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.	pp. 20, 22
c) Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.	p. 13

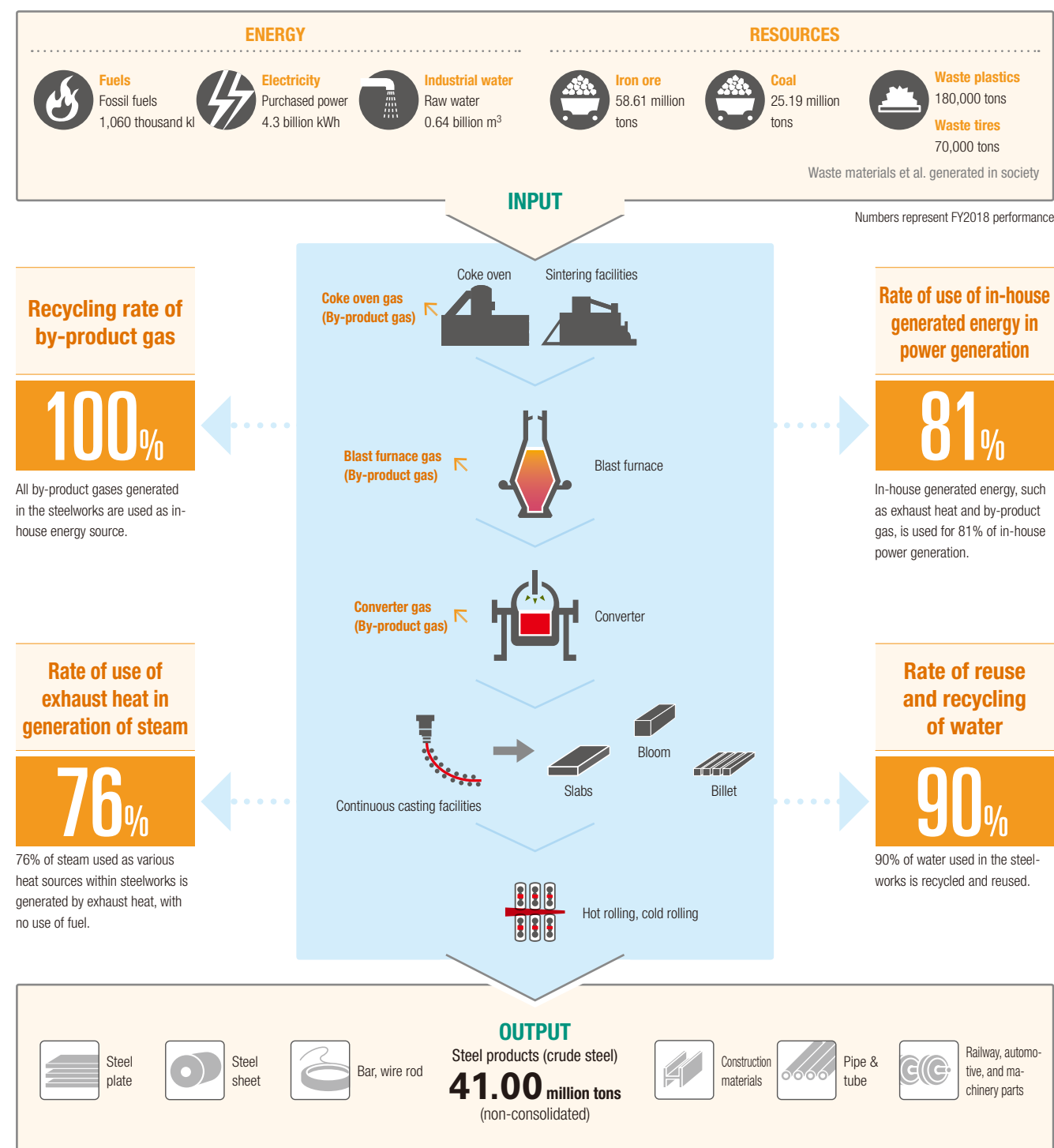
1 Source for EV-related data: IEA ETP2017
EVs only refer to battery electric vehicles (BEVs) with no internal combustion engine (ICE). ICEVs include plug-in hybrid vehicles (PHVs).
2 The ratio of the use of the EAF route is calculated from the estimated crude steel production in the JSF's paper "A challenge towards zero-carbon steel."



ECO PROCESS The way we manufacture is “eco-friendly”

Not wasting any energy

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.



As its main raw materials for steel production, Nippon Steel uses iron ore mined overseas, coal as for reduction¹ 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 88% 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

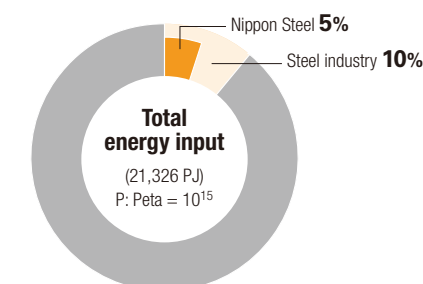
utilizing energy generated within the steelworks, we do our part to reduce CO₂ emissions. 90% of water used for cooling and cleaning products and manufacturing equipment is repeatedly re-used. [▶ p. 36](#)

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, waste tires, 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. [▶ p. 35](#)

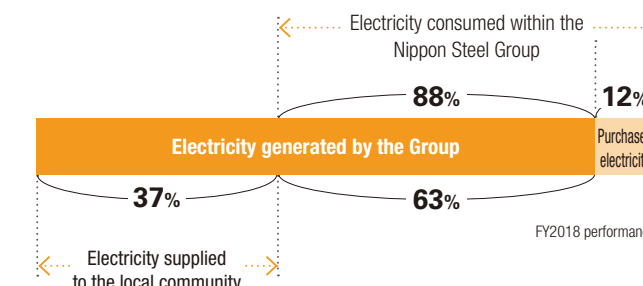
¹ Reduction: Chemical reaction to remove oxygen from an oxide.

Energy inputs

Nippon Steel's share in Japan's total energy input (FY2017)



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



Nippon Steel internally generates **88%** of the electricity it uses.

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

Blast furnaces are huge reactors, using coal

COLUMN

Iron ore and coal are the main raw materials fed into a blast furnace. Iron ore is melted in a huge furnace (height, about 100 meters) and steel is reduced and extracted, but what kind of role does coal play? The main ingredient of coal is carbon, but before it is fed into a blast furnace, it is thermally decomposed in the absence of oxygen (carbonized), effective ingredients such as hydrocarbon oil and gas are separately extracted, and it is turned into coke with high strength and high carbon purity. However, the iron included in iron ore is present as iron oxides. In the blast furnace, a chemical reaction called reduction, which removes oxygen from these 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.**

At present, as there is no reducing agent to replace coal in the industrial production of steel, the generation of CO₂ resulting from the reduction reaction caused by carbon cannot be avoided (iron oxide + carbon → iron + CO₂).

Nevertheless, as the Japanese steel industry, including Nippon Steel, has promoted energy-saving measures such as making effective use of the by-product gases and heat generated in the steelmaking process, it has realized the highest energy efficiency in the global steel industry and at the same time is controlling the CO₂ emissions. We may therefore conclude that making steel in Japan is ecologically wise.

Furthermore, for the above-mentioned COURSE50, we are engaged in R&D activities aimed at using hydrogen as a reducing agent partially replacing coal in industrial production (iron oxide + hydrogen → iron + water). [▶ p. 33](#)





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.

Promotion of measures against global warming (Energy preservation, CO₂ emission reduction)

Nippon Steel is contributing to reduction in CO₂ emissions associated with energy saving and fuel efficiency with its Eco Products, including high-tensile and other high-strength steel products (thinner and light-weighted), high-efficiency non-oriented electrical steel sheets (improved energy efficiency), and stainless steel (for use in the high-pressure hydrogen environment).



High-tensile steel sheets for automobiles

- This material contributes to reduction in weight, higher fuel performance, reduction in CO₂ emissions, as well as assurance of safety of the driver and passengers at the time of collision of a vehicle.
- Achieving both the strength and the formability, high-tensile, easy-to-form steel sheets have been developed and commercialized.
- We plan to start operating a new manufacturing facility for developing and commercializing ultra-high-strength (1.5 Gigapascal-class) steel sheets by 2020.

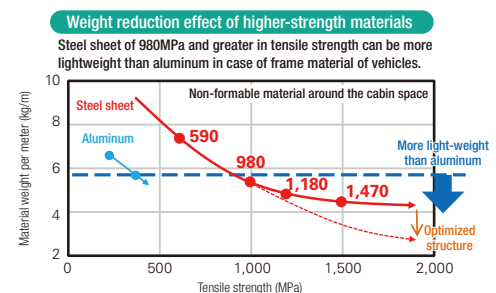
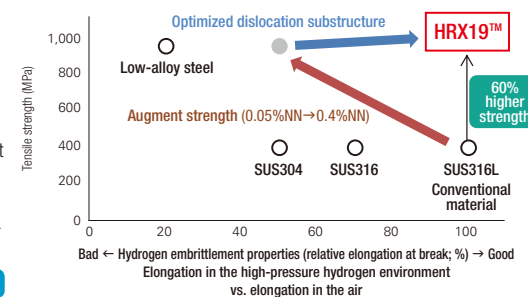


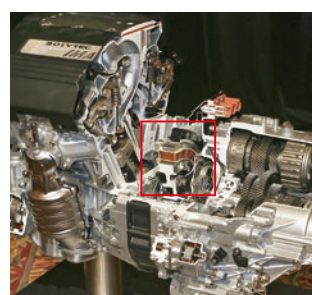
Photo by Iwatani Corporation

Stainless steel for use with high-pressure hydrogen environments

- This stainless steel is an ultimate material that is safe, compact, and has a long product life on top of satisfying features required for a hydrogen station.
- The material has the world's top-level hydrogen embrittlement properties, and is 60% higher strength than conventional materials, and is capable of being welded.
- Through this product, we contribute to establishing infrastructure to realize a hydrogen-oriented society.

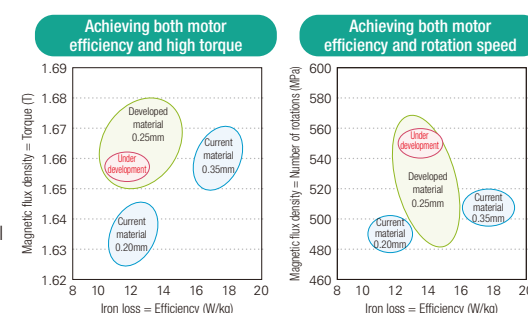


Awards received from outside institutions in FY2018 ● p. 54



Electrical steel sheets

- Nippon Steel's electrical steel sheets are used for transformers, which are indispensable for electric power transmission and distribution, and for diverse motors needed for automobiles, home appliances, and industrial carburetors. The material helps these devices to be smaller and more efficient, which ultimately contributes to energy saving in society.
- We are developing technologies to reduce electrical energy loss (iron loss), by maximizing magnetic properties of electrical steel sheets, used to make the iron core of motors. This has supported electrification of vehicles since a few years ago.



Ultra-high-tensile wires with low environmental impact

- Nippon Steel developed wires that are global top-class in strength (2,000MPa class) and eco-friendly (CO₂ emission reduction, lead-free) by using its proprietary process, in order to respond to needs of society and customers in bridge construction.

Awards received from outside institutions in FY2018 ● p. 54



Steel sheet piles

- NS Eco Piles™ are for civil engineering and construction. They are rotated while driven into the soil.
- Due to low vibration, low noise, and low earth displacement, NS Eco Piles™ were certified for the Eco Mark by the Japan Environment Association in 2007.



Wheelsets (wheels and axles) for high-speed railways

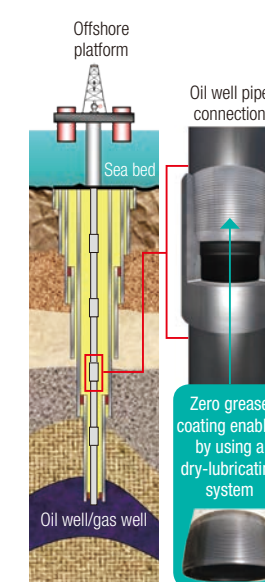
- Nippon Steel manufactures almost all wheels and axles used by railways in Japan. We are pursuing weight reduction by developing hollow axles, for example, and contributing to energy conservation in railway transport.

Nippon Steel's eco-friendly products help reduce environmental impact

Promotion of environmental risk management (Environment preservation, chemical substance management)

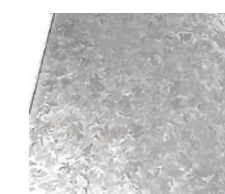
Nippon Steel is contributing to environmental risk reduction by providing products that have properties which were previously attained by adding substance of concern, but now without adding any substance, and products that prevent environmental pollution by their use.

Oil well pipe connections free of hazardous substance CLEANWELL™ DRY



- This grease-free, high-performance dry-lubricating system, used in the mill on the surface of couplings for oil and gas pipes, was developed to reduce marine environment impact on the offshore platform for development of oil wells and gas wells.
- It facilitates continual resource development in areas where there are strict environmental regulations, contributing to environment protection and future stable supply of energy.

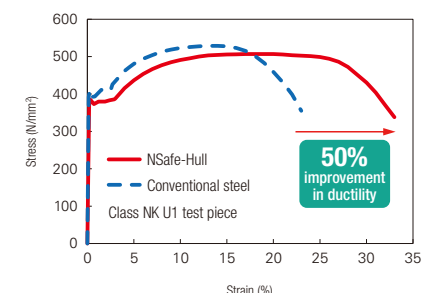
Chromate-free, lead-free galvanizing steel sheets



- These regular spangle-finished galvanizing steel sheets (available only from our company) are chromate-free in addition to being as lead-free as the conventional steel sheets.
- Since the launch in November 2018, the steel's even, aesthetic spangled-surface pattern has been favorably received in the market.

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

- NSafe™-Hull has 50+-% higher ductility than the regulatory required level for conventional steel, and contributes to preservation of marine environment by preventing oil leakage at the time of a ship's collision or stranding.
- Verifying the augmented anti-collision performance enabled by use of highly-ductile steel plates in advanced simulation and structural models, NSafe™-Hull has been adopted for the first time in the world in leading-edge ULCCs (Ultra Large Crude oil Carriers) and large-sized bulk carriers that require high collision safety.



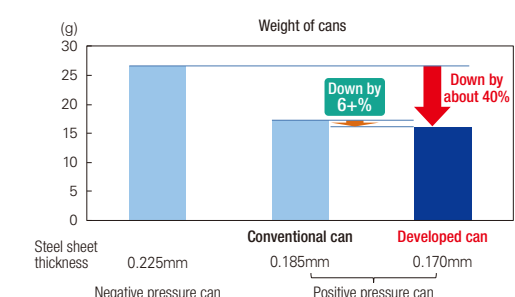
Participation in the creation of a circular economy (Longer product life, recycling)

Nippon Steel is contributing to the creation of a circular economy by providing anti-corrosion, highly-durable products that adapt to the usage or the environment to use them for their longer product life, and by providing steel with high recyclability and diverse added features.



Light-weight steel cans

- The steel can, jointly developed by Toyo Seikan Co., Ltd. and Nippon Steel, is the lightest can in the industry. It weighs 16.2g (excluding a lid) and is about 40% lighter than a general negative pressure can and over 6% lighter than a conventional low positive pressure can. This steel can contributes to reduction in CO₂ emission in manufacturing and transportation.
- Products that use this type of steel can have been in the retail market since May 2018 and are anticipated to be adopted more in the future.



New-type corrosion-resistance steel

- CORSPACE™ steel enables to extend the repainting cycle by two times, contributing to reduction in life cycle cost. Its thin film also contributes to lower environmental impact.



Highly-durable galvanized steel sheets SuperDyma™

- This material has over four times durability than the conventional products and are widely used outdoors and areas with salt damage. The sheets' cut surface also has excellent anti-rust effects, resulting in no need for coating after being processed and contributing to reduction in life cycle cost with shorter construction period and longer product life.



Anti-corrosion processing with titanium foil

- By applying anti-corrosion titanium foil, this metal's surface is well protected to extend a product life. The above photo is an example of its processing to be adopted to a 122-year-old lighthouse.

Awards received from outside institutions in FY2018 ● p. 54



ECO SOLUTION Sharing our “eco-solutions”

Technical cooperation and technology transfer promoted on a worldwide scale

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

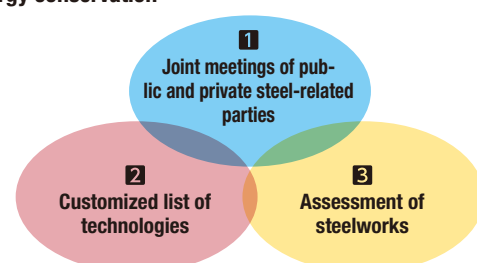
Japan's steel industry, including Nippon Steel, plays a leading role in the Global Sectoral Approach¹, a worldwide initiative to preserve the environment and conserve energy based on technologies accumulated in the steelworking industry. Japan's steel industry can contribute to reduction of CO₂ emission 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 62.59 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 energy-saving 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 co-operation 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 FY2018, joint meetings have been held 9 times in India and 11 times in six ASEAN countries.



India (since 2011)
The public and private collaborative meeting between Indian and Japanese iron and steel industry

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 FY2018, the JISF has conducted assessment of 11 steelworks in India and 14 steelworks in six ASEAN countries.

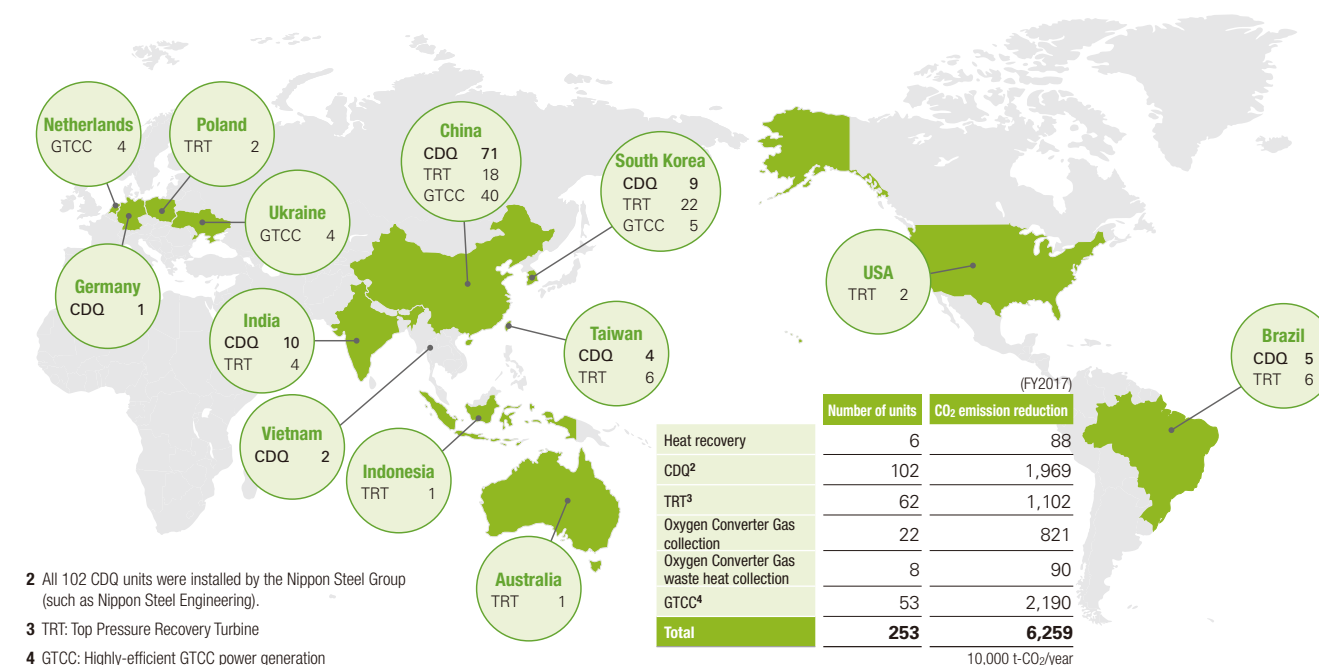


Nippon Steel also participates in the Climate Action Program of the World Steel Association, which uses universal methods to calculate and report on the CO₂ emitted by steelworks. We have been selected as a Climate Action member. Recently, quite a few customers have sought confirmation that their steelmakers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

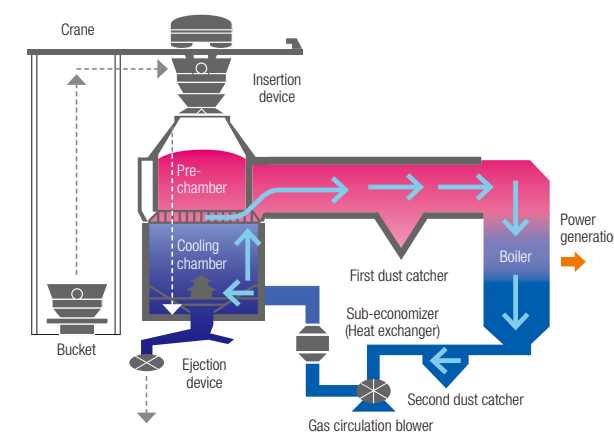


Climate Action member certificate

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



Coke Dry Quenching (CDQ): system and features

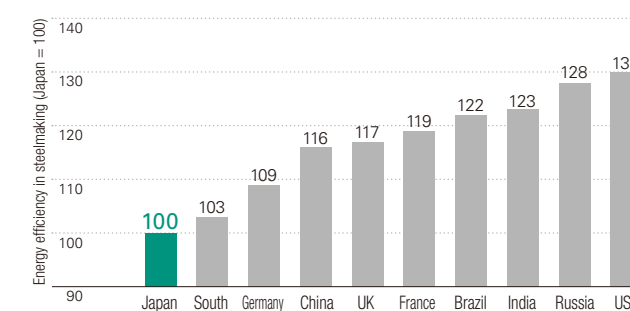


Hot coke made in the coke oven is transported in a bucket to the CDQ equipment where it is injected from its top part down to the chamber. The coke is quenched with inert gas, while the hot gas (approx. 950°C) from the exhaust heat is collected, and transferred to the boiler where it generates steam 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.)

INNOVATION Innovative Technology Development

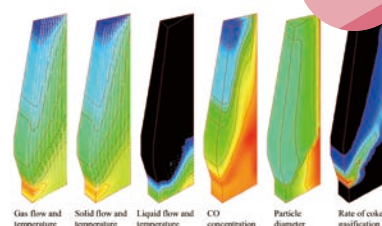
Since the 1970s, Nippon Steel has been striving for energy saving and reduction of CO₂ emission. At present, we are developing innovative technology that will enable us to make zero-carbon steel¹ by 2100. This effort has the four aspects of 1) reducing CO₂ emission, 2) separating and recovering CO₂,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



Development completed

Next generation coke oven Scope21

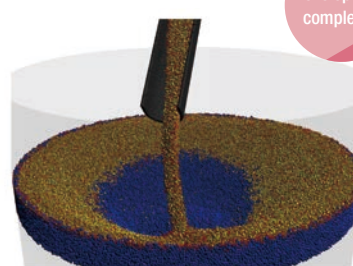
We developed the next-generation coke oven that uses an advanced coke-making technology, including prior rapid heat treatment of coal, and enabled significant energy saving. The first commercial models started operation in the Oita Works in 2008 and the Nagoya Works in 2013.



Development completed

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.



Development completed

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 Yawata Works in 1976.



Development completed

2010

CO₂ separation and recovery

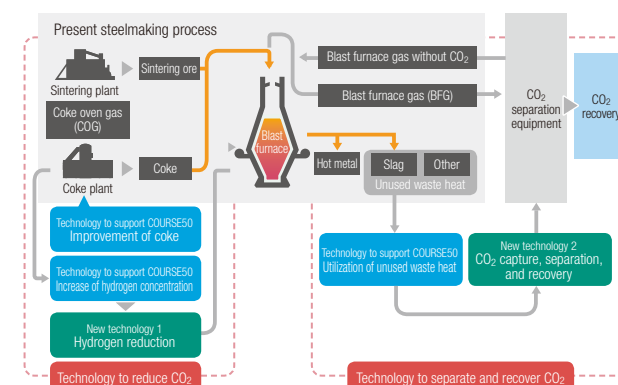
Commercializing ESCAP™ (Energy Saving CO₂ Absorption Process)

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.



Development completed

2020



Under development

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

Since 2008, the COURSE 50 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 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.

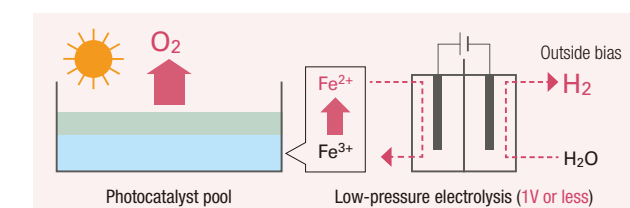
² Commissioned project by the New Energy and Industrial Technology Development Organization (NEDO)

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

2100

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

Technology to incorporate the photocatalytic technology in electrolysis in order to produce hydrogen through electrolyzing water. Use of solar energy enables reduction in use of electric energy.

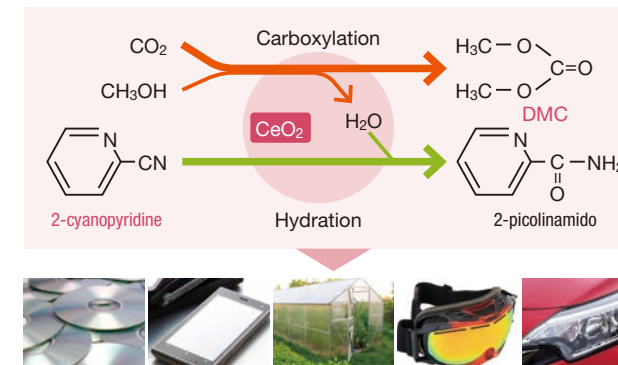


Under development

CO₂ recycling

Research on producing raw materials for plastics from CO₂

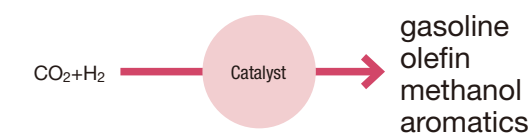
Technology to synthesize a carbonate ester (shown as DMC, or dimethyl carbonate in the figure below) from CO₂ and alcohol. Polycarbonate and other compounds are made from carbonate ester.



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

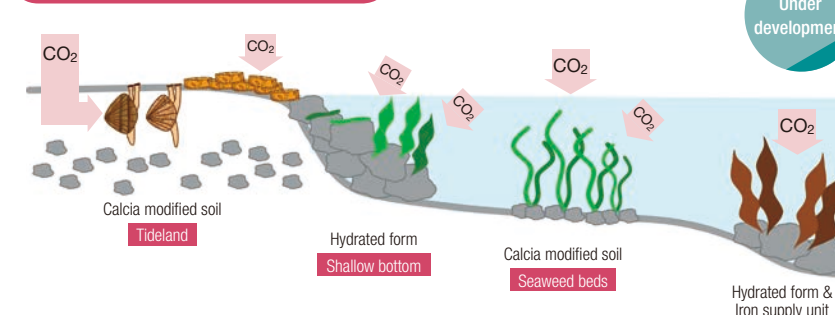
Carbon fixation

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.

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.



Under development

1970

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

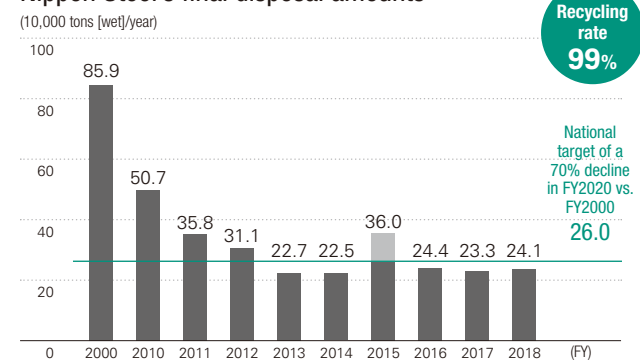
Steel, a material, used in great quantities in many kinds of products around us, is actually an eco-friendly material not only in its production but also in disposal of its products since almost all used steel is recycled endlessly into all kinds of products. As it is easy to remove impurities from steel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

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 FY2018, Nippon Steel produced 41 million tons of crude steel and generated 24.35 million tons of by-products. The majority of these by-products were recycled inside and outside the company. As a result of these efforts, our final disposal of industrial waste was reduced to approximately 240,000 tons, that is below the 260,000 ton government target. We reached a very high recycling rate of 99%. We intend to continue reduction of final disposals.

Nippon Steel's final disposal amounts



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

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.

natural crushed stone and less energy consumption in the cement making process, steel slug 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 the beneficial effects of improving the strength and inhibiting the elution of phosphorus, the generation of hydrogen sulfide, etc. in dredged soil. It has also been used to improve the marine environment, including restoration of seaweed beds and creation of wetlands and tideland. In addition, Nippon Steel's Beverly™ 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 Kashima Works and a rotary hearth reduction furnace (RHF) at Kimitsu Works, Hirohata Works, and Hikari Works. 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 (FY2018)

By-product	Amount generated (wet weight – million tons)	Recycling application	Recycling rate
Blast furnace slag	12.16	Blast furnace cement, fine aggregate, road base, etc.	100%
Steelmaking slag	5.40	Road base, civil engineering materials, fertilizer, etc.	99%
Dust	3.17	Raw materials for use in-house and also zinc refining	100%
Sludge	0.48	Raw materials for in-house use	88%
Coal ash	0.50	Cement raw materials, construction materials	100%
Waste furnace materials	0.35	Reuse, road base, etc.	81%
Others	2.30	In-house use, others	99%
Total	24.35	Total recycling rate	99%

¹ Fine dust collected with a dust collector

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

Recycling of waste generated by society

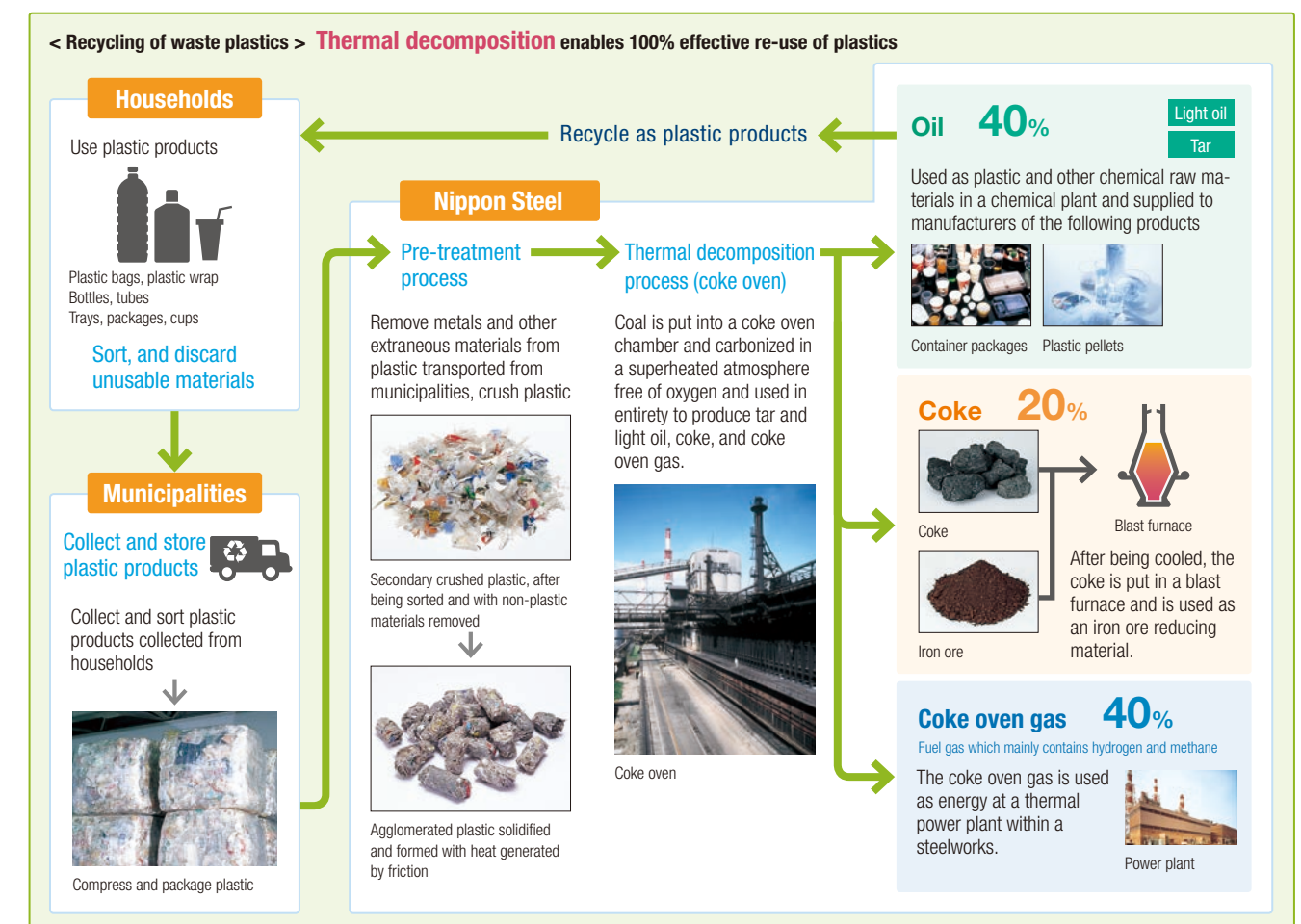
Waste plastics

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 FY2000–2018 was approximately 3.07 million tons, equivalent to 9.80 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.

Moreover, our plastic recycling plant in each steelworks is open for visits by the public. The Kimitsu Works, being located close to the Tokyo Metropolitan Area, welcomed about 9,300 visitors in FY2018, 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 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 in April 2018. In FY2018, we confirmed conformity with the voluntary management standard at all facilities subject to the voluntary initiatives. These evaluation result in FY2018 are disclosed on the JISF's website. Through such efforts, we strive to prevent mercury emission into the air.

Water risk management

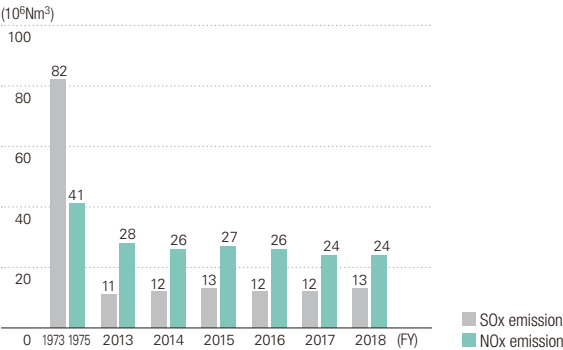
Nippon Steel uses approximately 6 billion m³ of freshwater a year at all of our steelworks and factories combined. Approximately 90% of this is re-circulated or reused. We try not to waste precious water resources, and to control wastewater discharge. To achieve this, we make daily efforts to maintain and improve the performance of wastewater treatment equipment, and the inspection and control of wastewater quality.

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.

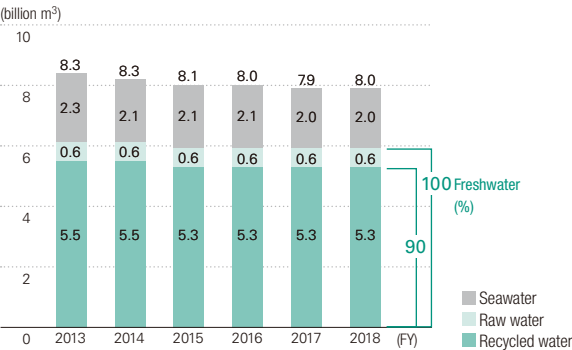
Moreover, our steelworks have taken measures, such as to install a large storage tank so that water tainted with iron ore powder would not directly be released into the sea even if our steelworks were struck by a local torrential rain caused by weather abnormality.

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 to maintain and manage it in a sound condition. In areas with potential risk of leakage of water which may exceed permissible levels of contaminants, a board or sheet water barrier may be installed so as to prevent leakage even if a crack develops on the embankment.

Emission of SOx and NOx



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



Prevention of scattering of materials and dust

Spraying of water and chemical in coal yards

Sprinkler trucks

Road cleaning trucks

Windbreak net at yards

Electric dust collectors

Dust collectors with bag filters

Wet type desulfurization equipment

Active coke dry type desulfurization equipment

Low NOx regenerative burners

Waste water coagulating sedimentation treatment equipment

Pressurized flotation system

Activated sludge treatment equipment

Filtration equipment (secondary treatment)

Waste water automatic monitoring equipment

Waste water closing gate

Rainwater effluent treatment facility

Checking of embankments

Repair of the damaged area of embankment

Environmental measures at steelworks

Countermeasures against air pollution

Water purification; prevention of abnormal waste water

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

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

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.)

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

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

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

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

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

Organic matter is decomposed and eliminated by bacteria.

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

Undissolved residue from rainwater is coagulated and eliminated.

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

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

Soil risk management

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

Starting in 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 PRTR Act¹, Chemical Substance Control Law², and other laws concerning the management of chemical substances as well as the procedures employed. According to the targets of the PRTR Act, 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 Control Law, we identify and provide notification of the amounts of production and sales of the targeted chemical substances.

Nippon Steel also took the lead to promote use of alternatives to steelmaking materials and equipment that contain hazardous materials such polychlorinated biphenyl (PCB) and mercury. We have been replacing or disposing of possibly risky parts and materials, according to safe handling standards.

Management of discharged based on the PRTR Act

In 1999, two years before the enforcement of the PRTR Act, 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 PRTR Act, we monitor 462 chemical substances and try to control their emission and improve the way we manage it. In FY2018, there were 52 target substances for notification and the emission amount was 420 tons into the atmosphere and 39 tons to public water areas, while the disposal amount of mostly manganese, chrome, other metals, and their compounds to outside of the steelworks was 5,307 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

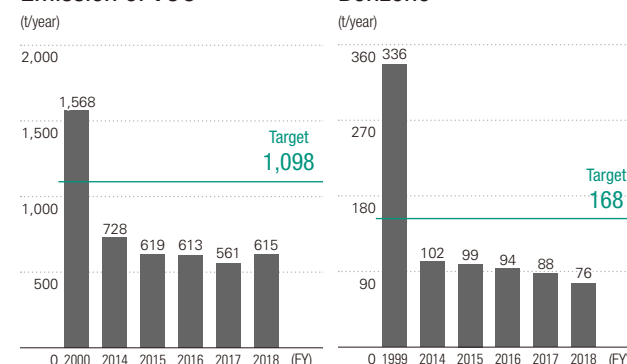
• Dioxin

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



¹ PRTR Act: An abbreviated name of the Act on Confirmation, etc., of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof. PRTR stands for Pollutant Release and Transfer Register.

² Chemical Substance Control Law: An abbreviation of the Law Concerning the Examination and Regulation of Manufacture of Chemical Substances.

³ Volatile organic compounds (VOC): Organic chemical compounds emitted into the atmosphere in the form of gases, which are considered to be the source of undesirable airborne particles and photochemical oxidants, which became subject to control under the Air Pollution Control Act of 2004, as amended.

Appropriate treatment of industrial waste

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

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

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

Environmental measures taken in steelworks

COLUMN

Reduction in emissions of SOx and NOx

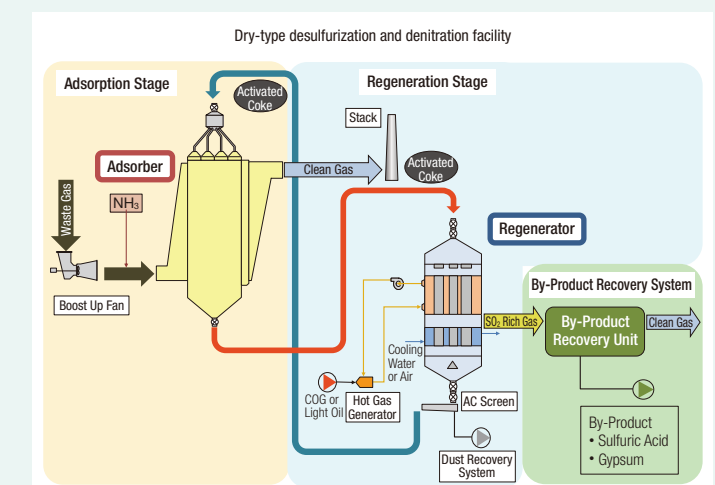
Nippon Steel takes measures to reduce emissions of sulfur oxides (SOx) and nitrogen oxides (NOx). With each local municipality where we make steel, we have entered into an agreement which includes more stringent contents than the total emission control standards stipulated by the Air Pollution Control Act. In order to control the emission amount at lower levels than agreed upon, we have implemented effective equipment-related measures such as using low-sulfur fuel, adopting equipment that reduces SOx and NOx emissions and low NOx generating burners, and installing exhaust gas treatment equipment.



Nagoya Works, Dry-type desulfurization and denitration facility

[Example: Dry-type flue gas treatment equipment (Dry-type desulfurization and denitration facility)]

The activated coke loaded in the absorber falls slowly from the top to the bottom of the absorber where it comes into contact with the horizontally flowing flue gas, while absorbing and removing environmental pollutants, such as SOx and dioxins. Moreover, by injecting ammonia (NH₃) into the flue gas, the catalytic activity of the activated coke decompose NOx into water (H₂O) and nitrogen (N₂). Activated coke that has absorbed environmental pollutants is discharged from the bottom of the absorber and transported to the regenerator by a conveyor. It is heated in the regenerator in an inert atmosphere to desorb SOx and decompose dioxins into harmless substances. In downstream processes, SOx is recovered as concentrated sulfuric acid or gypsum, which are valuable byproducts.



Coping with water risks

Nippon Steel makes efforts to continually reduce water usage volume and enhance efficiency in its usage, with the aim of reducing environmental impact.

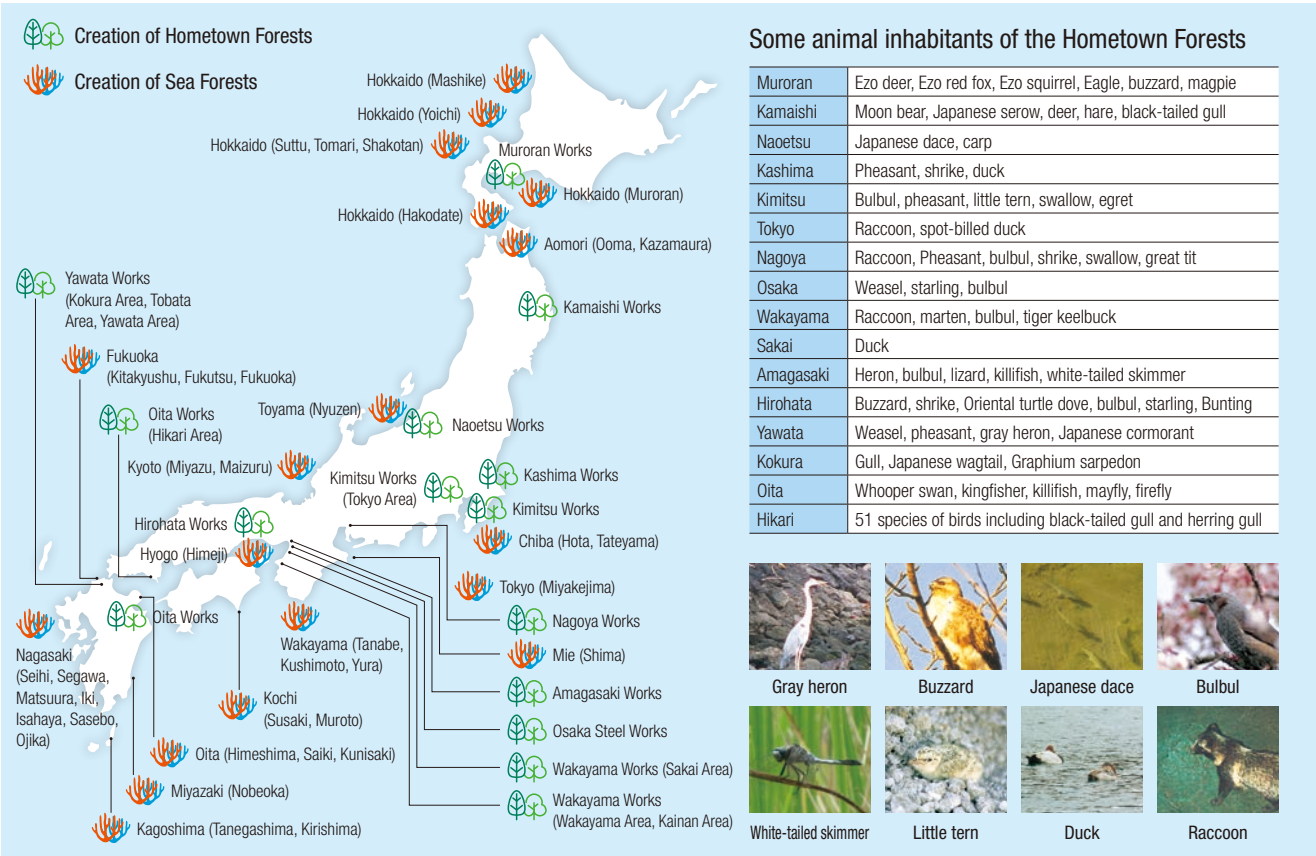
Our operational bases are spread across Japan. The World Resources Institute (WRI) Aqueduct has evaluated that our steelworks are not exposed to water stress and that only one steelworks is located in a high-risk site. (This steelworks' water intake volume represents less than 0.1% of our total volume.) Some of our steelworks possess their own water reservoir, in preparation of the remote chance of water intake restriction.



Yawata Works, Kawachi Reservoir

“Creation of Hometown Forests” and “Creation of Sea Forests”

As a member of Nippon Keidanren (Japan Business Federation), Nippon Steel participated in preparing the “Declaration of Biodiversity by Keidanren” published in March 2009, and has taken initiatives on biodiversity preservation according to its declaration and action policy. Among them, interesting programs thus far are “Creation of Hometown Forests” and “Creation of Sea Forests,” the world-leading pioneer projects.



“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

Sea desertification, a problem of the sea bed losing ability to support life due, in the case of Japan, to a decline in kelp, brown seaweed, and other varieties of seaweed, is happening along about 5,000 km of the coast in various parts of Japan. To offset a part of the decline in the supply of iron from nature, which is said to be one of the causes for sea desertification, Nippon Steel has developed and uses the Beverly™ Unit to promote regeneration of seaweed beds. The Beverly™ Unit provides iron ions, which are required for growing seaweeds, in the form of humic acid iron. Humic acid iron is the combination of iron ions and humic acid in the soil of a land forest. By using steel slag and humic substance originated from waste wood, we artificially generate the humic acid iron and provide it to help develop a seaweed bed.

Safety of the Beverly™ Unit has been certified by the Safety Check and Certification System of steel slag products, stipulated by the National Federation of Fisheries Cooperative Associations.

Steelworks’ community contribution activities

Participating in “Creation of a Hometown Forest” in local communities

Nippon Steel’s Amagasaki Works has participated in the Amagasaki 21st Century Forests Project, together with local municipalities, companies, and NPOs, under Hyogo Prefecture’s greenery promotion project, since FY2016. By FY2017, the reforestation area reached 14,552m², exceeding the size of the grounds of the Yankee Stadium. The Amagasaki Works endorsed the concept of a newly-added “large-scale urban greenery promotion business” in Hyogo’s project and planned to make a green space of over 1,000m², at the time of celebrating its 100th anniversary in September 2019.

Due to these initiatives, Nippon Steel received the Encouragement Award of Japan Greenery Research and Development Center at its 37th National Convention for the Promotion of Factory Greening.



Participation in ecological preservation activities in the community

Since 2012, the Nagoya Works of Nippon Steel has participated in the Inochi-wo-Tsunagu (Life Sustaining) Project, which consists of the students’ planning committee, 11 companies, Eco-Asset Consortium and Japan Ecologist Association of Support (NPO). This project seeks to develop an ecosystem network to links green areas at each company site and vicinity. To thereby increase the potential of the linked areas, an animal pathway was established and a fixed-point observation camera has recorded raccoons coming and going through the pathway.



The project also included experience-based activities, including corporate greenery visits, fun-filled learning events for families, and craft-making events. Being highly evaluated 1) as a community-building, corporate-government-student alliance, 2) for its creation of an ecosystem network in multiple companies’ extensive, combined greenery space, and 3) as a model suitable for use elsewhere, the project has received the 46th Environment Award (Special Jury Award), co-sponsored by National Institute for Environmental Studies (NIES) and the Nikkan Kogyo Shimbun newspaper, and supported by the Ministry of the Environment.

Tree planting by new employees

In the Kimitsu Works in Chiba Prefecture, new employees plant trees every year as a part of their environmental education. In FY2018, 208 participants including instructors planted several species of evergreen and broadleaf trees.



“Creation of Sea Forests” began in Mashike Town

A decline in kelp seabed due to lack of iron on the coast of the Sea of Japan in Hokkaido had been identified long ago. As a countermeasure, Nippon Steel has developed the Beverly™ Unit, an iron supply material, through joint research with the University of Tokyo.

We began experimental use of the product in Mashike Town, Hokkaido in 2004, continued observing development for more than 10 years, and confirmed restoration of a kelp seabed and its subsequent preservation. In 2014 the project was expanded to a 300-meter-long coastline. We have confirmed growth of the kelp seabed every year as well as an increase in concentration of iron, expansion of seaweed area, and an increase in the harvest of sea urchin. If we can contribute to sustainable recovery of fishery not only by a restoration of the sea bed but also by returning of but also herring for spawning in the restored kelp seabed in addition to sea urchins, and if the desertified sea bottom areas



Deserted sea bed

can be thus restored, the effect to steadily support bio-diversity can also be anticipated.



Installing iron supply units

By mixing with humus, the iron eluted from steel slag is prone to be absorbed by plants without becoming oxidized.



After one year, kelp is flourishing at Mashike Town in Hokkaido

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.



Well-grown rice paddy with steel slag fertilizers

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.

Under the OSHMS, we make policy, define targets, and develop a plan for the safety and health policy, implement a PDCA cycle, and drive continuous improvement. We are now considering obtaining the ISO (JIS Q) 45001 Health and Safety certification (published in March 2018) for all our workplaces. At present, about 40% of our offices and works have obtained OSHMS certification by a third party.

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 counter-measures 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 FY2018. There were 10 accidents for Nippon Steel's employees¹ and 10 for employees of subcontracting companies (including one fatal accident for Nippon Steel and two in subcontracting companies) The accident frequency rate was 0.10 (compared to Japan's steel industry average of 1.16) and the accident severity rate was 0.11 (vs. 0.21). We will continue to strive for a safe work environment with the safety well-ness targets for FY2019 that are zero fatalities/severe accidents and less than 0.10 as the accident frequency rate.

Target

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

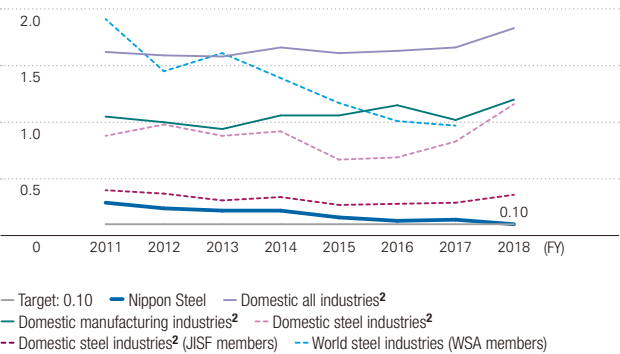
Safety training

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 and 91 in FY2018). 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>

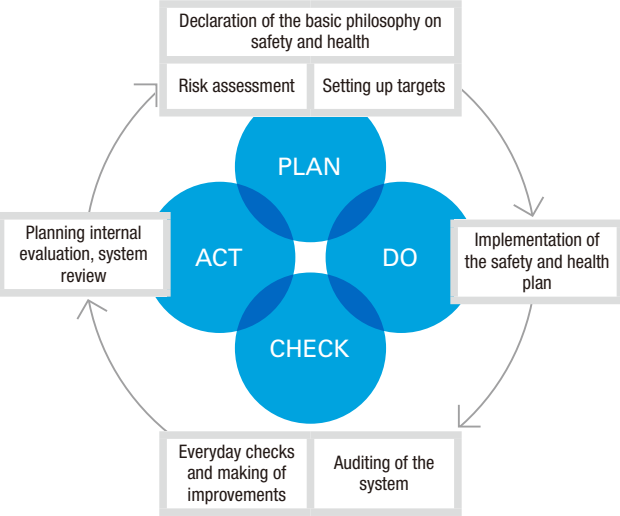
Accident frequency rate



- 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"

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

Occupational Safety and Health Management System (OSHMS)



Disaster Prevention Initiatives

In November 2014, we established the Plant Safety Division, with the objective of promoting essential disaster prevention improvement measures in manufacturing sites for solving challenges related to disaster prevention risks. The following three areas remain to be the focus in promoting the activities.

Three initiatives for risk reduction in disaster prevention

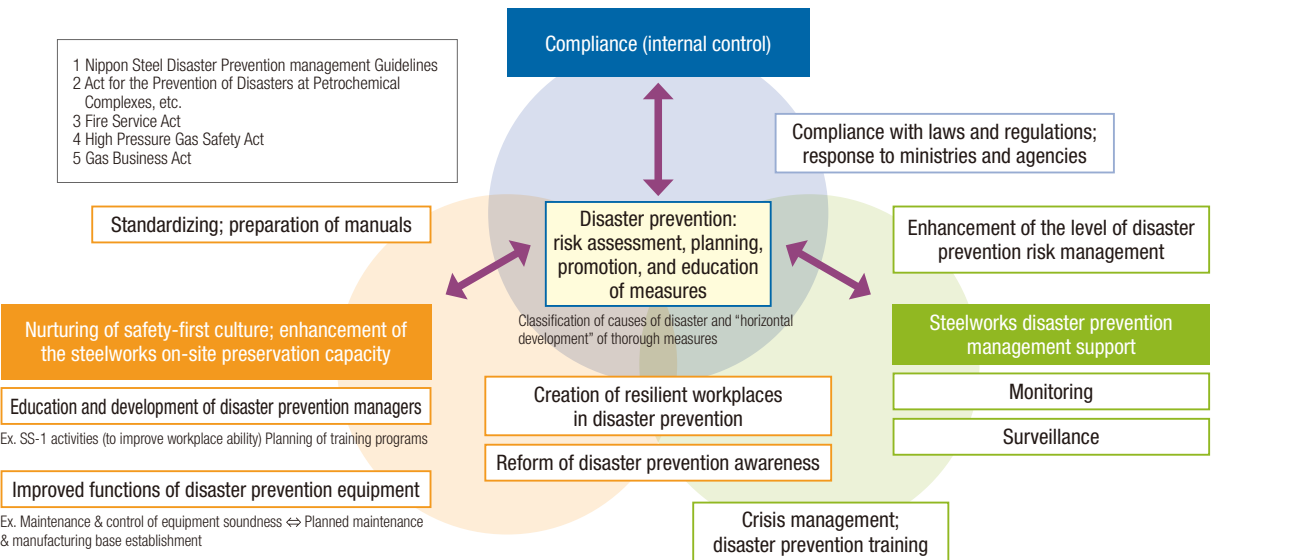
- 1 Corporate-wide implementation of measures against risks that emerge from instances of disaster, to prevent recurrence
- 2 Identification of disaster occurrence risks based on risk assessment plant by plant and by each of their process technology divisions; and implementation of measures in software and hardware to reduce risks and control residual risks
- 3 Voluntary monitoring (auditing) concerning appropriate implementation of points 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

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 (about ¥20 bn/year)
- 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
 - Develop policy to address conditions when a Nankai Trough earthquake emergency warning or alert is announced and act under the policy
- 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; visits to a plant where a disaster/accident happened

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

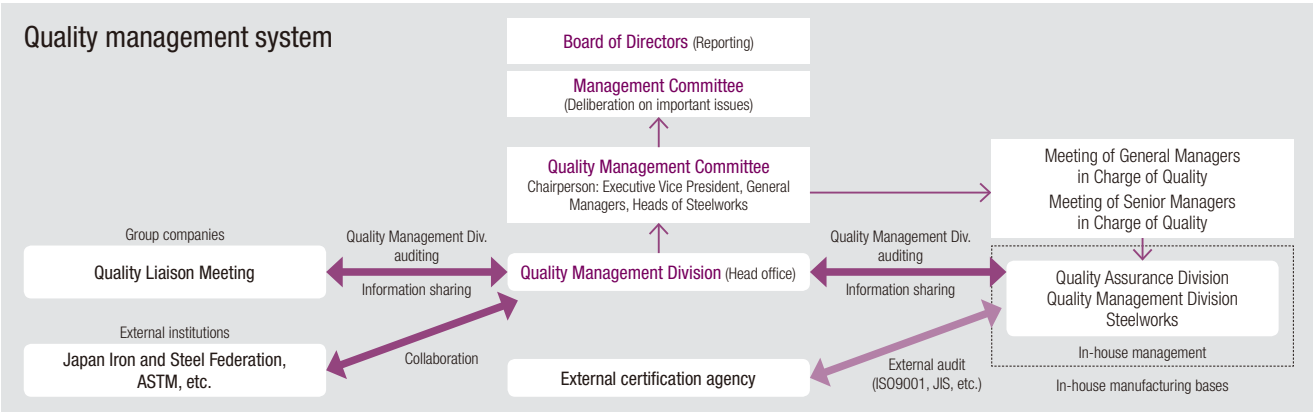
Nippon Steel's quality management system is based on autonomous, voluntary quality management activities of each product type business division of a Group company, including overseas ones and each steelworks. The status of each is checked through auditing of the Quality Management Division in the Head Office. The key points of this inspection include compliance with the guidelines* 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 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.

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



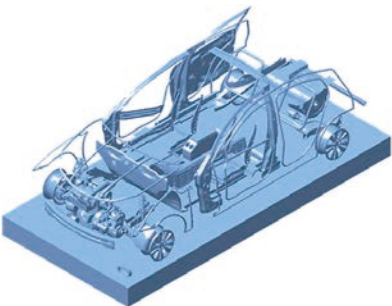
Enhancing customer satisfaction

Nippon Steel provides diverse solution proposals that can result in customer satisfaction. For example, seeing automakers' increasing needs for lighter car bodies and collision safety, electric and other energy vehicles, and spread of autonomous driving, we studied the automotive industry's drastic changes as our starting point for business evolution, taking the initiative to discover and derive ideas for automotive manufacturers to consider. We then assumed parameters of the performance required for next-generation vehicles and each of their components, combined the elements needed for a component structure that maximizes performance of materials with the processing technologies that enable them, and ultimately established the "NSafe™-AutoConcept," a new steel structure concept for next-generation vehicles. With the "NSafe™-AutoConcept," we propose how to enhance added value of the entire vehicle — from fuel/electric efficiency performance to collision safety, operation, sound vibration/silent performance — centered around solutions for lighter vehicles by raising the performance of each material. Through provision of materials and solutions that cope with social and industrial changes, we will continue efforts to enhance our technological capabilities in order to play a role as the best partner to the automotive industry and to help design future vehicles.

NSafe™-AutoConcept

Using advanced grades of material and solution technologies, Nippon Steel developed NSafe™-AutoConcept, by processing originally-designed components for a future vehicle

- Stronger Safety
- More flexible Comfort
- More friendly Eco-friendliness
- Lighter Lightweight



Toward More Stable Production

Nippon Steel has been implementing diverse measures for restoring strength in manufacturing to make production more stable. In the recent several years, however, reduced production, caused by problems, continued and the level of crude steel production were depressed at the 41 million ton level in FY2018 (on a non-consolidated basis). Measures were taken and we continue to do what is needed to improve the situation.

Working for stabilizing production (restoring strength in manufacturing)

Measures in hard aspects

Strengthen domestic manufacturing capabilities

- 1 Yawata Works: Start operation of a leading-edge continuous casting facility. A blast furnace and steelmaking facility in the Kokura area of the Yawata Works is planned to be closed by around the end of FY2020.
- 2 Wakayama Works: Switch from the No. 5 BF to the new No. 2 BF to increase annual crude steel production capacity by 0.5 million tons, and suspend operations at an electric arc furnace of Nippon Steel Structural Shapes Corporation located within the Works by around the end of FY2019.
- 3 Kimitsu Works: A small-diameter seamless steel pipe & tube mill will be shut down by around May 2020. Production will be consolidated at the Kainan area of the Wakayama Works.
- 4 Kashima Works: A UO steel pipe mill will be shut down by the end of October 2019. Production will be consolidated at the UO steel pipe mill in the Kimitsu Works.
- 5 Coke oven (CO) refurbishment: Kimitsu No. 5 CO, Muroran No. 5 CO, and Nagoya No. 3 CO.



Leading-edge continuous casting machine (Yawata Works)

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.

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.

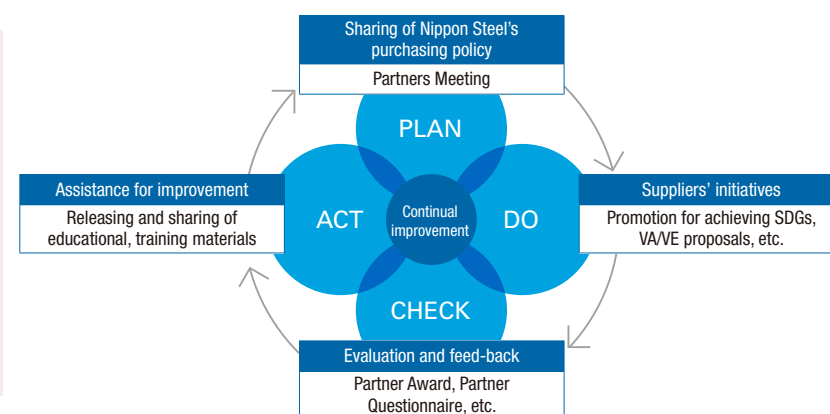
Initiatives for stable procurement

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 mid-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 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

- 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>

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) Respect for human rights and promoting diversity & inclusion

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.

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, 2019)

25,376 (Membership ratio: 100%)

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 whistleblower 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

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 Work Style Innovation, we are expanding the working system from the viewpoint to fully utilize the optimized work time and to allow all employees use their full capacity. In FY2019 we began a telework program. We also provide both diverse welfare programs to support employees' personal life and numerous measures for individual departments depending on their business conditions, such as to setting a no-overwork day.

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 FY2018) **77.5%**

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.

In addition to implementing a childcare leave system which is more generous than legally required, a rehiring program for employees who previously left the company for child or elderly care and other reasons, and a leave program to assist overseas relocation of the spouse, we 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 look into detailed planning to raise the retirement age from 60 to 65. This change reflects the decline in the working population and the raising of pension eligibility age, and would be made also from the perspective of maintaining and enhancing our work environment.

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 FY2018)	Number of users of the childcare leave system	206
	Ratio of returnees after childcare leave	91.4%
	Number of users of the short-work hour system for childcare	89
	Internal childcare centers	5 centers
	Users of internal childcare centers	80

The ratio of women in overall hiring (Average ratio from FY2017 to FY2019)

Office staff and engineers **34%**

Operators and maintenance personnel **17%**

Overall hiring **23%**

Number of women in managerial positions (as of April 2019) **97**

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 (FY2018) **3,041**

Disabled-person employment rate (as of June 2019) **2.21%**

Respect for human rights and promotion of diversity & inclusion

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

(2) 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.



Nippon Steel School (name for education targeted young employees)

Number of training/learning hours (FY2018)

1.5 million hours/year (56 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 (unconsolidated basis)	
Number of employees (number of women in parenthesis)	26,570 (2,483) (March 31, 2019)
Number of new hires (number of women in parenthesis)	1,386 (281) (FY2019)
Average years of service	15.1 years (March 31, 2019)
Rate of voluntary termination	1.5% (FY2018)

Utilization and development of human resources

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

(3) 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. As measures against cancer, cancer screening tests are broadly included in checkup items, depending on age and gender. In 2018, screening for breast cancer and uterine cervix cancer were included for female employees of all group companies.

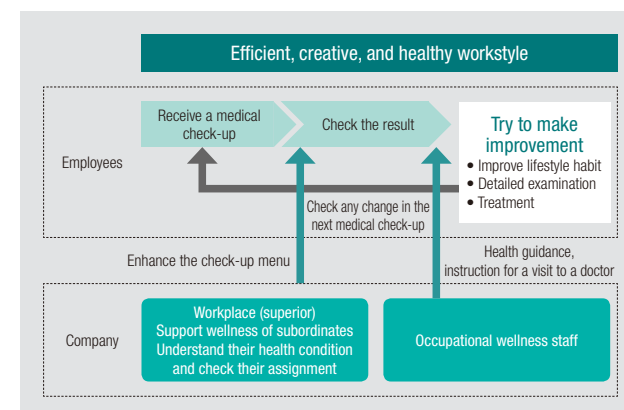
Mental wellness

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.

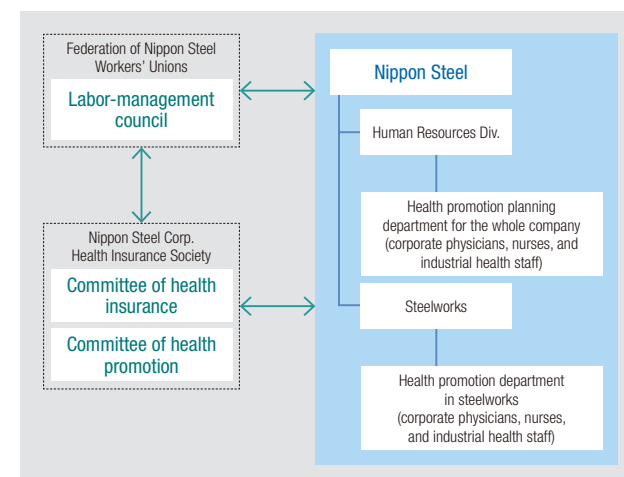
Support to employees who work overseas

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.

Cleanup activities in communities

All of our steelworks and factories are involved in cleanup activities of their surrounding areas and community. As a member of society, many employees participate in volunteer activities and cleanup activities, jointly with residents in the community.

Providing education on manufacturing and the environment

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, we organized a scientific stand as a part of a local festival at Kimitsu Works, where our younger employees introduced the fascinating properties of iron and the mechanism of electricity generation to primary and secondary school children. Our employees at Oita Works also gave a “travelling scientific lecture” at local primary and secondary schools. Nippon Steel's Head Office staff took part in an Energy and Environmental Workshop held by a junior high school in Kanagawa Prefecture, showing an example of use of waste plastics at Nippon Steel to demonstrate the steelmaking industry's environmental initiatives. In addition, we 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 the basics about why disasters happen and what appropriate actions to take when one occurs.

Training programs for educators at private companies

Every summer we support the “Training Programs for Educators at Private Companies” sponsored by the Japan Institute for Social and Economic Affairs, so that teachers can better understand how the steel industry is contributing to society and can better appreciate the fascination of product-manufacturing. In 2018, we hosted 126 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 — at our steelworks and nearby schools in Japan every year.

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 135,000 people visited our steelworks in FY2018.

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.”

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 activities of our corporate philanthropy 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 "Kioi Hall Chamber Orchestra Tokyo" and promoting Japanese traditional music by using Kioi Hall's special small hall. We also formed the annual Nippon Steel Music Awards, in 1990, to encourage young classical music performers and to those who have made contributions to the development of classical music.



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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.



Relation to Shareholders, Government and Public Institutions

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.

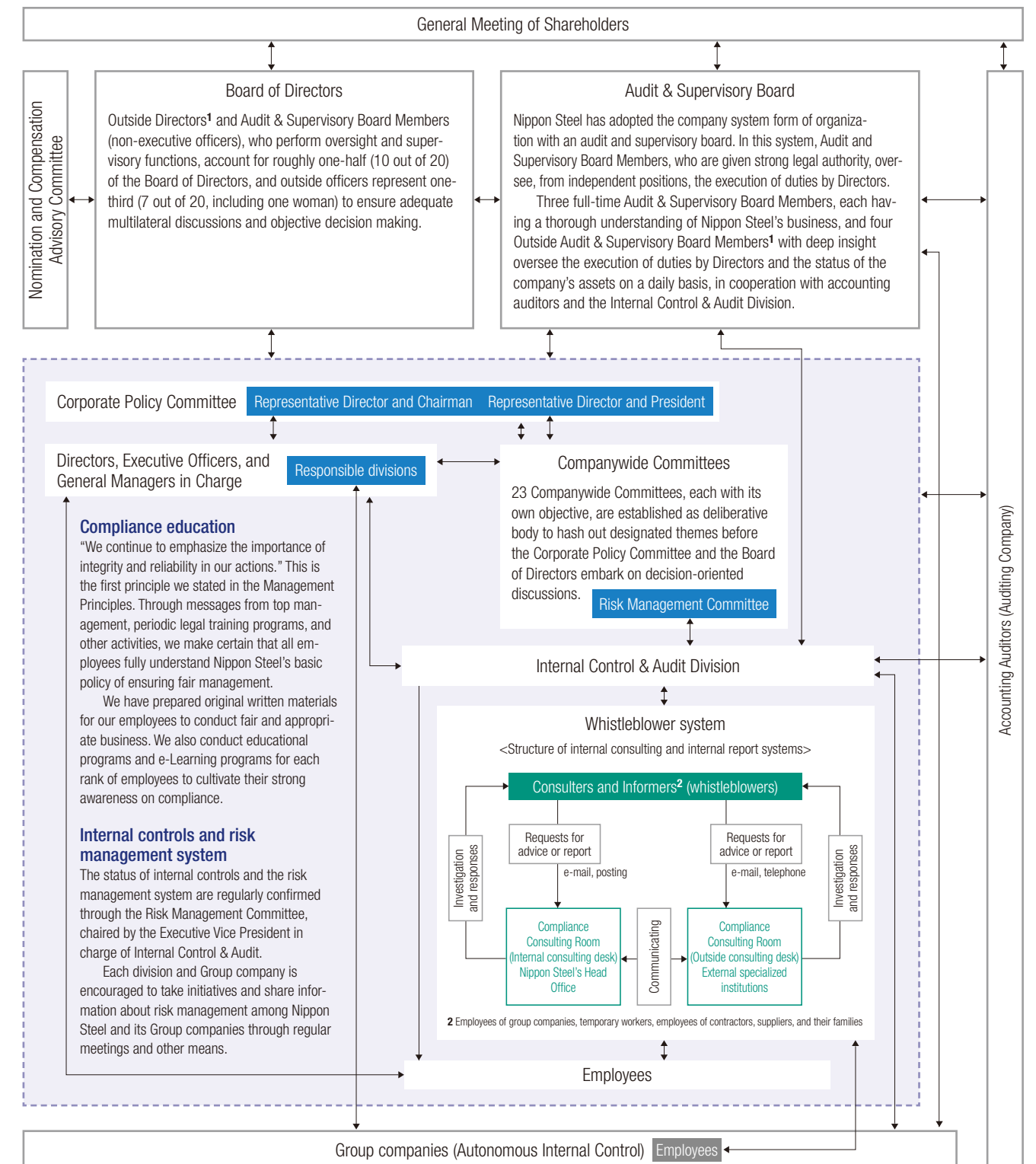
■ Appropriate tax payment

- 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 Structure

The Nippon Steel Group aims to respond to confidence and trust extended by shareholders, business partners, and all other stakeholders, and to achieve healthy sustainable growth and medium- to long-term improvement in corporate value. For that purposes, the Group has established a corporate governance structure appropriate for its businesses.

Corporate governance structure and internal control system



¹ All Outside Directors and all Outside Audit & Supervisory Board Members are registered as independent directors at financial instruments exchanges in Japan.

Awards received in FY2018

Award name	Sponsor	Detail
Awards from customers		
Excellent Supplier Award 2017 (12th time)	TTX Company (USA)	High evaluation of quality, cost, delivery, service, financials, and management (Nippon Steel, Standard Steel)
Supplier of the Year 2019	Railway Systems Business Unit, Hitachi Ltd.	Delivery of high-grade high-performance railway cars, wheels and axles and bogies to railway systems of Hitachi Ltd. for many years (Nippon Steel)
Excellent Partners Meeting 2018 ECO-VC Gold Award (9th consecutive year)	Panasonic Corporation	Significant reduction in CO ₂ emission by developing a new series of electrical steel sheets that realize high efficiency (Nippon Steel)
Wells Equipment Supplier of the Year Award	Royal Dutch Shell Group	Delivery of high-grade product development, on-time delivery, global provision of best practices that match needs of each region (Nippon Steel)
Diamond Supplier Award 2018 (2nd consecutive year)	Navistar International Corporation (USA)	Outstanding contribution of high-grade precision-machined crankshafts in quality, delivery, technology and cost (Nippon Steel and Sumikin Crankshaft)
2018-19 Top 100 Global Innovator Award (the first steel company awarded for the 7th consecutive year)	Clarivate Analytics (USA)	Awarded as one of the world's most innovative companies based on the analysis of the trend in intellectual property and patents (Nippon Steel)
Awards from governments and institutions		
Person of the Year	Câmara de Comércio Brasileira no Japão (CCBJ)	Achievement as a corporate executive who contributed and strived to enhance the Brazil-Japan business (President of Nippon Steel)
The 2nd Infrastructure Maintenance Grand Award (Award of Excellence)	Ministry of Land, Infrastructure, Transport and Tourism, etc.	Adoption of long-term durable, anti-corrosion titanium foils for the lighthouse made of steel in the early Meiji period (Nippon Steel, Nippon Steel Anti-Corrosion) ▶ p. 29
The 34th SOKEIZAI Industry Technology Award (SOKEIZAI Center Chairman's award)	SOKEIZAI (Shaped Raw Material) Center	Development of forming technology for fuel tanks made of titanium steel for mass-produced motorcycles (Nippon Steel)
The 53rd JSPMI Award, (Chairman's Award)	Japan Society for the Promotion of Machine Industry (JSPMI)	Development of high-efficiency, light-weight permanent magnetic retarder (Nippon Steel)
The 65th Okochi Memorial Production Prize	Okochi Memorial Foundation	Development of environmental impact-reducing ultra-high-tensile wire rods for bridge cables (Nippon Steel) ▶ p. 28
The 51st Ichimura Prize in Industry for Distinguished Achievement	Ichimura Foundation for New Technology	Enhancement of collision safety for ships by development of high-ductility steel plates (Nippon Steel) ▶ p. 29
The 51st Ichimura Prize in Industry against Global Warming for Distinguished Achievement	Ichimura Foundation for New Technology	Development HRX19™ high-strength stainless steel for high-pressure hydrogen environments to help accelerate the creation of a hydrogen-oriented society (Nippon Steel) ▶ p. 28
The 45th Iwatani Naoji Memorial Award	The Iwatani Naoji Foundation	Development HRX19™ high-strength stainless steel for high-pressure hydrogen environments (Nippon Steel) ▶ p. 28

Editorial policy

This Sustainability Report is the 22nd since the former Nippon Steel Corporation issued what is the first sustainability report by a Japanese steel manufacturer, in 1998. In April 2019, we made a fresh start as Nippon Steel Corporation. Our name changed but our commitment to promote business activities that contribute to the realization of a sustainable society remains unchanged.

In this report, we have tried to clearly express our approach toward realizing a sustainable society and present our Environment, Social, and Governance (ESG) initiatives, that form a base to support our sustainable growth.

Period covered

The period covered in the report is FY2018 (from April 2018 to March 2019). For some activities, the period from April 2019 to June 2019 is included.

Scope of report


- Environmental and social aspects: Activities of Nippon Steel and its group companies in Japan and overseas
- Economic aspects: The Integrated Report 2019 of Nippon Steel (issued in October 2019) also covers the contents of the economic report.

Reference for guidelines

- GRI (Global Reporting Initiative) “Sustainability Reporting 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

Website


Details on the following subjects



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

Sustainability Report 2019

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 2019

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
- Reports for Shareholders

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

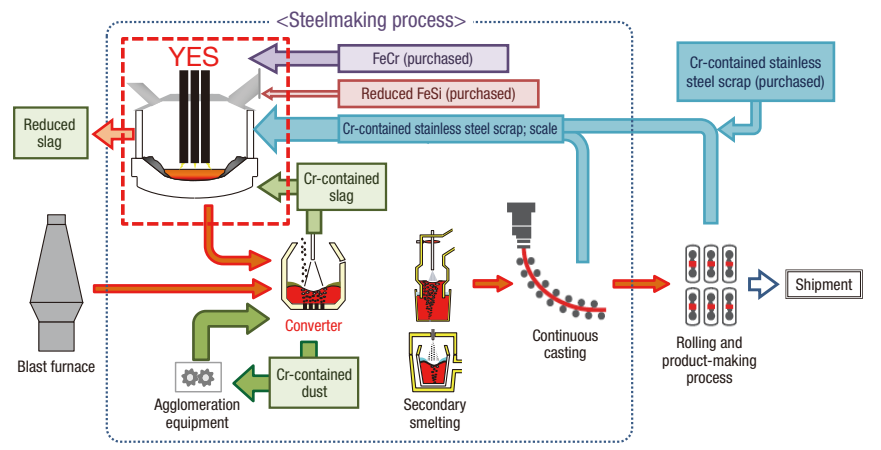
¹ PDF files are available for downloading from the website. ² Printed copies are available upon request from the website.

Eco-friendly resource-saving high-productivity stainless steelmaking process (YES) COLUMN

Stainless steel is a functional material with a corrosion-resistance property achieved by adding chromium. In its manufacturing, however, a large amount of chromium and other raw materials need to be added and the heat tolerance in smelting is low, which results in limited recycling of steel scrap and other raw materials. In addition, silicon raw materials are added in a converter furnace for reduction of oxidized chromium during decarburization by oxygen. This process generates a large volume of slag and causes chromium loss, hence there is an issue of environmental impact.

In order to solve this issue, we have made practical use of a process in which chromium oxide generated in a converter is collected and then melted with recycled materials such as chromium raw material and steel scrap. We have done this in the Yawata environment-friendly smelter (YES). This smelter has 17 times higher reduction ability than a converter. By being combined with the conventional converter process, the new process has reduced generation of slag by 60% and out-of-system emission of chromium by 95% compared to the conventional process, as well as has realized 100% recycling of chromium and other generated substances.

This technology's uniqueness, practicality, and contribution to alleviating environmental impact were highly accredited, resulting in receiving many awards, including the Okochi Memorial Production Grand Prize, the highest award of its kind for a corporation, in February 2018. Also awarded was the Minister of Education, Culture, Sports, Science and Technology Minister Prize for Science and Technology (Development Division), in April 2019.



Cr = Chrome; FeCr = Ferrochrome; FeSi = Ferrosilicon

Corporate profile

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 (453,253 shareholders)
Stock listings	Tokyo, Nagoya, Fukuoka, Sapporo
Number of employees	105,796 (consolidated)
Group companies	420 consolidated subsidiaries 119 equity-method affiliates

Contact

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



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.