Overview of the communication tools

### Sustainability Report 2018
- Easy-to-understand brochure on environmental initiatives
  - Sustainability Report 2018
    - Book form and PDF file
- Brochure on the compact overview of the company
  - Company Brochure
    - Book form and PDF file
- Brochure on the overall businesses and management for investors
  - Annual Report 2018
    - Book form and PDF file

### Website
- Environment & CSR
- Investor Relations

### Other publications
- PR brochures “Quarterly Magazine: NSSMC”
- Picture book “A New Story About Iron”
- Technical articles and technical reports
- Fact Book 2018
  - Available for downloading from the website.
- Printed copies are available upon request from the website.

### Corporate profile
- **Company name**: Nippon Steel & Sumitomo Metal Corporation
- **Head office**: 2-1, Marunouchi, Chiyoda-ku, Tokyo 100-8071, Japan
- **Date of Establishment**: March 31, 1970
- **President**: Kosei Shindo
- **Capital**: ¥419.524 billion
- **Total number of shareholders**: 468,295
- **Stock Exchange**: Tokyo, Nagoya, Fukuoka, and Sapporo
- **Number of employees**: 93,557 (consolidated basis)
- **Group companies**: 377 consolidated subsidiaries and 114 equity-method affiliates

### Cover photo
- Kashima Works and Hometown Forest

Nippon Steel & Sumitomo Metal Corporation will change its name to “Nippon Steel Corporation” effective April 1, 2019.
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.

Corporate Philosophy

Nippon Steel & Sumitomo Metal Corporation Group will pursue world-leading technologies and manufacturing capabilities, and contribute to society by providing excellent products and services.
Nippon Steel & Sumitomo Metal (NSSMC) announced in March 2018 the 2020 Mid-Term Management Plan for the three years from fiscal 2018 to fiscal 2020. Aiming at becoming the best steelmaker with world-leading capabilities, we will "forge manufacturing capability, address megatrends, and create the value of steel, while continuing to strengthen our superiority in technology, cost, and being global. Great waves of long-term, structural changes are washing over society and industries today. Examples include increasing needs for lightweight, high-strength automobiles, development of electric vehicles, realization of a hydrogen-oriented society, diffusion of renewable energy, establishment of safe, resilient urban infrastructure, and IT innovations, including AI, IoT, and big data. We aim to capture such megatrends and create the value of steel, while contributing to society by providing steel for a myriad of uses.

Contributing to the achievement of a sustainable society (by attaining sustainable development goals [SDGs]) is one of the initiatives of the new plan. Consistent with this, we believe it is important that we engage in our business activities in accordance with the SDGs adopted by the United Nations. The 17 SDGs include many environmental items. Having identified environmental management, ongoing initiatives, and commitment to keep contributing to the realization of a sustainable society and to remain actively tackling various environmental issues, including some at a local community level and others of global scale. These efforts include efforts on behalf of the maintenance and improvement of good living environments, the promotion of reduction and recycling of waste, measures that address global warming, and the maintenance and improvement of biological diversity.

Concerning global climate change, following accession to the Paris Agreement in November 2016, Japan has been working on a plan to cut national greenhouse gas emissions 26% from 2013 levels by 2030, and going forward, a long-term strategy toward 2050 is being developed. In accordance with these goals, NSSMC is promoting "three ecos," namely, Eco Process (The way we manufacture is eco-friendly), Eco Products (What we produce is eco-friendly) and Eco Solution (Sharing our eco-solutions). The company also is steadily advancing the Action Plans for a Low-Carbon Society. Moreover, from a longer perspective, we have been participating in the innovative steelmaking process (COURSE50), as well as doing basic research on the technology to transform CO2 into usable materials and "Blue Carbon" to absorb and sequester CO2 via ocean and coastal eco systems.

We keep reminding ourselves that environmental risk management, including prevention of unexpected events and accidents, is one of our overriding concerns for our sustainable operations, along with safety and disaster prevention. We comply with laws and regulations, adapt to ordinances, bylaws, and standards, and carry out measures to reduce environmental burden with due consideration to the situation at each point of operation. We will keep addressing the issues of environmental preservation in terms of hard and soft aspects.

In April 2019, we will change our name to Nippon Steel Corporation, opening a new chapter in our history. As a steel company that originated in Japan, we will strive to keep our position as the "best steelmaker with world-leading capabilities." In the environmental and social area, we intend to continue to further enhance the quality of our environmental management by developing two-way communication with all stakeholders. Desiring to be ever more trusted and relied upon by society, we will fulfill our corporate social responsibility (CSR) to contribute to society by carrying out our corporate philosophy to "pursue world-leading technologies and manufacturing capabilities, and to contribute to society by providing excellent products and services."

This Sustainability Report contains details of our progress in environmental management, ongoing initiatives, and commitment to keep contributing to the realization of a sustainable society through environment matters.

Kosei Shindo
Representative Director and President
NSSSMC Group’s Long-Term History of Innovations

Nippon Steel & Sumitomo Metal Corporation (NSSMC) has strived to introduce new products to society, by always appropriately adjusting to the changing times and making advances in steelmaking technology so as to better satisfy the needs of customers.

Energy saving challenge

Steel supported high economic growth

1960s
- The Yawata Ironworks adopted NSSMC’s railway wheels and axle, and drive system.
- Supplied a massive quantity of foundation piles, materials for bridges, and other steel products in the construction of the Tomei Expressway.

1970s
- Developed the world’s first continual annealing furnace, integrating five annealing processes for automotive steel sheets into one continual process, and reducing manufacturing time from 10 days to 10 minutes.
- Developed the Coke Dry Quenching (CDQ) system, enabling exhaust heat to be collected and used for power generation, and contained dust generation.
- Developed high-nitrogen steel sheets for automobiles, contributing to reduction in weight of automobiles and to resultant improvement in fuel efficiency.
- Developed the power generation technology to turn a turbine by blast furnace top gas, with no use of fuel.
- Developed the world’s first continual annealing furnace, integrating five annealing processes for automotive steel sheets into one continual process, and reducing manufacturing time from 10 days to 10 minutes.

1980s
- Began production and sales of corrosion resistance, lightweight, and high-strength steels.
- Developed the Coke Dry Quenching (CDQ) system, enabling exhaust heat to be collected and used for power generation, and contained dust generation.
- Developed high-nitrogen steel sheets for automobiles, contributing to reduction in weight of automobiles and to resultant improvement in fuel efficiency.
- Installed exhaust heat dry quenching and desulfurization equipment to significantly reduce emissions of SOx and NOx.
- Developed NAREST steel that is resistant to cracking at the time of collision of a ship in order to prevent oil leakage and pollution of the ocean.
- Developed high-tensile steel sheets for automobiles, that contribute to both enhancement of collision safety.
- Developed ultra-high tensile steel sheets for automobiles, that contribute to both enhancement of collision safety and reduction in weight of automobiles.
- Developed HSSR™ stainless steel, which contains a substance of concern.
- Developed a waste plastics full-recycling system using casting side beads and began operation.
- Established the production and shipment system for the world’s longest 150-meter-long rails.
- Developed HRX1™ stainless steel, for hydrogen stations and fuel cell vehicles.
- Conducted a verification test of an experimental blast furnace of the COURSE50 project, aimed at reducing CO2 emission by 70%.

1990s
- Participated in the Kita-Kyushu Smart Community Creation Project which aimed at town planning with the harmonious coexistence of communities and factories.
- Began production and sales of steel houses with balanced features of seismic resistance, fire resistance, durability, and thermal retention.
- Developed HANAKET steel that is resistant to cracking at the time of collision of a ship in order to prevent oil leakage and pollution of the ocean.
- Developed Ultra High Tensile Steel sheets for automobiles, that contribute to both enhancement of collision safety.
- Developed a waste plastics full-recycling system using casting side beads and began operation.
- Established the production and shipment system for the world’s longest 150-meter-long rails.
- Developed ultra-high tensile steel sheets for automobiles, that contribute to both enhancement of collision safety and reduction in weight of automobiles.
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NSSMC Group’s Businesses

Based on the long accumulation of technology through steelmaking, the Nippon Steel & Sumitomo Metal Corporation (NSSMC) Group operates businesses in five areas: steelmaking, engineering, chemicals, new materials, and system solutions, with the core business being steelmaking.

New materials business
37.0 billion yen
Nippon Steel Sumikin Materials Co., Ltd., etc.

Based on materials expertise gained from steelmaking, Nippon Steel & Sumikin Materials provides original materials and components that are indispensable to leading-edge technology fields, with primary focus on the three areas of semiconductor and electronics, automotive & machinery parts, and titanium & construction products.

Chemicals business
200.7 billion yen
Nippon Steel & Sumikin Chemical Co., Ltd., etc.

Nippon Steel & Sumikin Chemicals is developing demand for functional materials for electronic materials such as for displays, memory, microcircuits, and organic electronics, on top of a variety of original coal-based products, including needle coke and various aromatic products.

FY2017 Sales composition by business segment

Steelmaking and steel fabrication business
5,017.2 billion yen
Nippon Steel & Sumitomo Metal Corporation, etc.

Enhancing technological superiority, NSSMC provides a variety of high-grade steel products (i.e., steel plates; flat products; bar & wire rod; construction products; pipe & tube; railway, automotive & machinery parts; and stainless & specialty stainless steel) to many customers in Japan and overseas.

Engineering and construction business
294.2 billion yen
Nippon Steel & Sumikin Engineering Co., Ltd., etc.

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

NSSMC Group’s Businesses

The NSSMC Group is steadily progressing in establishing a global business structure that enables it to capture overseas growth markets and to readily respond to customers’ overseas expansion.

<table>
<thead>
<tr>
<th>Region</th>
<th>Sales composition</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>65%</td>
<td>69.1</td>
<td>70.4</td>
<td>70.6</td>
<td>70.9</td>
<td>71.0</td>
</tr>
<tr>
<td>Overseas</td>
<td>35%</td>
<td>30.9</td>
<td>29.6</td>
<td>29.4</td>
<td>29.1</td>
<td>29.0</td>
</tr>
</tbody>
</table>

Number of employees (consolidated basis)

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>69,621</td>
</tr>
<tr>
<td>2014</td>
<td>69,447</td>
</tr>
<tr>
<td>2015</td>
<td>69,180</td>
</tr>
<tr>
<td>2016</td>
<td>68,906</td>
</tr>
<tr>
<td>2017</td>
<td>68,640</td>
</tr>
</tbody>
</table>

R&D expenditure (consolidated basis)

<table>
<thead>
<tr>
<th>Year</th>
<th>R&amp;D expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>14.1%</td>
</tr>
<tr>
<td>2014</td>
<td>14.1%</td>
</tr>
<tr>
<td>2015</td>
<td>14.1%</td>
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<tr>
<td>2016</td>
<td>14.1%</td>
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<tr>
<td>2017</td>
<td>14.1%</td>
</tr>
</tbody>
</table>

The NSSMC Group has a strong focus on R&D and continues to invest significantly in research and development to maintain its technological superiority in the steel industry. This commitment to innovation enables the group to stay ahead in the highly competitive global market, offering customers high-quality products and solutions tailored to their needs. The group’s global presence and extensive network of operations position it well to capture growth opportunities in overseas markets, contributing to its strategic expansion and long-term growth.
NSSMC Group’s Value Chain

The NSSMC Group conducts business activities making use of its strengths in each stage of the value chain in steelmaking, and is also engaged in initiatives in each of these stages, responding to expectations and requests from society. Having established a business model in which environmental and social initiatives are integrated with business activities, NSSMC is thus contributing to sustainable growth of society.

Business activities

NSSMC’s Value Chain

Value chain

NSSMC manufactures steel plates, steel sheets, bars and wire rod, construction products, pipes & tubes, railway, automotive & machinery parts, stainless, stainless steel, and other high grade products for many customers in Japan and abroad. Safety, environment, and disaster prevention come first in steelmaking, and quality, delivery, and costs are thoroughly managed. Identifying 12 domestic works as mother mills, we enhance technologies, expand business overseas, and manage as an integrated entity.

NSSMC’s initiatives

•  Sharing of value through the supply chain
•  Management system of substance of concern
•  Enhanced efficiency in logistics and costs
•  Thorough确认 of no use of conflict materials
•  Enhanced efficiency in transportation of raw materials for reduction of CO2 emissions
•  Management system of substance of concern in purchased materials and products

Expectations and requests from society

Environment

•  Eco-friendly purchasing of raw materials
•  Reduction in greenhouse gas emissions in material purchasing
•  Enhanced management of substances of concern

Society

•  Material purchasing in consideration of human rights

Environment

•  Reduction in greenhouse gas emissions in steelmaking
•  Thorough cyclical use of resources

Society

•  Establishment of safe, pleasant workplaces
•  Prevention of accidents and disasters
•  Provision of reliable high-quality products
•  Creation of jobs
•  Workstyle innovation

Environment

•  Development and installation of environmental preservation and energy efficient equipment
•  Effective use of by-product gas and waste heat for reduction in CO2 emissions
•  Transfer of world-leading technology for environmental preservation and energy efficiency to overseas steelmakers

Society

•  Promotion of workplace culture that prioritizes safety, environment, and disaster prevention
•  Scheduled equipment maintenance
•  Promotion of environmental risk management
•  Thorough quality management
•  Continuous steady hiring
•  Promotion of work-life balance
•  Improved healthcare counseling

Environment

•  Reduction in CO2 emissions in transportation due to improved efficiency in logistics and reduction in weight of steel products
•  Reduction in CO2 emissions due to a lower number of processes at customers and improvement in processing, weldability, and workability by customers

Society

•  Stable supply of steel materials to customers’ overseas manufacturing bases
•  Provision of information to customers’ surveying of value chain

Environment

•  Fluidity in CO2 emissions in use of products of more lightweight materials, enabled by enhanced strength

Society

•  Compliance education concerning the Anti-Monopoly Act, prevention of bribery, etc.
•  Promoting public understanding on selection of materials from a life cycle perspective, that encompasses not merely use of product but from material manufacturing to disposal and recycling

Society

•  Promoting public understanding that steel supports a future recycling oriented society due to its superior recycling properties (i.e., being easily sorted due to its magnetic property; resistance to being degraded as impurities are easily removed)

NSSMC delivers products of high quality to many customers in Japan and abroad in a safe, efficient manner. We strive to accurately understand customers’ needs and respond to them by being dedicated in monozukuri (manufacturing).

NSSMC’s steel products have advanced functions, such as safety enhancement by improving durability and strength, and cost reduction by prolonged product life. They are ultimately transformed to a wide range of end products to help improve the quality of life of people.

NSSMC collects scrap steel generated during steelmaking and processing or at the end of the life of steel products. They are re-used as raw materials together with iron ore, to make steel.

Disposal and recycling

Transportation and processing of steel products, manufacturing of products

Sales and usage

Recycling

NSSMC Group’s Value Chain

Mining and transportation of raw materials; purchasing of materials and equipment

Steelmaking

NSSMC Group’s Value Chain

About one million items of equipment materials, from gigantic steelmaking equipment to electric and mechanical components and office supplies, are purchased from about 3,000 companies.
Steel is indispensable in social infrastructure, such as buildings, vehicles, railway, ships, bridges, and power stations. It is also used everywhere in our everyday life from TV sets, refrigerators, washing machines and other home appliances to eating utensils such as forks and spoons, and cooking utensils such as microwave ovens, helping us to have a pleasant, convenient life. Steel also plays a crucial role in making our infrastructure resilient to natural disasters caused by earthquakes or abnormal weather associated with climate change.

The amount of steel stock in Japan, which, in the form of social capital, is supporting our lives, exceeds 1.3 billion tons, or 10.7 tons per capita. The amount of steel stock in the world is estimated at around 30 billion tons (in 2015) but about merely 4 tons per person. An increase in steel stock means that we can play an important role in supporting social infrastructure through steelmaking.

We believe our contribution to developing a sustainable society through our initiatives also contributes to achieving the United Nation’s SDGs, which are scheduled to be globally resolved by 2030.

### NSSMC Group’s Contribution to SDGs

**Steel supports society and simultaneously achieves multiple SDGs.**

SDGs are interlinked. Many of the NSSMC Group’s initiatives that address the issues are contributing to simultaneously achieving multiple SDGs, as shown below.

#### Steel is an indicator of affluence

The length of steel life differs by its end product: dozens of years for infrastructure, such as buildings and bridges; 5-10 years for consumer durables, such as automobiles and refrigerators; and up two years for steel cans. However, after the end of a product life, steel stock almost anywhere in the world can be collected as steel scrap and be reborn many times in whatever form is needed. Steel is therefore a sustainable material, which is abundant and easy to recycle.

Steel production requires considerable energy, but all by-product gas generated in steelmaking process is collected and used as an energy source within a steelworks. 90% of precious water resources used are recycled and reused. We are thus engaged in recycling even in our manufacturing process. We are also engaged in recycling of by-products and waste generated in and out of the NSSMC Group, by utilizing the iron-making process. For example, 99% of steel slag, a by-product of steelmaking, is recycled and used in a wide range of applications, mainly as materials in cement and road materials but also as slag fertilizer, contributing to improving farm productivity and, when placed in desertified places in the sea, as a source of iron for help other seaweeds, as well as fish fishing in such habitats, contributing to restoration of marine resources.

Concerning waste generated in society, discarded plastics and motor vehicle tires are not burned but thermally decomposed and recycled, contributing to reduction in CO2 emissions.

In short, steelmaking can be said to be a sustainable industry that does not waste resources.

#### Steel is a champion in recycling

Steel is a champion in recycling productivity and salt damage in farmland. We are thus engaged in recycling even in our manufacturing process. The NSSMC Group is supporting our lives, exceeds 1.3 billion tons, or 10.7 tons per capita. The amount of steel stock in the world is estimated at around 30 billion tons (in 2015) but about merely 4 tons per person. An increase in steel stock means that we can play an important role in supporting social infrastructure through steelmaking.

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Advantages of Steel that Contribute to Sustainable Society

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 burden in use but may have high environmental burden in the overall life cycle.

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

Comparison of CO₂ emissions in manufacturing for same vehicle component

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

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Advantages of Steel that Contribute to Sustainable Society

Steel is an abundant, easy to procure, and sustainable material

Steel represents over 95% of metal products, as steel, being abundant, cheap, and having good workability, has a wide range of applications.

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

One of distinctive features of steel is to be recyclable many times in whatever form. 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 many times.

Advantages of Steel that Contribute to Sustainable Society

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Comparison of CO₂ emissions in manufacturing for same vehicle component

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High-tensile steel sheets for automobiles that contribute to both reduction in weight and assurance of safety of the driver and passengers

Steel sheets for automobiles are required to be light for better fuel economy and reduction of CO2 emission, and at the same time to be strong enough to ensure the safety of passengers in case of a collision. The materials also need to be superior in workability, such as to be rolled out or pressed, in keeping with the design of the car body. In order to control the temperature-caused differences in steel’s crystalline structure, temperature control in the heat treatment process of steelmaking must be precise. By blending soft crystalline texture and hard line structure, temperature control in the heat treatment process of steelmaking contributes to society by providing advanced IT technology. Therefore, we have been working on an advanced use of data, including collection and analysis of the massive volume of data generated in manufacturing workplaces, and their utilization with the intention of reducing cost and enhancing quality. At the same time, we are making use of AI to convey skills of veteran engineers to younger generation, and to make manufacturing and production facilities of steel products more optimally and more efficiently sustained and maintained.

In April 2016, a unit specialized in studying and promoting use of advanced IT was established within the Information System Division of the Head Office. Further in April 2018, another unit for big data analysis and AI research was formed within the research laboratories. Our organization has therefore become better engaged from conducting basic research up to use of advanced IT.

At present, these units are playing a key role in making arrangements for total optimization of manufacturing workplaces by use of advanced IT, as follows:

1) Arrangement to use the latest big data analysis method to sustain high-quality, stable manufacturing

2) Arrangement to automatically prepare a production plan (when to put which order to be executed by which manufacturing facility), replacing manual preparation by veteran workers, and efficiently giving instruction on production to a plant, based on the plan

3) Arrangement to use smartphones and the Internet of Things (IoT) so as to promptly and accurately give work instruction to workers, enable managers to remotely obtain safety-related information on subjects such as the location and health conditions of workers, and monitor the safety of workers.

4) Arrangements to maintain equipment in good condition by anticipating malfunction or problems of the equipment, based on operation information and the many sensors that have been installed.

We believe that such arrangements will allow us to deliver high-quality products to customers more efficiently in a shorter time span and to provide safer, more pleasant workplace to employees.

In cooperation with internal relevant divisions in charge of research, manufacturing, and equipment as well as GS Solutions and outside system vendors, we will make more sophisticated use of advanced IT in steelmaking, and contribute to society by providing advanced IT technologies we have internally fostered, through group companies.

Stainless steel for high-pressure hydrogen environments, HRX19™—a revolutionary product for a Hydrogen-Based Society

For eco-friendly fuel-cell vehicles to become used in significant numbers, certain infrastructure, including hydrogen stations, to be established. NISSMC and Nippon Steel & Sumikin Stainless Steel Pipe Co., Ltd. NISSMC’s fully owned subsidiary), have jointly developed a stainless steel for high-pressure hydrogen environments, HRX19™, that has already been used for pipes, joints, and valves in the high-pressure hydrogen environments of hydrogen stations.

As hydrogen is a small molecule, it can be introduced into the metal but there it can cause brittleness and a tendency for fracture to occur. By blending additives to stainless steel and developing a new heat treatment method during manufacturing, HRX19™ overcomes the problem of embrittlement and both made a longer product life possible and improved the safety of pipes for hydrogen stations.

Moreover, HRX19™ is approximately twice as strong as conventional SUS316L stainless steel, enabling the design of thinner pipe walls even for high-pressure hydrogen environments, and for pipes to be made with greater inside diameters, resulting in larger capacity and shorter hydrogen filling times. Furthermore, it is lightweight and provides the additional merit of reducing CO2 emission while transported.

Moreover, welding can be done to HRX19™, without requiring joints, whereby a contribution is made to reduction of construction and maintenance costs.

Geothermal power stations and seamless pipes for geothermal power generation

Geothermal power generation is promising as renewable energy use of which results in low CO2 emission. Nippon Steel & Sumikin Engineering in the NISSMC Group has been responsible for the construction of production equipment and pipelines on nine of 17 large-scale geothermal power plants in Japan. The company thus has abundant construction achievements and knowhow.

Leveraging the technology accumulated in manufacturing OCTGs for deep-sea underwater offshores where the steel is exposed to a highly-corrosive environment, NISSMC also provides seamless pipes, suitable to be used in geothermal power generation, which also involves a similar high-temperature, high-pressure, highly-corrosive environment.

Steel pipes, contributing to boost efficiency in pumped-storage hydroelectric power generation

This is a power generation method to make upper and lower reservoirs and release the pumped-storage water in the upper reservoir to the lower reservoir through turbines to produce electric power. In order to secure generation efficiency, high-strength, high-grade steel pipes were required to withstand increased water pressure due to greater elevation of water. NISSMC has successfully developed and commercialized Japan’s first 100kg-class steel used for a pressurized water pipe.
NSSMC’s Environmental Management

Environmental management is a corporate mission

Nippon Steel & Sumitomo Metal (NSSMC) 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,” NSSMC 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.

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

Three ecos and innovative technology development

NSSMC 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 fiscal 2018 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.

2020 Mid-Term Environmental Management Plan

Under the Basic Environmental Policy, we have developed a mid-term environmental management plan for three years from fiscal 2018 to fiscal 2020 and are tackling many environmental challenges accordingly.

Environmental management system

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

Creation of a recycling-based society

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

Environmental relationship activities

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

Measures against climate change problems

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

Environmental risk management

- Promote companywide discussion on environmental risk issues
- Respond to new environmental regulations
CO₂ emissions reduction through three ecos and innovative technology development

Nippon Steel & Sumitomo Metal Corporation (NSSMC) promotes energy conservation and CO₂ emissions reduction throughout the entire supply chain: manufacturing, transportation, and final use of products. We also actively work at innovative technology development and transfer of established technology to our overseas operations, helping them to contribute to CO₂ reduction over the medium- and long-term.

Continue CO₂ emission reduction by implementing the three ecos

Based on the 32.3 billion metric tons of CO₂ emissions from worldwide fossil fuel combustion in 2015, Japan’s product emissions represent 3.5% of global CO₂ emissions from combustion of fossil fuels. Japan also accounts for 2.5% of worldwide greenhouse gas emissions, according to estimates by the International Energy Agency in 2014.

According to the latest data available, Japan’s CO₂ emissions from fossil fuel combustion amounted to 1.13 billion metric tons in 2016 and the industrial segment accounted for roughly one-third of that. As a member of the Japan Iron and Steel Federation, NSSMC has been playing a part in CO₂ emission reduction of the industrial segment through implementing “Eco Process,” and introducing “Eco Products” and “Eco Solution” in Japan and overseas.


Realizing the world’s top-class energy efficiency

Since the first oil crisis in 1973, NSSMC 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, converters, and other areas have been collected and reused 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. Starting in 2010, the Super Coke Oven for Productivity and Environmental Enhancement toward the 21st Century (SCOP(21)) was developed, and high-efficiency by-product burning power generation facilities were introduced as a part of unrelenting efforts in energy conservation. 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

NSSMC’s current energy-conservation initiatives

NSSMC has been working on energy conservation from diverse starting points: improving efficient use of energy generated in steelmaking process; making operational improvements in each process; renovation of aged steel plants and other equipment; introduction of high-efficiency power generation facilities and oxygen plants; conversion to regenerative burners in heating furnaces; and use of waste plastics and waste tires. As a result of these continual efforts, the NSSMC Group (NSSMC and affiliated electric furnace companies) consumed 1,018 PJ of energy and emitted 88 million tons (preliminary) of CO₂ in fiscal 2017, which represented reduction of 15% and 14% respectively compared to fiscal 1990.

3.5% Million electric furnaces and other emitters (Nissan Steel Co., Ltd., Nippon Steel & Sumitomo Stainless Steel Corporation, Nippco Needle & Engineering Co., Ltd., 5 cooperative thermal power companies, and 2 zendo centers, total 529.)

 energy reduction for efficient use of energy and other ways. Concerning collection of waste plastics and other ways, 100\*PJ indicates peta-joules (10^15 joules). A joule is a unit of energy, or amount of heat.

Promoting innovative technology development

Along with the three ecos, we have been working on the CO₂ Ultimate Reduction in Steelmaking Process by Innovative Technology for Cool Earth 5D-COURSE Project, from the perspective of CO₂ emission reduction over the mid-to-long term. Further, we are undertaking R&D aimed at developing dramatically new CO₂ reduction technology, including new way of heating or separation of CO₂. 1 P. 26

Global Warming Countermeasures

NSSMC’s energy consumption

NSSMC’s energy-derived CO₂ emissions

Co₂ emissions of households using the Household Energy Diary

Promote energy saving efforts in offices and at home

A policy of lights-out during lunch breaks, a business-casual dress code during summer, eco-no-working days, etc. has been implemented in offices. So as to encourage employees make energy-saving efforts at home and actually reduce emissions, keeping records in a Household Energy Diary has been promoted.

CO₂ emissions from fossil fuel combustion

Breakdown of CO₂ emissions from fossil fuel combustion

Global: 32.3 billion tons (2015)

Japan: 1.13 billion tons (2015)

Source: International Comparison of Energy Efficiency, (Source: Electricity Generation, Iron and steel, Cement, ETC., METI, 2013) The Japanese translation and numerical values were provided by the Japan Iron and Steel Federation.

Source Prepared by NSSMC based on the data from the IEA.

Japan Iron and Steel Federation’s Action Plans for a Low-Carbon Society

Source: Japan Iron and Steel Federation.

“Three ecos and innovative technology development”

1 CO₂ Ultimate Reduction in Steelmaking Process by Innovative Technology for Cool Earth 5D-COURSE Project. From the perspective of CO₂ emission reduction over the mid-to-long term. Further, we are undertaking R&D aimed at developing dramatically new CO₂ reduction technology, including new way of heating or separation of CO₂.

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3 Concerning collection of waste plastics and other ways, 100\*PJ indicates peta-joules (10^15 joules). A joule is a unit of energy, or amount of heat.

4 Contributing to collection of waste plastics and other ways.

5 Contributing to energy reduction for efficient use of energy and other ways.

6 Contributing to valuable use of energy reduction by technology innovation and diffusion.
Global Warming Countermeasures

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

Not wasting any energy

Nippon Steel & Sumitomo Metal Corporation (NSSMC) is committed to reduction of the environmental burden 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, NSSMC uses iron ore mined overseas, coal as for reduction of iron ore, and scrap generated by society.

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

In addition, NSSMC itself generates 88% of the electricity it uses at steelworks, 78% 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.

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.

Recycling rate of by-product gas
100%

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

Rate of use of exhaust heat in generation of steam
76%

76% of steam used as various heat sources within steelworks is generated by exhaust heat, with no use of fuel.

Blast furnaces are huge reactors, using coal

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.

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 NSSMC, 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.

COLUMNS

Iron ore, coal, and scrap generated as by-products are utilized in steelmaking processes. However, the promotion of energy saving and recycling of waste contributes to reduction of the environmental burden.

In the steelmaking process, not only the iron ore but also the iron oxide in scrap is reduced to iron. As a result, the CO2 emissions decrease. In addition, energy generated within the steelworks is utilized to reduce CO2 emissions. Moreover, we are engaged in the recycling of waste plastics, waste tires, and other waste materials as raw materials or energy in steelmaking processes.

NSSMC internally generates 88% of the electricity it uses.

NSSMC supplies 40% of internally-generated electricity to the local community.

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

Eco PROCESS

Global Warming Countermeasures
Global Warming Countermeasures

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 burden.

NSSMC’s eco-friendly products help reduce environmental burden

High-strength wires for suspension bridges

High-strength wires are widely adopted in many big suspension bridges across major rivers in Japan and abroad. By utilizing compact bridge designs and shorter construction periods, these wires help cut CO2 emissions and contribute to the prevention of global warming.

Roofs made of titanium sheets

NSSMC’s titanium building materials contribute to safety and beauty by their contribution to thermal safety of roof of high-glass surface. Rain resilience is enhanced by mitigating back on roofs, and low impact on surroundings as a result of being environment-friendly. In addition, these products enable advanced design, provide superior discoloration resistance, have a long product life, and reduce maintenance costs.

Steel tire cord

Steel tire cords for automobiles use wires made with steel cords that are as thin as three human hairs. Use of NSSMC’s steel tire cords enables to reduce weight of tires. This is another way to help preserve the global environment through improved fuel efficiency.

Stainless steel clad sheets

Use of a material combing of stainless steel and aluminum for the food packing/retaining parts of rice cookers enables a reduction of electricity consumption due to higher heat efficiency than the conventional tin coatings that apply heat at the bottom of pot mainly made of aluminum. This is because outer stainless steel problems heat while the inner aluminum has excellent thermal conductivity for conveying heat.

Tinplate for beverage and food cans

Tinplate for beverage and food cans can be recycled many times. Moreover, it helps protect food safety due to its strength, and its thinness minimizes container weight, thereby contributing to improving transportation energy and efficiency.
Global Warming Countermeasures

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 & Sumitomo Metal Corporation (NSSMC) 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 NSSMC, plays a leading role in the Global Sectoral Approach (GSA), 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 energy-consuming 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 about 5.58 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.

Japan’s steel industry’s international cooperation in energy conservation

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

The three pillars of international cooperation in energy conservation

1. Joint meetings of public and private steel-related parties
2. Preparation of customized list of technologies
3. Assessment of steelworks as to energy-saving status

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.

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Global Warming Countermeasures

Development of Innovative Technologies

Research & development for global warming prevention

With the aim of preventing global warming, Nippon Steel & Sumitomo Metal Corporation (NSSMC) is taking on a challenge in the form of the “CO2 Ultimate Reduction in Steelmaking Process by Innovative Technology Project,” in addition to making efforts to reduce CO2 by further improving its world’s highest energy efficiency. We are also involved in medium- to long-term R&D activities, on use of CO2 as raw material; production of hydrogen from renewable energy; and sequestering of CO2 in the oceans and coastal ecosystems.

The COURSE50 Project (Technological Development and Innovative Steelmaking Process)

Since fiscal 2008, four blast furnace steelmakers including us, and Nippon Steel & Sumikin Engineering, have been working on the “CO2 Ultimate Reduction in Steelmaking Process by Innovative Technology for Cool Earth 50 (COURSE50) Project” which is aimed at developing dramatically new CO2 reduction technology. Its goal is to develop technology to reduce CO2 emissions in the steelmaking process by 30% through technology that reduces iron ore using hydrogen amplified coke oven gas to curb CO2 emissions from blast furnaces as well as technology that uses hitherto-unused exhaust heat to separate and recover CO2 from blast furnace gas. Following the Step 1 of Phase I (i.e., tests of the hydrogen reduction process at a test blast furnace in Sweden) which greatly contributed in the development of element technology, our main focus in the Step 2 of Phase I (fiscal 2013–2017), was to verify technology to reduce CO2 emissions from a blast furnace in a comprehensive manner. By using a 12 m3 test blast furnace constructed at the Kimitsu Works, in 2017 we achieved the 10% target in reduction of CO2 emissions from a blast furnace by combining the technology to control blowing that offsets the endothermic reaction of hydrogen with the control of raw materials. Concerning development of high-efficiency processes to separate and collect CO2, we were able to achieve the world top-class amount of heat per unit. We are now undertaking Step 1 of Phase II, mainly targeting scale expansion, and are leading R&D efforts of the COURSE50. Main areas of concentration include pursuit of potential use of hydrogen by using the test blast furnace; preparation for raising the scale of blowing; further enhancement in efficiency of CO2 separation and recovery processes; and development of highly efficient heat exchanges.

Environmentally Harmonized Steelmaking Process Technology Development “COURSE50”: Structure and Features

Use of steel slag to improve coastal environment and to fix CO2

NSSMC has been working on scientific interpretation of the effectiveness and safety of using steel slag for the creation of sea forests. As an extension of such technology, we have launched a basic research project on blue carbon (the carbon captured and sequestered by oceans and coastal ecosystems), which has started to attract attention as a measure to ameliorate the effects of climate change. As the first step, we began by accumulating basic data by using our own large-sized water tank (Sea Lab), in which steel slag was used to form a shallow bottom, a tidal flat, seaweed beds, etc. to simulate the coastal environment and to see how much CO2 will be sequestered.

Technology development to sequester CO2 as useful substance

Carbon Capture and Utilization (CCU) has recently been highlighted as a way to recycle CO2 as a useful carbon resource. Through joint research with Tohoku University, we are developing a process to produce dimethyl carbonate (DMC) from CO2. DMC is widely used as raw material for high-performance plastics and as electrolytic solution for lithium batteries. Recently, we have developed a dehydration agent called 2-cyanopyridine, which enables low-pressure, low-temperature, high-efficiency reaction, resulting in an effective use of CO2. While the conventional production method requires phosgene, a toxic gas, a new method is safer with no use of phosgene. Our future target is to make an alliance between a steel plant and a plastic plant.

Development of a new hydrogen production process, which contributes to reduction in CO2 emissions

Many CCU processes require hydrogen in sequestering CO2 as useful substance. Through a joint research undertaking with the National Institute of Advanced Industrial Science and Technology, NSSMC has developed the technology of artificial photosynthesis to produce hydrogen through electrolyzing water. This technology converts Fe3+ to Fe2+ when oxygen is photocatalytically generated by solar energy. Fe2+ then enables production of hydrogen by using only about one-half of the electricity needed by ordinary processes. We have developed a new type of photocatalyst and have achieved the world’s top-level efficiency. Looking ahead, we plan to enhance stability in photocatalyst and to refine the water electrolysis equipment so that we can go to the stage of a verification test.

From “Creation of Sea Forests” to “Blue Carbon”

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[For reference] NSSMC’s R&D capacity

Approximately 800 researchers in the R&D group; Approximately 29,500 patents, issued in about 70 countries
Recycling of in-house by-products and waste generated by society

Nippon Steel & Sumitomo Metal Corporation (NSSMC) not only works for the realization of zero emissions and low environmental impacts, and recycling of in-house by-products, but also is actively engaged in recycling of waste generated by society or other industries, by utilizing its iron-making process.

Promotion of in-house zero emissions

By-products generated and the amount finally disposed

In the iron-making process, over 600 kg of by-products, such as steel slag, dust, and sludge, are generated for every ton of iron produced. In fiscal 2017, NSSMC produced 40.67 million tons of crude steel and generated 23.29 million tons of by-products. The majority of these by-products were recycled inside and outside the company. NSSMC’s final disposal amounts to approximately 230,000 tons and maintained a very high recycling rate of 99%.

Effective use of slag

Steel slag is almost entirely utilized. Approximately 70% of blast furnace slag is used for cement, while steelmaking slag is used for materials for road bases, civil engineering work, fertilizer, soil improvement, etc.

“Blast furnace cement,” a mixture of pulverized blast furnace slag and ordinary Portland cement, contributes to a 40% reduction of CO2 emissions during manufacturing, since the cement making process can be omitted. It also exhibits superior long-term strength and is registered as an Eco Mark product. Due to the effects of reduction in mining of natural crushed stone and less energy consumption in the cement making process, steel slag products are designated as a “designated procurement item” under the Green Purchasing Law, and included in the Common Specifications for Civil Engineering Work compiled by the Ministry of Land, Infrastructure, Transport and Tourism.

NSSMC’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 prevention pavement to be installed near mega-solar panel installations and other locations. [p. 15, 35]

Geo-Tizer™ is 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 remade soil is outstanding in compacting and can also be easy to dig 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, NSSMC’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. 34]

Moreover, as steel slag contains nutrition that helps plants grow, it is also widely used as fertilizer, contributing to improving farming productivity. [p. 35]

Recycling of dust and sludge

To recycle the dust and sludge generated in the iron manufacturing process to be used as raw materials, NSSMC operates a dust reduction kiln (RC: Resource circulating oven) at Kashima Works and a rotary hearth reduction furnace (RHF) at Kitimotsu Works, Hikawa 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.

NSSMC’s final disposal amounts to approximately 100,000 tons and maintained a very high recycling rate of 99%.

Recycling of waste plastics and waste tires

NSSMC collects plastic containers and packaging collected used at general households and treats them at the coke ovens at seven steelworks to be recycled 100%, complying with the Act for Promotion of Use of Recycled Resources.

NSSMC has established a system to receive waste plastics from municipalities nationwide and is handling about 200,000 tons per year, equivalent to roughly 10% of waste plastics collected all over Japan. The cumulative amount for fiscal 2000–2017 is approximately 2.89 million tons, equivalent to 9.25 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 Act.

Discarded tires are fully recycled in the Hikawa Works as raw material in the Scraper Melting Process and through thermal decomposition in the gasification recycling facility. The treated amount is 120,000 tons per year, meaning recycling of roughly 10% of discarded tires in Japan.
Activities for reducing environmental risks

ATmospheric risk management

In order to reduce emissions of sulfur oxides (SOx) and nitrogen oxides (NOx), NSSMC 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 windbreaks 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 outside.

With regard to mercury, it is contained in waste gas is effectively captured by dust collectors or is absorbed by activated coke or activated charcoal so as to reduce mercury emission in the air. In April 2018, the Revised Air Pollution Control Act became effective and has regulated the mercury concentration in emission gas for waste incinerators. Our facilities conform to the regulations.

For sintering furnace and electric furnace for steelmaking, the Revised Air Pollution Control Act specifies companies to promote voluntary initiatives to control emission of mercury. NSSMC’s sintering furnaces and electric furnaces have already installed emission gas treatment systems that are effective in capturing mercury. In April 2018 the Japan Iron and Steel Federation established a voluntary management standard concerning mercury concentration and decided to regularly measure the amount of emission, and evaluate as well as disclose the status of achievement of the voluntary standard. Through such efforts, we strive to prevent emission of mercury into the air.

Water risk management

NSSMC 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.

For sintering furnace and electric furnace for steelmaking, the Revised Air Pollution Control Act specifies companies to promote voluntary initiatives to control emission of mercury. NSSMC’s sintering furnaces and electric furnaces have already installed emission gas treatment systems that are effective in capturing mercury. In April 2018 the Japan Iron and Steel Federation established a voluntary management standard concerning mercury concentration and decided to regularly measure the amount of emission, and evaluate as well as disclose the status of achievement of the voluntary standard. Through such efforts, we strive to prevent emission of mercury into the air.

Promotion of Environmental Risk Management

NSSMC 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. We also are engaged in reducing environmental risk throughout the Group.

In addition to the above, we also are engaged in reducing environmental risk throughout the Group. NSSMC 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.
Promotion of Environmental Risk Management

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

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

Management of discharged chemical substances

Comprehensive management of discharge
NSSMC appropriately manages and tries to improve the production, handling, and discharge or disposal of chemical substances in accordance with the PRTR Act, Chemical Substance Control Law, 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 (VOCs), 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.

NSSMC also took the lead to promote the use of alternatives to steelmaking materials and equipment that contain hazardous materials such as 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, NSSMC 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 them. In fiscal 2017, there were 52 target substances for notification and the emission amount was 429 tons into the atmosphere and 29 tons to public water areas, while the disposal amount of mostly manganese, chrome, other metals, and their compounds to outside of the steelworks was 6,317 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 at reducing VOCs. In fiscal 2019, the 30% reduction target relative to fiscal 2000 was achieved but we have since then continued efforts for further reduction.

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 dioxin into the atmosphere. All these facilities have satisfied the emission concentration standard and have achieved the voluntary reduction target, based on the JISF guidelines, relative to fiscal 1997 by a large margin. Since then low emission levels have been maintained.

• 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

Appropriate treatment of industrial waste

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 NSSMC steelworks and offices have adopted the e-Manifest system and fully utilize it for waste management.

Examples of environmental initiatives at steelworks

Electronic Manifest

Manifest system

This is a system for waste generators to track the flow of hazardous industrial waste shipments to collectors, transporters, and disposal contractors, as to ensure appropriate handling and to prevent illegal dumping.

The waste generators are required to use the manifest system and confirm that the industrial waste is appropriately handled up to final disposal by contractors.

Benefit of the e-Manifest system

The e-Manifest system is a scheme in which the three parties, namely, waste generators, collectors and transporters, and disposal contractors, exchange e-Manifest information on the network via the government’s information processing center. As the items required by law are systematically controlled, inappropriate treatment, such as consigned treatment without a contract or treatment of unauthorized items, can be prevented.

In addition, as the parties can browse and monitor the status of Manifest registration and reporting online, the Manifest is reliably managed in a proper way and inappropriate treatment of industrial waste can be prevented, contributing to enhanced compliance.

As a waste generator, all NSSMC steelworks and offices have adopted the e-Manifest system and fully utilize it for waste management.

Addressing water risks: Measures against local torrential rain and water leakage of embankments

Measures against local torrential rain

In recent years, the frequency of local torrential rains, due to weather abnormalities, has been increasing. Once the amount exceeds the limit of runoff and wastewater treatment capacity, a huge amount of rainwater that has fallen in the vast premises of a steelworks could directly flow to the sea. In a storage area of raw materials in particular, there was a risk that water tainted with iron ore powder or coal dust could flow into the sea. We have therefore identified such risk areas within the steelworks and have installed large-sized storage tanks to collect and store the rainwater, as a measure to prevent abnormal water discharge in case of a local torrential rain or other abnormal conditions.

Measures against water leakage of embankments

Steelworks are located facing the sea and have extremely long embankments. If there is a crack in the embankment, there is a risk of a leakage of groundwater of unknown water quality. In order to prevent this, we use a boat to regularly inspect the embankment. When a damaged area is found through the inspection, it is promptly repaired to maintain and manage the embankment in a sound condition. A water barrier will be installed on the land side of embankments having potential risk of leakage of water which may exceed permissible levels. When deemed important, we also will install a wall and pump out groundwater so as to lower it to level on the land side. These are examples of measures taken to prevent water leakage even if a crack develops in the embankment.
**Initiatives on Conservation of Biodiversity**

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

### "Creation of Hometown Forests"

NSMSC is participating in the "Company Forests" program for preservation of forest environments in Wakayama Prefecture. This program involves tree-planting and other volunteer work with the aim of preserving Wakayama's natural environment by maintaining local forests. At 2.52-hectare privately-owned forest we have rented in Nakahoku-cho, Tanabe City, a project named "Nippon Steel & Sumitomo Metal Forest" calls for planting and cultivating approximately 5,000 broad-leave trees. Daily maintenance is entrusted to the Nakahoku-cho Forest Cooperative, while our employees participate in works such as tree planting and underbrush cutting. Further, NSSMC’s pavement materials, KATAMA™ SP made of steel slag, b by a product in the project, are used for forest roads in Wakayama Prefecture.

### "Creation of Sea Forests"

Some animal inhabitants of the Hometown Forests

- **Hokkaido**: White deer, fox, hares, rabbit, eagle, jay, pigeon
- **Toyama**: White-tailed eagle, swift, swallow, wagtail
- **Kochi**: Raccoon, marten, bulbul, tiger keelbuck
- **Kushimoto, Yura**: Raccoon, otter, seal, sea cow
- **Wakayama**: Raccoon, marten, bulbul, tiger keelbuck
- **Kagoshima**: Raccoon, marten, bulbul, tiger keelbuck
- **Oita**: Black-tailed weasel, pheasant, Japanese cormorant
- **Tokyo**: Hirohata buzzard, shrike, Oriental turtle dove, bulbul, starling, Bunting
- **Kyoto**: Amagasaki heron, bulbul, lizard, killifish, white-tailed skimmer
- **Osaka**: Steel slag, a by-product in the Wakayama Works, are used for forest roads in seasons across Japan. Wild birds and animals inhabit the land returns to the forests. Thus, the “Creation of Hometown Forests” helps conserve biodiversity, and sequestrates CO2. Some animal inhabitants of the Sea Forests

- **Kamakura**: Seaweed, crabs, sea urchin, squid, urchin
- **Fukuoka**: Hiyakawa Works, Rakushu, flowers
- **Hokkaido**: (Citrus, Shikotsu)

### "Creation of Sea Forests"

Implementing 37 spots in Japan to improve sea desertification

Sea desertification, a problem of the sea bed losing ability to support marine life, is a vital issue in 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, NSSMC 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 and 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 in the soil of a land forest. By using steel slag and humic substance originated from waste wood, we artificially generate the humic acid in the soil of a land forest.

**Steel slag being used for rice cultivation**

Steel slag, a by-product of steelmaking, contains nutrient materials that help 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 fertilizers.

NSSMC donated converter slag fertilizers to cooperate for research by Tokyo University of Agriculture for salt removal in Tsurumashi in the Soma area of Fukushima Prefecture, which was devastated by the earthquakes and tsunami of March 2011. The slag fertilizers have proved effective in rapid and efficient salt removal. The restoration of rice fields also means to restore habitats for birds, frogs, and various other living things.
**Promotion of Environmental Management**

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

**Environmental management system**

- **Plan**
  - NSSMC promotes the awareness of environmental management among its employees, managers, and workers.
  - NSSMC builds an environmental management system with each steelworks general manager serving as the responsible person. Each year, in addition to an internal auditing of each steelworks and a management review by its general manager, each steelworks is audited by the Head Office Environmental Department.
  - NSSMC holds an Environmental Information Foundation Environmental Conference attended by general managers of all group companies.
  - NSSMC holds in-house environmental audits and management reviews by the ISO certification agency.

- **Do**
  - NSSMC promotes the implementation of environmental regulations and laws in accordance with the checklist and the check list.
  - NSSMC holds an Environmental Management Committee meeting twice a year to set environmental management goals.
  - NSSMC promotes the leaders of the Environmental Management Committee to set clear environmental management goals.
  - NSSMC promotes the leaders of the Environmental Management Committee to set clear environmental management goals.

- **Check**
  - NSSMC promotes the awareness of environmental management among its employees, managers, and workers.
  - NSSMC builds an environmental management system with each steelworks general manager serving as the responsible person. Each year, in addition to an internal auditing of each steelworks and a management review by its general manager, each steelworks is audited by the Head Office Environmental Department.
  - NSSMC holds an Environmental Information Foundation Environmental Conference attended by general managers of all group companies.
  - NSSMC holds in-house environmental audits and management reviews by the ISO certification agency.

- **Action**
  - NSSMC promotes the implementation of environmental regulations and laws in accordance with the checklist and the check list.
  - NSSMC holds an Environmental Management Committee meeting twice a year to set environmental management goals.
  - NSSMC promotes the leaders of the Environmental Management Committee to set clear environmental management goals.
  - NSSMC promotes the leaders of the Environmental Management Committee to set clear environmental management goals.

**Environmental accounting**

NSSMC 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.

**Environmental preservation costs**

Capitalexpenditureforenvironmentalpreservationamounted19.8 billion yen in total for FY2017: 17.8 billion yen for investment in equipment for environmental measures and 2 billion yen for investment in energy-saving equipment. The aggregate amount accounted for approximately 5% of the total cost of equipment investment.

As environmental measures, we invested in preventive measures for dust emissions, visible smoke emitted from steelworks stacks, abnormal waste discharge from drain outlets, and leakage of water from the revetments and quay walls at steelworks.

For saving of energy, measures were taken to improve the efficiency of heating furnaces as well as overall energy-saving measures in each manufacturing process.

**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 19; water consumption volume, on page 30; and various resources spent, on page 20. For atmospheric substances, SOx and NOx emissions are shown; for water quality and soil, individual performance indicators are used; for hazardous chemical substances, actual reduction volume of substances such as dioxins, benzene, and VOCs are stated; and for waste products, reduction in final disposal volume is stated.

NSSMC will continue efforts to improve accuracy in environmental accounting and use it as a management benchmark to effectively invest in equipment and attempt to further preserve the environment and conserve energy.

**Environmental preservation costs (Unit: 10^9 yen)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>FY2017</th>
<th>FY2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pollution Prevention Costs</td>
<td>Environment-related expenses for dust</td>
<td>16.4</td>
<td>16.4</td>
</tr>
<tr>
<td></td>
<td>Environment-related expenses for dust</td>
<td>14.6</td>
<td>14.6</td>
</tr>
<tr>
<td></td>
<td>Environment-related expenses for dust</td>
<td>1.8</td>
<td>1.8</td>
</tr>
<tr>
<td>Global Warming Prevention Costs</td>
<td>Environment-related expenses for dust</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>Environment-related expenses for dust</td>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Costs of Recycling Resources</td>
<td>Environment-related expenses for dust</td>
<td>7.4</td>
<td>7.4</td>
</tr>
<tr>
<td></td>
<td>Environment-related expenses for dust</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td></td>
<td>Environment-related expenses for dust</td>
<td>0.03</td>
<td>0.03</td>
</tr>
<tr>
<td>Environmental Management Activities Cost</td>
<td>Environment-related expenses for dust</td>
<td>1.2</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td>Environment-related expenses for dust</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Research and Development Costs</td>
<td>Environment-related expenses for dust</td>
<td>3.6</td>
<td>3.6</td>
</tr>
<tr>
<td></td>
<td>Environment-related expenses for dust</td>
<td>7.0</td>
<td>7.0</td>
</tr>
<tr>
<td>Social Activity Costs</td>
<td>Environment-related expenses for dust</td>
<td>2.7</td>
<td>2.7</td>
</tr>
<tr>
<td>Other Environmental Costs</td>
<td>Environment-related expenses for dust</td>
<td>4.2</td>
<td>4.2</td>
</tr>
<tr>
<td>Total</td>
<td>Environment-related expenses for dust</td>
<td>19.8</td>
<td>19.8</td>
</tr>
<tr>
<td></td>
<td>Environment-related expenses for dust</td>
<td>85.3</td>
<td>85.3</td>
</tr>
</tbody>
</table>

**Reference:** Net income (consolidated basis) 195.0
Concerning global warming countermeasures, NSSMC is concentrating on four major efforts, namely, the three ecos and the innovative technology development, in order to achieve the targets of the Initiatives for Achieving a Low Carbon Society.

With the aim of creating a recycling-oriented society, we maintained a high recycling ratio of 99% by reducing the volume of final disposal through increased recycling of by-products. With regard to environmental risk management, the management cycle is efficiently fulfilled with the Environmental Management Committee at the core of its efforts, raising the level of environmental management of the entire group. Eco Products and Eco Solution were successfully developed and offered in a market in an active manner.

### Targets and Achievements in FY2017

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Initiative/Target</th>
<th>Achievements in FY2017 (by NSSMC and some group companies)</th>
<th>Indicators</th>
<th>Typical website</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium-term Environmental Management Plan and Priority Targets</td>
<td>Enhance and promote an environmental management system</td>
<td>Developed corporate environmental management system</td>
<td><a href="#">Link</a></td>
<td><a href="#">Website</a></td>
</tr>
<tr>
<td></td>
<td>Promote environmental management in coordination with group companies</td>
<td>Fully established environmental management system in group companies</td>
<td><a href="#">Link</a></td>
<td><a href="#">Website</a></td>
</tr>
<tr>
<td></td>
<td>Enhance and promote the recycling of resources</td>
<td>Developed scheme for recycling of resources</td>
<td><a href="#">Link</a></td>
<td><a href="#">Website</a></td>
</tr>
<tr>
<td></td>
<td>Reduce the final disposal volume of by-products</td>
<td>Recycled 99% of the 23.39 million tons of by-products generated in the past</td>
<td><a href="#">Link</a></td>
<td><a href="#">Website</a></td>
</tr>
<tr>
<td></td>
<td>Initials for environmental risk management</td>
<td>Completed risk management system for each sector</td>
<td><a href="#">Link</a></td>
<td><a href="#">Website</a></td>
</tr>
<tr>
<td></td>
<td>Promote the effective use of water and resources</td>
<td>Achieved the voluntary target (27,763 m³) for water and 1,777,766 m³ for cooling water</td>
<td><a href="#">Link</a></td>
<td><a href="#">Website</a></td>
</tr>
<tr>
<td></td>
<td>Reduce environmental risks of the air, water, soil, etc.</td>
<td>Achieved the voluntary target of 1.45 billion yen for environmental protection</td>
<td><a href="#">Link</a></td>
<td><a href="#">Website</a></td>
</tr>
<tr>
<td></td>
<td>Maintain and enhance preservation of the local environment</td>
<td>Achieved the voluntary target of 2.2 billion yen for environmental protection</td>
<td><a href="#">Link</a></td>
<td><a href="#">Website</a></td>
</tr>
<tr>
<td></td>
<td>Monitor environmental data based on national environmental management plan (14 bases)</td>
<td>Achieved the voluntary target of 27.6 billion yen for environmental protection</td>
<td><a href="#">Link</a></td>
<td><a href="#">Website</a></td>
</tr>
<tr>
<td></td>
<td>Electrical; radioactive waste reduction based on license fees and Indian regulations</td>
<td>Achieved the voluntary target of 22.6 billion yen for environmental protection</td>
<td><a href="#">Link</a></td>
<td><a href="#">Website</a></td>
</tr>
<tr>
<td></td>
<td>Environmental control of chemical substances in the workplace</td>
<td>Achieved the voluntary target of 2.6 billion yen for environmental protection</td>
<td><a href="#">Link</a></td>
<td><a href="#">Website</a></td>
</tr>
<tr>
<td></td>
<td>Reduce CO2 emissions by promoting energy-saving activities</td>
<td>Achieved the voluntary target of 2.2 billion yen for environmental protection</td>
<td><a href="#">Link</a></td>
<td><a href="#">Website</a></td>
</tr>
<tr>
<td></td>
<td>Enhance and promote an environmental management system</td>
<td>Achieved the voluntary target of 2.1 billion yen for environmental protection</td>
<td><a href="#">Link</a></td>
<td><a href="#">Website</a></td>
</tr>
</tbody>
</table>

### Corporate Governance Structure

The NSSMC 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.

#### General Meeting of Shareholders

- Board of Directors
  - Outside Directors and Audit & Supervisory Board Members (non-executive officers), who perform oversight and supervisory functions, account for roughly one half (10 out of 23) of the Board of Directors, and outside officers represent about 7 out of 12. (Including one woman) to ensure adequate multidisciplinary discussions and objective decision making.

#### Audit & Supervisory Board

- NSSMC has adopted the corporate system of organization with an audit and supervisory board in this system. Audit and Supervisory Board Members, who are given strong legal authority, oversee, from independent positions, the execution of duties by Directors. These full-time Audit & Supervisory Board Members, each having a thorough understanding of NSSMC’s business, and four Outside Audit & Supervisory Board Members with deep insight over the execution of duties by Directors and the status of the company’s assets on a daily basis, in cooperation with accounting auditors and the Internal Control & Audit Division.

#### Corporate Policy Committee

- Directors, Executive Officers, and General Managers in Charge
  - “We continue to emphasize the importance of integrity and reliability in our actions.” This is the first principle we stated in the Management Principles. Through messages from top management, periodic legal training programs, and other activities, we make certain that all employees fully understand NSSMC’s basic policy of ensuring fair management.
  - We perform original written materials for our ear in fair and appropriate business. We also conduct educational programs and a training program for each rank of employees to cultivate their strong awareness on compliance.

#### Internal Control & Audit Division

- The status of internal controls and the risk management system is regularly confirmed through the Risk Management Committee, chaired by the Executive Vice President in charge of Internal Control & Audit.
  - Each division and Group company is encouraged to take initiatives and share information with NSSMC and its collaborative companies through regular meetings and other occasions.

#### Whistleblower system

- <structure of internal consulting and internal report systems>
Stakeholder Engagement

The NSSMC Group treasures its partnership with all its stakeholders and aims to improve its corporate value by enhancing its relationships with them through better exchanges and communication.

We hope to help all stakeholders understand the importance of "mono-zukuri (product manufacturing)" and our various initiatives on environmental issues and through that understanding to be a company trusted by them all the time. For those objectives, we seek to offer sufficient opportunities for constructive communication, ensure timely disclosure of information, and continue to make social contribution activities that are closely tied to local communities. We also strive to create workplaces in which employees can work with pride and enthusiasm, and fulfill our corporate social responsibilities as a member of society.

Together with customers and suppliers

We endeavor to closely communicate with our customers in automobiles, electric, shipbuilding, construction, civil engineering, and other sectors as well as suppliers of raw materials and equipment, ensuring that environmental and social concerns are addressed at all levels of our supply chain.

Quality management

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 engaged in thorough quality management. In coordination with product units and steelworks, the Company’s Quality Assurance Department promotes measures to cope with Group-wide quality control and assurance issues. We also make efforts to standardize or systemize ways to enhance and assure quality, and carry out capital spending. The quality management structure for all Group companies including overseas ones is based on the autonomous quality enhancement activities of the relevant section of each product unit and steelworks, which are then internally monitored and checked. Furthermore, NSSMC has received certifications from external institutions such as for ISO 9001 and Japanese Industrial Standards (JIS), boosting our credibility.

Enhancing customer satisfaction

In general, it is customers who do the final processing of steel products. NSSMC thus contributes to quality enhancement of customers' products by providing them with comprehensive solutions including proposals on process technologies, in addition to improving the quality of materials.

As an example, high tensile steel sheets for automobiles are required to satisfy needs for weight reduction to lessen environmental impact and for vehicle body stability. They are thin, strong, and hence difficult to process. Based on our long relationships of trust with customers, we are engaged in the design and development stage of automobile bodies, use our forming, joining, and analyzing technologies, and develop easy-to-process steel materials with high performance. At the same time, we propose a wide range of solutions, including methods of processing, which utilize steel materials' properties, shapes, and structures.

In addition to activities "before service," we provide "after service," in which our engineers visit customers’ manufacturing sites on a regular basis, bring back the "voices of customers" to their own worksites, and thus ensure further improvement in developing steel materials.

Communicating with customers through exhibitions

As a place for dialogue with customers, we participate in the Highly-functional METAL EXPO, the New Environmental Exposition, the Eco-Pro Exhibition, and numerous other exhibitions. We strive to make our impact through preservation of resources and energy, and lower CO2 emissions. (pp. 22, 23) "Steel being an outstanding material from the perspective of Life Cycle Assessment. (pp. 12, 13) is another point we want to emphasize to customers.

Together with suppliers

As stipulated in the Charter of Corporate Behavior by Keidanren, we have set up internal rules, including an appropriate purchasing policy, which put us on record as fully considering resource protection and environmental preservation. In order to promote purchasing activities toward achieving SDGs by the entire supply chain, we are enhancing cooperation with each supplier. In fiscal 2018, we hosted the first Material/Equipment Procurement Partners Meeting and shared our purchasing policy that emphasizes the following: thorough compliance; product safety, ensuring of quality, cost, and delivery (QCD) and advancement of technology development capability; consideration of human rights, labor environment, safety, and health; environment conservation; and thorough information management.

Based on the Life Cycle Assessment concept, NSSMC is taking initiatives in reducing environmental impacts 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.
Stakeholder Engagement

Together with shareholders and investors

In our Investor Relations (IR) activities we strive for timely disclosure of information, to improve our IR briefings, dialogues, and other opportunities to interact with our shareholders and investors.

Measures to enhance dialogues

For shareholders, NSSMC 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 stakeholders’ 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.

Together with employees

We pursue various personnel policies, based on fair treatment of personnel, to ensure that our employees work consistently with pride, motivation and vitality. We are implementing various health and safety measures so that employees can do their jobs in safe and secure workplaces.

Respect for the human rights

In compliance with the Universal Declaration of Human Rights and other international norms on human rights, NSSMC conducts business ethically, while paying full heed to human rights issues arising with the increasing globalization of the economy. We give due attention to the rights of workers, and staunchly oppose 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.

Ensuring diversity in human resources

NSSMC is proactively hiring women and non-Japanese. We are promoting diverse measures so as to build workplaces in which a diversity of people, including seniors and women, are empowered. As a part of such approach, we opened a 24-hour childcare center for use by shift work employees who are in a childbearing or child raising period. This was in the Oia Works, Kimitsu Works, and Yawata Works; we are planning to open another childcare center in the Nagoya Works in October 2018.

Fostering personnel and skill transfer

Based on the belief that the development of excellent personnel is a prerequisite for the production of excellent products, NSSMC is actively rolling out programs to strengthen the overall capabilities of each employee. In addition to the on-the-job training as a base, various types of off-the-job training sessions are conducted. Veteran employees are relaying their accumulated skills and know how to young workers in manufacturing worksites. On top of steady hiring of employees, the method of transferring skills has also been evolved into systemized teaching methods, which include visualized work procedures and comprehension tests. Leverage of its world top-class technological prowess, we also aggressively expand overseas growth markets, such as Southeast Asian countries, such as Vietnam, Thailand, and Indonesia, as well as the Middle East, and North and South America. Many of our employees are working together with local employees and employees of our joint venture partners. In order to develop employees who promote our overseas business expansion, we put efforts into international education, such as intercultural learning programs and study abroad programs.

Efforts toward labor safety and health management

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 (such as that safety, environment, and disaster prevention comes first) in all of our activities. We have been improving our Occupational Safety and Health Management System (OSHMS) and strive to make safe and secure workplaces. The Basic Policy on Safety and Health is applied to NSSMC as well as to related subcontracting companies. Under the OSHMS, we make a policy, targets, and a plan on the safety and health policy, implement a PDCA cycle, and drive continuous improvement.

Regarding labor management, besides improving healthcare counseling for employees, we make efforts for early detection and appropriate actions in the area of mental health.

Promotion of balanced work-life

NSSMC complies with labor laws and regulations of each country and strives to create the work environment that allows each and every employee to do his/her best. We promote balanced work-life by encouraging employees to fully use their paid holidays and to reduce long working hours under an appropriate working hour management, in cooperation with labor unions. We also provide 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.

Together with local communities

We carry out environmental protection activities which match the needs and characteristics of local communities, and engage in environmental activities with various stakeholders in our local communities, including outside groups, NGOs, students, and teachers.

Providing Education on Manufacturing and the Environment

NSSMC feels it is important to be involved in educating young people and their teachers, who are helping prepare our future generations. We try to help them better understand the appeal of “monozukuri (product manufacturing)” and our various initiatives concerning environmental issues. With the aim of showing children the joy of product manufacturing, NSSMC has been holding demonstrations on “sasa inromi-kyo” — Japan’s indigenous ironmaking technique — and science experiment classes at our steelworks and nearby schools in Japan every year. For many years, we have been offering internship opportunities to students to help them learn our business and gain some work experience. In fiscal 2017, a total of 1,771 students from universities and technical colleges participated in the intern program at our steelworks and research centers throughout Japan, and the program was favorably received.

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Support for the arts

The Nippon Steel & Sumitomo Metal Arts Foundation operates the Kioi Hall (in Chiyoda-ku, Tokyo) and hosts classical concerts by Kioi Sinfonietta Tokyo, the resident orchestra of the hall. The foundation also makes the hall available for traditional Japanese music performances; there are few places where such performances are common. The objective is to help popularize traditional Japanese music. In 2017, in order to familiarize children and their parents with the fascination of such music, we held a participatory program named “Welcome to the world of traditional Japanese music.” More than 900 people in Japan and abroad participated in the project.

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Overall environmental management

I was struck by a subtitle “Together with SDGs” on the cover of this Sustainability Report 2018, and took it as a clear indication of NSSMC’s commitment to contributing to a sustainable future. The global population is expected to reach 9.9 billion by 2050. Increased activities of people have significant impacts, such as climate change, depletion of natural resources, crises of biodiversity, and other environmental problems as well as serious concerns posing threats to food, education, human rights, labor, and other issues.

Moreover, as mentioned in “A Message from Top Management,” great waves of long-term structural changes are now washing over society and industries. And other IFIs are realizing Society 5.0 while particularly in Japan, regional revitalization is much desired to solve problems of the aging of the population and declining birthrate, as well as weakening of depopulated regions. Against such a background, I compliment NSSMC’s declaration to “Create the value of steel, while contributing to society by providing steel.”

In the 2020 Mid-Term Management Plan announced in March 2018, NSSMC stated it will particularly focus on environmental management by “aggressively addressing to environmental issues from a local level up to a global level and contributing to the achievement of a sustainable society.” I highly regard the accuracy of its viewpoint as a company being in key basic industries supporting Japan and as an energy-consuming company that has always pursued the best available environmental measures.

Specifically, looking at NSSMC’s Long-Term History of Innovation through Steelmaking, I became aware that NSSMC has a history of technological development in response to requests from user companies on matters of environmental performance and enhanced safety measures since the 1960s when steel supported high economic growth in Japan.

Along with market growth and user companies’ overseas expansion, NSSMC too has established overseas production bases. Today overseas business represents 35% of NSSMC’s total sales in its main steelmaking business and four other areas, and domestic business represents 65%. This means that NSSMC has firmly established a management base for contributing to the sustainability of the world through steel.

From the perspective of the 17 Sustainable Development Goals (SDGs) adopted by the United Nations in 2015, NSSMC’s measures are well balanced from economic, environmental, and social aspects. Going forward, if similar checking on idiosyncratic and harmonious manage-

concerning food, education, human rights, labor, and other issues. NSSMC's initiatives begun up to now could enable it to reach the 2030 target, but the 2050 target might be difficult to achieve.

I am anticipating NSSMC, as a company consuming about 5% of Japan’s total energy consumption, takes further actions with COURSE50, which promotes technology development for drastic CO2 emis-
sion reduction in steel production. I sincerely hope that NSSMC will show a problem-solving model in the world steel industry by using the technology to reduce iron ore using hydrogen amplified coke oven gas to curb CO2 emissions in steelmaking process from blast furnaces, raising efficiency in the CO2 separation and collection processes, pursuing potential use of hydrogen, and other developments.

Toward the realization of a recycling-oriented society, NSSMC has pro-
moted in-house zero emissions by recycling 99% of internally-generated plastic waste in steelmaking process. I sincerely hope that NSSMC will show a problem-solving model in the world steel industry by using the technology to reduce iron ore using hydrogen amplified coke oven gas to curb CO2 emissions in steelmaking process from blast furnaces, raising efficiency in the CO2 separation and collection processes, pursuing potential use of hydrogen, and other developments.

Social reporting

Last but not least, engagement with stakeholders, or cooperation with all types of stakeholders, is important to be trusted in society. I understand that NSSMC has prohibited as unjust the discriminatory treatment of workers based on nationality, race, belief, creed, gender, and disability. I would like NSSMC to incorporate an international perspective, by reflecting the United Nations’ Guiding Principles on Business and Human Rights, for example.