

NIPPON STEEL & SUMITOMO METAL CORPORATION

http://www.nssmc.com/en/

NSSMC's Logotype



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



Eco-friendly vegetable oil ink is used for this report.









NIPPON STEEL & SUMITOMO METAL CORPORATION

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.

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.

Basic Environmental Policy (Established in October 2012)

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.

- 1. Reducing environmental impacts at every stage of operations (eco process) \Rightarrow pp. 10–19
- 2. Offering of environment-oriented products (eco products) \Rightarrow pp. 20–23
- 3. Proposing environmental preservation solutions from a global perspective (eco solution)
 \bigcirc pp. 24–29
- 4. Development of innovative technologies ⇒ pp. 30–31
- 5. Development of a rich environment 会 pp. 28–29
- 6. Promotion of environmental relations activities 🔊 pp. 36–39



Editorial policy

This Sustainability Report is the 18th since the former Nippon Steel Corporation issued what is the first sustainability report by a Japanese steel manufacturer, in 1988. The report presents NSSMC's progress in ecological management and details of our various initiatives.

Period covered

The period covered in the report is fiscal year 2014 (from April 2014 to March 2015). For some activities, the period from April 2015 to June 2015 is included.

Scope of report

- Environmental and social aspects: Activities of NSSMC and its group companies in Japan and overseas
- Economic aspects: The Annual Report for 2015 (issued in July 2015) also covers the contents of the economic report.

Reference for guideline

- GRI (Global Reporting Initiative) "Sustainability Reporting Guidelines Version 4.0"
- "Environmental Reporting Guidelines," by the
- Ministry of the Environment

Corporate profile

Company name	Nippon Steel & Sumitomo Metal Corporation	
Head office	2-6-1, Marunouchi, Chiyoda-ku,	
	Tokyo 100-8071, Japan	
	Phone: +81-3-6867-4111	
Date of Establishment	March 31, 1970	

Cover photos: (Top) Muroran Works and Hometown Forest

(Bottom from left) Toyota Motor Corporation's "MIRAI", NSSMC's titanium foil (p. 26) JR East's Hokuriku Shinkansen, NSSMC's high-speed railway wheel and axle (p. 21) YZF-R1 of Yamaha Motor Co., Ltd., Connecting rod made of NSSMC's titanium alloy (p. 20)

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	NSSMC'	's Businesses
	We aim at bec	coming the world-leading steelmaker b p. 2
	with compren	
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NSSMC'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.



2010 2011 2012 2013 2014

NSSMC/NSC¹ SMI²

(FY)

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.

Sales and manufacturing of automotive steel sheet









1 NSC: Nippon Steel Corporation 2 SMI: Sumitomo Metal Industries, Ltd.

A Message from Top Management



Aiming to Be Ever More Trusted and Relied Upon by Society

I would like to start this message by saying that we at Nippon Steel & Sumitomo Metal (NSSMC) sincerely regret the great trouble and inconvenience caused to those concerned by the Nagoya Works power failure accidents and the smoke generation after the coke fire accident in 2014. We investigated the causes of the accidents and identified areas for improvement and lessons to be learned. Reflecting on those issues, we are sincerely committed to go back to basics, prevent recurrence of similar accidents, and strive hard to enhance our overall manufacturing bases.

In March 2015, NSSMC announced its Mid-Term Management Plan for fiscal 2015-2017. As we are in an environment which keeps changing, ever more quickly, on a global scale, we must go ahead and distinguish ourselves from our competitors by placing particular emphases on "technology," "cost," and "being global." By doing this we intend to firmly establish our position as the best steelmaker with world-leading capabilities.

For many years, based on our "Ecological Management," we have been fulfilling our commitment to contribute to the creation of a society oriented toward environmental preservation and lower environmental impact, under the principle of "Basic Environmental Policy." Under our new Mid-Term Management Plan, NSSMC will continue to address various environmental issues from the local community level to the global scale by keeping foremost in our activities the "three ecos," namely eco process, eco products and eco solutions, and the "development of innovative technologies." The issues encompass the maintenance and improvement of good living environments, the promotion of reduction and recycling of waste, measures to address global warming, and the maintenance and improvement of biological diversity.

Regarding the global climate change issue, 2015 is an important year as the United Nations Climate Change Conference, or COP21, will be held in Paris, to achieve a universal agreement on a new framework to be used from 2020. While the Japanese government is discussing the matter in preparation for the Conference, Japan's steel industry as well as the business community in general have just organized the Phase II of their initiatives for achieving a Low-Carbon Society with a 2030 target, and have made commitment to society. The NSMMC Group will continue its ongoing efforts to achieve its target for fiscal 2020 and to accelerate its efforts for reduction of CO_2 emission with a long-term view of the future.

We keep reminding ourselves that environmental risk management is one of the critical challenges for our sustainable operations. 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 condition of each business base. We will keep enhancing our capability to address the issues of environmental preservation in terms of hard and soft aspects.

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. Our specific CSR concerns include compliance with laws and regulations and risk management in areas of safety, environment, disaster prevention, among others. We also intend to continue to further enhance the quality of our ecological management by developing two-way communication with all stakeholders, i.e., local communities, customers, shareholders, investors, researchers, and environmental NGOs.

This *Sustainability Report* introduces NSSMC's progress in ecological management and details of our various initiatives mentioned above. We hope that you take a look at it and let us learn from your candid opinions regarding our environmental and other activities.

> Kosei Shindo Representative Director and President



05

NSSMC makes ecological innovations with the "three ecos and innovative technology development"

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.

We are committed to contribute to the development of society by further improving our advanced technology.

Resin film steel sheet (1994)

Balanced features of seismic resistance

fire resistance, durability, and thermal

• I/N Tek (U.S.) began operation (1990)

• The Smart Community Creation Project

of Kitakyushu City was launched (1994)

Participated in creation of a city under

the theme of harmonious existence in

Kitakyushu City, Fukuoka Prefecture

• ICI (U.S.) began operation (1992)

Lead-free wire rod (1999)

HIAREST steel (1996)

Steel House (1996)

retention



eco PRODUCTS

What we produce is "eco-friendly"

ECO SOLUTION

Sharing our "eco-solutions"

We contribute to the reduction of CO₂ emissions and other environmental bur-

dens on a global scale by diffusing our

Group's world-class environmental and

energy-saving technologies in Japan

We produce and offer eco-friendly "products" using our world-leading technological capabilities, thus conserving resources and energy and thereby contributing towards building a sustainable society.

ECO PRODUCTS

Adoption of railway wheels and axles • Wires for steel tire cords (1978) and powertrain equipment for the Enhanced strengths enabled reduction Tokaido Shinkansen trains (1964) \Rightarrow p. 21 in wire for tires. Use of steel sheet for consumer durables contributing such as cars. coolers. and color TVs to higher fuel



Began production of Orient Core HI-B™ which is used in transmission/distribution transformers and reduces their energy

Thai Steel Pipe began operation (1965)



Celebrates 50th anniversary in 2015. Supported the development of the automobile industry in Thailand, as one of the oldest Japanese companies to be active in Thailand

The world's first forest was created by using the Miyawaki method. 😔 pp. 28–29 Began operation of the first waste direct-melting and resource recovery system (1979

Introduced computer control of blast

Shortened the processing time from 10 days to one day The steel industry's first online system began operation (1973)





Continuous annealing furnace

• Opening of the Meishin Expressway (1963) Japan World Exposition (Osaka Expo'70) (1970) Opening of the Tokaido Shinkansen Line (1964) Sapporo Winter Olympics (1972) Tokyo Summer Olympics (1964) Shift to the floating exchange rate regime (1973) • The first oil crisis (1973) The second oil crisis (1978)

 High-tensile steel sheets for automo biles 🔿 p. 21 • Began manufacturing and sales of titanium materials (1984)



NSSMC began production and sales of outstanding corrosion-resistant, light, and strong titanium Steel tubes for automobile door impact beams (1987) · High-strength wires and steel plates for the Akashi Kaikyo Bridge (1988) 🔿 p. 19

 Began technology transfer of Coke Dry Quenching (CDQ) (1985) 🔿 p. 2 Cooperated in construction of Shanghai Baoshan Steel (1985)



Deng Xiaoping, China's Deputy Prime Minister, visited the Kimitsu Works in 1978

 TMCP (Thermo Mechanical Control Process for plate rolling) (1985) Realized the increased strength and productivity improvement by meticulous control of rolling and water-cooling

Opening of the Tohoku and Joetsu Shinkansen Lines (1982)

The International Exposition, Tsukuba, Japan (1985)

• Opening of the Seikan Submarine Tunnel (1988)

• Opening of the Great Seto Bridge (1988)

Introduction of 3% consumption tax (1989)

The Plaza Accord (1985)

The United Nations Conference on Environment

and Development (UN Earth Summit) (1992) The Great Hanshin-Awaii Farthquake (1995) Consumption rate hike to 5% (1997) Nagano Winter Olympics (1989)

events

Major

ecos

Three

47

Based on the objective of offering to society technologies and products that contribute to the saving of resources and energy and the reduction in environmental burden, we are developing innovative advanced technologies from a medium- to long-term perspective.

and overseas.



"Creation of Hometown Forests" began (1971)



• Stainless steel

economy

heat-resistance stainless steel with

NSSMC developed corrosion-resistant,

strong adaptability to match design

specifications



2000's Support for customer's global expansion

- Advanced waste water risk management (i.e., installation of waste water closing gate) 🔿
- Developed Rotary Hearth Furnace (2000)



- Recycled dust and sludge, generated in steelmaking process
- Gas Turbine Combined Cycle (GTCC) power plant exclusively fired using by product gas (2004)
- Generated more power than by conventional thermal means, using the same amount of fue
- SuperDyma[®] (2000) 🔿 p. 20
- · Lead-free galvanized steel sheets for fuel tanks (2005)
- UStainless steel boiler tube (2007) Ultra-high-tensile steel sheet for automobiles

Satisfied requirements for both collision safety and weight-reduction functionalities \bigcirc p. 19



 Began waste plastic recycling D. 1



- Creation of sea forests Beverly[™] Series (2004) 🗩 p. 2
- Japan-China Steel Industry Advanced Technology Exchange Meetings for EnvironmentalPreservation and Energy-saving (from 2005) \bigcirc p. 24 Asia Pacific Partnership
- (APP; precursor of GSEP; 2006-2011
- Start development of CO₂ separation and recovery technologies (2005) • SCOPE21 (2008; Oita) 🔿 p. 31
- FIFA World Cup Korea/Japan (2002)
- The 2005 World Exposition Aichi Japan (2005)
- Lehman Shock (Global Financial Crisis) (2008)

2010's Toward becoming the world-leading steelmaker with comprehensive strength

07

Expansion of usage of biomass resources (2010)



Utilize wood palette for packing, thinned wood, coffee grounds, and other resources as coal alternative fuel for power generation

- High-speed railway wheel for heavy freight Establishment of production and shipment
- system or 150 meter long rails (2014) • HRX19[™] stainless steel for high-
- pressure hydrogen (2015) 🔿 p. 27 • 7% Ni steel plate for LNG tanks Slashed the amount of nickel by about 20% but ensured the equivalent safety and strength to conventional levels

🗩 p. 2



 Global Superior Energy Performance Partnership (GSEP: from 2011) \bigcirc p. 24 Public and private collaborative meeting between the Japanese and Indian iron and steel industries (from 2011) \bigcirc p. 24



- SCOPE21 (2013; Nagoya) 🌖 p. 31 Completion of the first commercial model of CO₂ separation and recovery facility (2014: Muroran Works)
- COURSES0 (2015: construction of an experimental blast furnace) \bigcirc p. 30
- The Great East-Japan Earthquake and Tsunami (2011) · Opening of the entire line of the Kyushu
- Shinkansen Line (2011)
- Opening of the Tokyo Skytree (2012) • Consumption rate hike to 8% (2014)
- Opening of the Hokuriku Shinkansen Line (2015)



NIPPON STEEL & SUMITOMO METAL CORPORATION Sustainability Report 2015



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

Recycling and environmental aspects of energy and natural resources

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.

NSSMC uses iron ore mined overseas, coal as an iron ore reductant, and scrap generated by society as its main raw materials for steel production. By-product gases, such as coke oven gas generated by dry distillation of coal 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, among electricity used in steelworks, 90% of selfgenerated power was fueled by recovered waste heat and by-product gas. 90% of water used for cooling and cleaning products and manufacturing equipment is repeatedly re-used.

When one ton of iron is produced, the amount of by-products generated exceeds 600 kg, but the steel slag, dust, and sludge are reused in-house as raw materials, or are used by society or other corporations as raw materials for cement, construction materials, and so forth. These efforts have resulted in the achievement of a very high

We are also engaged in the recycling of various types of byproducts 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

Global warming countermeasures

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.

Achieved the world's top-class energy efficiency

Japan's steel industry invested ¥3 trillion in plant and equipment in the 1970s and 1980s and realized 20% energy saving. From 1990 to 2012, ¥18 trillion was invested to achieve 10% energy saving.

• Continue CO₂ emission reduction by implementing the three ecos

Following the Voluntary Action Plans, the industry is now participating in the Action Plans for the Realization of a Low-Carbon Society.

Work to achieve further CO₂ emission reduction through development of innovative technology



• Work to achieve further CO₂ emission reduction by raising efficiency in logistics

Maintain and further improve NSSMC's high modal shift ratio¹ of 95.7%; improve transportation efficiency by using larger vessels (changing from 700 tons to 1,500 ton vessels) in domestic coastal transport and taking other measures; and improve fuel economy by introducing energy-saving timetable management, lightweight vehicles, etc.



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.



https://www.kankyo-kakeibo.jp/ (only in Japanese)

NSSMC's changes in energy consumption



Energy consumption (left scale) — Energy consumption per ton of crude steel (right scale)

3 PJ indicates peta-ioules (10¹⁵ ioules).

A joule is a unit of energy, or amount of heat

4 GJ indicates giga-joules (10⁹ joules)

Logistics sector's ton-kilometer achievements for FY2014²

	Transportation quantity: 10,000 tons/year	Million ton-kilometers/year
Ship	2,010 (55%)	10,775 (87%)
Railway	6 (0%)	38 (0%)
Truck and trailer	1,620 (45%)	1,530 (13%)
Total	3,636(100%)	12,343(100%)

1 Modal shift rate: A modal shift indicates the domestic freight transport shift from truck carrier to coastal shipping and railroad carrier as a countermeasure against global warming. A modal shift rate is a percentage of cargo volume transported over a distance of 500 km and more by rail or sea (including ferry) (as defined by the Ministry of Land, Infrastructure. Transport and Tourism).

 Ton-kilometer: Total sum of the weight of load (ton) transported multiplied by transport distance (km)

NSSMC's energy-derived CO₂ emissions



- CO₂ emissions per ton of crude steel (right scale)

5 A provisional value based on the assumption that the CO₂ level in a unit of purchased electricity in FY2014 is the same as in FY2013.

Achieved the world's top-class energy efficiency

From the time of the first oil crisis until around 1990, NSSMC intensively promoted continuous processing, exhaust heat recovery, and other measures, all to enable significant energy conservation. This has led to NSSMC and Japan's steel industry as a whole achieving the world's top-class energy efficiency.—> Graphic A

Continue CO₂ emission reduction by implementing the three ecos

Based on the 31.7 billion metric tons of CO_2 emissions from worldwide fossil fuel combustion in 2012, Japan's product emissions represent 3.9% of global CO_2 emissions from combustion of fossil fuels. Japan also accounts for 27% of worldwide greenhouse gas emission, according to estimates by the International Energy Agency in 2010.

According to the latest data available, Japan's CO₂ emissions from fossil fuel combustion amounted to 12.4 billion metric tons in 2013 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 processes," and introducing "eco products" and "eco solutions" in Japan and overseas.→ Graphic B

In the Voluntary Action Plans up to FY2012, energy consumption for FY2008 through FY2012 was reduced by 11.1% relative to the FY1990 level (CO₂ emission was reduced by 11.2%), achieving participants' goals. From FY2013 on, NSSMC has been participating in the Action Plans for the Realization of a Low-Carbon Society for further CO₂ reduction by means of the three ecos. The industry-wide efforts are made to achieve the Phase I goal of CO₂ reduction of 5 million tons by FY2020 by fully implementing state-of-the-art technologies. \rightarrow Graphic C



The most effective measure against global warming is energy conservation, and therefore NSSMC is striving to improve energy efficiency by using energy generated in steelmaking processes, including power generation through use of by-product gas or exhaust heat recovery, or by reusing waste plastics and discarded tires. As a result of these efforts, the NSSMC and affiliated electric furnace companies⁶ consumed 1,100 PJ of energy and emitted 96 million tons (preliminary)⁵ of CO₂ in FY2014.

6 Affiliated electric furnace and other companies: Osaka Steel Co., Ltd., Godo Steel, Ltd., Nippon Steel & Sumikin Stainless Steel Corporation, Nakayama Steel Works Ltd., Nippon Coke & Engineering Co., Ltd, three Cooperative Thermal Power Companies (Kimitsu, Tobata and Oita), and two Sanso Centers (Nagoya and Oita)

Promote innovative technology development

In addition to promoting the three ecos, the industry has worked at developing the innovative steelmaking process (COURSE50) from a medium- to long-term CO_2 emission reduction perspective. From 2023 onward, under the Action Plans for a Low-Carbon Society, the global warming countermeasures will be steadily implemented on the basis of the three ecos and COURSE50.

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

	Eco process	Eco products	Eco solution
CO ₂ emission reduction plans	Aim at improving energy efficiency	Contribute to emission reduction when steel materials are used in final products	Contribute to world- wide energy reduction by technology transfer and diffusion
Phase I Fiscal 2020	5 million tons ⁷	33 million tons	70 million tons
Phase II Fiscal 2030	9 million tons ⁷	42 million tons	80 million tons

Development of innovative steelmaking processes (COURSE50) \Rightarrow P30

 ${\bf 7}$ The target reductions in CO_2 emission volume are based on a certain crude steel production assumption.



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

Source: Ministry of the Environment

Contributing to creation of a recycling-oriented 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 waste, but also is actively engaged in recycling of by-products 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 are generated for every ton of iron produced. In FY2014, NSSMC produced 44.96 million tons of crude steel and generated 26.05 million tons of byproducts. The majority of these by-products were recycled inside and outside the company. Approximately 230,000 tons were ultimately disposed, making our recycling ratio reach 99%.





Recycling of steel slag

Steel slag is almost entirely utilized. Approximately 70% of blast furnace slag is used for cement, while steelmaking slag is used for materials for road bases, civil engineering work, fertilizer, soil improvement, etc. For example, 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. 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 preventive pavement to be installed near mega-solar panel installations and other locations.

"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 slug products are designated as a "designated procurement item" under the Green Purchasing Law, and included in the Common Specifications for Civil Engineering Work compiled by the Ministry of Land, Infrastructure, Transport and Tourism.

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 Kimitsu Works, Hirohata Works, and



Hikari Works¹. 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.

1 Hikari Works: Transferred to Nippon Steel & Sumikin Stainless Steel Corporation.

By-products and Recycling

By-product	Process of generation	Amount generated (wet weight – million tons)		Recycling application	Recycling rate	
		FY2013	FY2014		FY2013	FY2014
ast furnace slag	Components other than iron melted in blast furnace	13.47	13.46	Blast furnace cement, fine aggregate, road base, etc.	100%	100%
eelmaking slag	Substances other than steel generated in the steelmaking process	6.26	6.28	Road base, civil engineering materials, fertilizer, etc.	99%	99%
ust	Fine dust collected with a dust collector	3.58	3.38	Raw materials for use in-house and also zinc refining	100%	100%
udge	Water treatment sludge, residue from plating solution, road cleaning sludge	0.60	0.39	Raw materials for in-house use	93%	90%
oal ash	Ash from coaled-fired power plants	0.54	0.53	Cement raw materials	100%	100%
aste furnace materials	Refractories from steelmaking facilities and furnace facilities	0.32	0.28	Reuse, road base, etc.	74%	71%
thers	Scale, etc.	1.72	1.73	In-house use, others	98%	<mark>96</mark> %
	Total	26.49	26.05	Total recycling rate	99%	99%

Recycling of waste plastics and waste tires

NSSMC recycles 100% of plastic containers and packaging and all discarded tires by using them in the steelmaking processes.

15

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.

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 windscreens and sprinklers, based on air pollution risk analysis through scientific simulation. We also conduct constant monitoring and regular patrols to ensure that no abnormal emissions are released outside.

Water quality risk management

NSSMC uses approximately 6.2 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.

Soil risk management

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

Chemical substances discharge control **Comprehensive control of discharge**

NSSMC appropriately manages and tries to improve the production, handling, and discharge or disposal of chemical substances in accordance with the PRTR Act¹, Chemical Substance Control Law², Volatile Organic Compounds (VOC)³ voluntary management, and other laws concerning the management of chemical substances as well as following the voluntary management procedures set by the Japan Iron and Steel Federation (JISF) and NSSMC.

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

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



Topics

Steelmaking manufactures tons of steel with dimensions measured in microns and nanos

Visitors to steelworks may be surprised by the gigantic production facilities and products. Despite such largeness, steelmaking is controlled in units of microns and nanos.

As the metallic structure of steel changes by the temperature and the speed of change in temperature, finelytuned temperature control is necessary for us to be able to produce the quality of materials our customers require. Production method and know-how to bring out such diverse



One hot coil is as long as 1.000 meters. isit to steelworks

Case of Akashi Kaikyo (Strait) Bridge

The Akashi Kaikyo Bridge, the longest suspension bridge in Japan (4 km in length), has been realized by NSSMC's high-strength steel cables, which was developed by using the analysis technology at the level of microns and nanos.

Cable used in the Akashi Kaikyo Bridge



Case of high-tensile-strength steel materials

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 work-

ability, 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 crystalline texture in a balanced manner, we have developed strong high-tensile steel with high formability.



Emission of SOx and NOx (10⁶Nm³) 100 82 80 60 41 40 28 28 28 20 11 11 11 12



characteristics is based on the analysis technology that explores the nature of materials.

At our research institutes, structural change of materials caused by external great force, heat, or other stress factors are observed and measured by using electronic microscopes and other devices. A variety of materials can be designed by predicting changes on those materials. Based on such basic research, we can come out with products having the characteristics required by our customers.

As such, NSSMC also analyzes possible internal changes in steel during the manufacturing process, making best use of its world-class facilities and know-how, and manufacture many tons of eco products to specifications in units of microns and nanos.



The wire viewed by an electron scanning microscope

Subjects in microns and

nanos are observed by

an electron microscope



an electron scanning nicroscope

The wire viewed by

The wire viewed by a field ion



nm (10⁻⁹ m)

µm (10⁻⁶ m)



Maxima adopted NSSMC's 1.2 Gigapascal (GPa) ultrahigh-tensile-strength high-formability steel

Image provided by Nissan Motor Co., Ltd

Working in microns to develop the new material

Environmental measures at steelworks

NSSMC is implementing a variety of environmental measures against the range of risks inherent to each of its steelworks and manufacturing sites. In addition, many steelworks have been working on the "Creation of Hometown Forests" to preserve the natural environment.









Hikari Area

Hirohata Work

Yawata Works

Oita Works



Quay wall water leakage management















Local environmental activity Employees clean steelworks vicinity.





ECO PROCESS



Kamaishi Work



In cooperation with local residents, employees clean the nearby beach.



NSSMC's eco-friendly products help reduce environmental burden

Our Group's products, having advanced or highly specialized functions, technological capabilities, and reliability, 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.

to smarter use of precious resources

Titanium alloy connecting rods

of supersport motorcycles

and construction machinery)

(Titanium and stainless steel; Transportation

NSSMC's proprietary Al-5%, Fe-1%, Ti-based alloy

contributes to weight reduction of the connecting

rod, which converts reciprocating motion of the piston into rotating motion of the crankshaft, and



A COLORADO COLORADO

Corrosion-resistant SuperDyma[™] galvanized sheets (Steel sheet; Living)

SuperDyma[™] is highly corrosion-resistant and lasts four times longer than conventional products. As coating and painting on cut-end surfaces are unnecessary, all such costs are eliminated. The sheets weigh less, and are an eco-friendly building material well suited for various applications



Exterior material of the new Kobe plant of Rock Field, Co., Ltd.

External-dimension constant H-shape (Hyper-Beam) (Building materials; Living)

NSSMC's VETM/NSYPTM345B is a high-performance steel for use in construction. It makes structural design with increased earthquake resistance possible. Weighing about 5% less than the comparable conventional steel, it is also economically efficient. This steel is contributing to Japan's National Resilience Initiatives, specifically for the enhancement of social infrastructure.

Steelmaking slag (KATAMA[™] SP) (Steel slag and cement; Living)

KATAMA[™] SP is a roadbed material that features sufficient strength for use as paving, and that can be placed simply by compaction with water. As this material tends not to be depleted by rainfall and resists formation of ruts, it can help decrease maintenance renair and other related costs

Ring gears (Bar and rod materials; Transportation and construction machinery)

Better fuel economy is achieved when the automobile engine rotates slowly with strong torque. In cooperation with an automaker, NSSMC has developed a lightweight, high-strength ring gear that can withstand the strong forces involved in generating such torque.



High-tensile-strength steel materials (Steel sheet; Transportation and construc tion machinery)

> High-tensile-strength steel materials for automobiles help overcome two challenges: improvement in fuel efficiency by reduction of vehicle body weight, and ensuring the safety of passengers at the time of a collision. These materials are also superior in workability.



Wheelsets (wheels and axles) for high-speed railways (Railway, automotive, & machinery parts; Transportation and construction machinery)

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



retarder

(Railway, automotive, & machinery parts; Transportation and construction machinery)

NSSMC's gear units have reduced the level of noise by about 10 decibels compared to conventional products. This was achieved by raising the precision of the meshing of gears,

which resulted in reducing noise-producing

Low noise gear units



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NIPPON STEEL & SUMITOMO METAL CORPORATION Sustainability Report 2015 21

are high-tensile-strength steel materials)



Permanent magnet-type

(Railway, automotive, & machinery parts; Transportation and construction machinery)

NSSMC's permanent magnet-type retarder is installed as the auxiliary brake system on many heavy-duty trucks and buses. Once the retarder is installed, the frequency of accelerating or decelerating of the speed decreases, which results in better fuel efficiency, while the frequency of applying the foot brake decreases, reducing brake dust caused by abrasion.





(Steel plate; Transportation and construction machinery)

The ABREX[™] Series abrasion-resistant steel plate is 5-6 times harder than ordinary steel and wears out less. It is eco-friendly and enables extension of the maintenance cycle of machinery and weight reduction of the product for which it is used.

©Volvo

Ni-7% steel sheet for LNG storage tanks (Steel plate; Energy)

Steel sheet for storage tanks needs to have high fracture resistance and strength under extremely low temperature conditions. For this reason, steel that contains a higher percentage of nickel has been used for many years. The new Ni-7% steel has slashed the amount of nickel needed by about 20% but ensures performance equivalent to that of conventional steel.



Steel can be reborn many times in whatever form

Automobiles, electric appliances, buildings, bridges, and various other industrial products made of steel support our living.

Each such industrial product has its service life. After they fulfill their lives, many of the non-steel materials are discarded, due to problems in quality or economic efficiency, or recycled in a limited way. In contrast, steel materials are recycled as scrap and reborn as new steel products. This type of recycling is called "closed loop recycling."

While converter furnace steel materials are mainly made of iron ore, which is a natural resource, and scrap, the sole main material for almost all electric furnace steel materials is scrap.

Some people tend to mistakenly think that electric furnace steel material is recycled material, whereas the converter furnace



Car making according to LCA-based environmental specifications



Automakers aim to reduce environment burden by improving fuel efficiency of vehicles. In addition to powertrain technology for enhanced efficiency of engines and automotive electrification, weight reduction of the car body is an important measure. In pursuit of enhanced safety and improved performance of electrical components, automobiles tend to become heavier. In order to satisfy various needs and requirements, weight reduction of car bodies is desired more and more.

Comparison of the amount of CO₂ emission in manufacturing of materials or ordinary steel and equivalent automotive materials (for car bodies) (kg CO₂e) 2 300 2.000 1,500 990 1,000 757 500 230 173 Weight of materials 100 75 67 50 45 (estimates) (kg) Amount of CO 2.3 2.3 11.3 46.0 22.0 emission per unit

In recent years, aluminum, plastic, carbon fiber reinforced plastic (CFRP) and other materials which are lighter than steel have been adopted for car bodies for the improvement of fuel efficiency (reduction of greenhouse gas emission while driving). However, materials for vehicles need to be evaluated not only in terms of the level of CO2 emission reduction by higher fuel efficiency. The amount of CO₂ emission for the entire life of a vehicle, namely from material manufacturing to disposal of the vehicle, needs to be considered.

Aluminum Magnesium

High-tensile steel

CFRP

of weight (median)

Ordinary



This is called "Life Cycle Thinking." "Life Cycle Assessment" (LCA), a technique to assess environmental impacts for all stages of a product's life, has been adopted internationally. Based on the LCA technique, alternative lightweight materials to steel reduce the amount of CO2 emission in driving but emit more CO2 during material manufacturing.

2

ECO PRODUCTS

23

steel material is not. In fact, scrap is used in the converter furnace steel material. Steel products, including both of those materials, are recyclable resources to be collected as scrap and to be reborn as a new product.



If the car body material is changed from ordinary steel to thinner high-tensile highstrength steel, the lighter car body results in less CO₂ emission in driving and the reduction of steel in use also results in less CO_2 emission in manufacturing. Hence the amount of reduction in CO2 emission for the entire life cycle can be more than when other lightweight alternative materials are used.



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, the Global Superior Energy Performance Partnership (GSEP), 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 Approach¹, a worldwide initiative to preserve the environment and conserve energy based on technologies accumulated in the steelworking industry. Japan's steel industry can contribute to reduction of CO₂ emission on a worldwide scale by transferring its advanced energy-saving technologies to emerging countries where there is the potential to improve energy efficiency. The reduction effects of CO₂ emission by transfer of Japanese steelmakers' energy-saving technologies have amounted to around 50 million tons in total. This is equivalent to 4% reduction in Japan's annual CO₂ emission. Japan's steel industry, including NSSMC, is working on various projects to introduce Japan's advanced technology in this area to other countries.

Multinational and bilateral collaboration

As a member of the Japan Iron and Steel Federation, NSSMC is partic-

ipating in multinational and bilateral projects for energy saving, in cooperation with the Japanese government.



The Japan-India Public and Private Collaborative Meeting

Standardization of methods to calculate CO₂ emission

NSSMC also participates in the Climate Action Program of the World Steel Association, which uses universal methods to calculate and report on the CO_2 emitted by steelworks. We have been selected as a Climate Action member. Recently, quite a few customers have sought

Country/region	Year of launch	Major activities and topics in fiscal 2014		
China	2005	Exchange between experts on advanced technologies for energy saving and environmental preservation		
India	2011	Exchange among public and private steel-related parties Prepared the List of Energy-Saving Technologies suitable for India NSSMC's briefing on the method to calculate CO_2 emission in Delhi, in March 2015		
U.S., EU, China, India, and South Korea 2011 Dis		iSEP's Steel Section Working Group (with Japan as the chair) Discussion on steelworks energy issues with public and private participants of various countries ISSMC's briefing on ISO14404-based energy management in Paris, in September 2014		
ASEAN	2013	Exchange among public and private steel-related parties Prepared the List of Energy-Saving Technologies suitable for ASEAN Evaluation of NatSteel's steelworks in Singapore		

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

Overseas steel industry's CO₂ emission reduction effects by introducing Japan's energy-saving equipment (fiscal 2013, JISF)



confirmation that their steelmakers are Climate Action members. Efforts to standardize these calculation methods as ISO have been spearheaded by the Japanese steel industry. This had resulted in international standardization of the procedure as ISO14404 "Calculation method of carbon dioxide emission intensity from iron and steel production" in March 2013. It has enabled steelworks not participating in the World Steel Association to calculate CO₂ intensity using universal

Coke Dry Quenching (CDQ): system and features

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



VOICE



The steel industry in India is undergoing rapid development, building new steel works and introducing new equipment with the aim of 300 million tons of crude production by 2025. At the same time, we are facing serious environmental issues such as air and water pollution. In such an environment, the NSSMC Group is contributing to the industry by introducing the CDQ project and other eco-friendly technology to India. When I visited the Kimitsu Works in Japan, I was impressed with how byproduct gases and waste heat are used for energy saving.

steel industry

Senior Manager Nippon Steel & Sumitomo Metal India Private Limited

methods. This marked the first step forward in greatly facilitating the global sectoral approach sought by the steel industry. NSSMC is promoting diffusion of ISO14404 through the initiatives taken by

Hollowood	Nippon Steel & Sumitom Metal Corporation
CLIMATE ACTION Member	In recognition of your participation in the worldsteel CO, data
and the second second	collection programme 2014-2015.

Climate Action member certificate

Japan and India, Japan and Southeast Asia, and other relations.

can be fully recycled by being guenched and circulated back to the chamber. By not using water as a cooling medium, the CDQ method raises the strength of the coke and contributes to stable operation of the blast furnace, an increase in tapping quantity, and reduction in consumption of the reducing agent.

Environmental conservation is indispensable in sustainable development of the steel industry. Serving as an intermediary between Japan and India, I am determined to contribute to energy saving and environmental improvement of the Indian 25

Contributing to a Hydrogen-Based Society

The NSSMC Group provides advanced materials for the realization of a hydrogen-based society

Advanced materials for fuel cell vehicles

Toyota Motor Corporation launched the Mirai, its first fuel cell vehicle (FCV) that runs on hydrogen instead of gasoline, and construction of the first hydrogen stations for fueling FCVs began. Progress has been made recently toward the realization of a hydrogen society

A fuel cell is a device that converts the chemical energy from a fuel into electricity through a chemical reaction of positively charged hydrogen ions with oxygen in the air. A fuel cell vehicle uses a fuel cell to power its on-board electric motor. As a fuel cell vehicle emits only water but no CO₂ while running, it is considered a promising, ultimate eco-friendly vehicle.



Fuel cell (reverse reaction to the electrolysis of water)



Basic structure of a fuel cell vehicle



Source: Prepared by the Agency for Natural Resources and Energy



Fuel-cell stack



NSSMC's titanium foil Image provided by Toyota Motor Corporation



Tovota Motor's Mirai fuel-cell vehicle Image provided by Toyota Motor Corporation

However, fuel cells are located in highly corrosive environments and require materials with high corrosion resistance. Using an unusually versatile material, that has outstanding lightness, strength, and corrosion resistance, NSSMC has developed a method of manufacturing special rolled titanium foil to cope with the corrosion. Our material has been adopted for fuel cell parts (the parts that make up the cells inside the fuel-cell stack) of the Mirai fuel cell vehicle produced by Toyota Motor Corporation.

Just like an electric vehicle and a hybrid vehicle, a fuel cell vehicle is powered by a motor, a device that converts electrical power to motive force. NSSMC's electromagnetic steel sheet is used in the motor core and contributes to world-class efficiency of this part. Our electromagnetic steel sheet has also been adopted for Toyota's Mirai fuel cell vehicle.

In addition to components that are used specifically in FCVs, such as the above, other NSSMC materials are used in FCVs. They include our high-tensile high-strength steel sheets that help reduce automobile weight while ensuring collision safety performance.

Materials needed for a hydrogen-based society infrastructure such as hydrogen stations Stainless steel for high-pressure hydrogen environments, HRX19[™] — a revolutionary product for a Hydrogen-Based Society

Diffusion of eco-friendly fuel-cell vehicles requires certain infrastructure, including hydrogen stations, to be established. NSSMC and Nippon Steel & Sumikin Stainless Steel Pipe Co., Ltd. (NSSMC'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 where it can cause brittleness and a tendency for fracture to occur. In a high-pressure environment, this issue becomes more problematic. By blending additives to

Left: Conventional SUS316L stainless steel pipe Middle and right: HRX19[™] stainless steel pipe

stainless steel and developing a certain 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[™], whereby a contribution is made to reduction of construction and maintenance costs.

This is in sharp contrast to the case of SUS316L which requires coupling pipes with screws, and requires hundreds of joints and a large number of construction processes to build one hydrogen station

Nippon Steel & Sumikin Pipeline & Engineering's hydrogen station

Image provided by Toyota Motor Corporation motor cores

HRX19[™] is therefore the most appropriate material for highpressure hydrogen pipes and can be used for pipes in hydrogen stations, dispensers, and fuel cell vehicles. NSSMC is committed to providing steel materials to help accelerate the construction of infrastructure needed for the realization of a hydrogen-based society.

Provide hydrogen stations

Nippon Steel & Sumikin Pipeline & Engineering Co., Ltd. in the NSSMC Group has entered the hydrogen station construction business.

The company has contributed to the establishment of energy infrastructure such as natural gas pipelines and LNG plants for over 50 years. In the field of hydrogen infrastructure as well, it has experience in constructing a hydrogen station at the 2005 World Exposition in Aichi, Japan, and in constructing the first hydrogen pipelines in Japan for the Kitakyushu Hydrogen Town project. In addition to these advanced engineering achievements, the company formed an alliance with U.S.-based Air Products and Chemicals, Inc.--the world's leading company in the supply of hydrogen—in February 2014, and will contribute to the realization of a hydrogen society through the construction of hydrogen stations with excellent safety and reliability.

Evaluation technology used in high-pressure hydrogen gas environments

Nippon Steel & Sumikin Technology Co., Ltd. in the NSSMC Group also support the realization of a hydrogen-based society by engaging in the business of evaluating materials used in hydrogen stations and fuel cells, through tensile tests, fatigue tests, and other tests in highpressure hydrogen gas environments.

Fatique test

Creation of Hometown Forests and Creation of Sea Forests

In order to realize a sustainable society, companies have to take effective initiatives to live in harmony with nature. Among eco-solutions that the Nippon Steel & Sumitomo Metal Corporation (NSSMC) Group provides, "Creation of Hometown Forests" and "Creation of Sea Forests" are two ongoing activities, which we believe are well representing our policy initiatives in this regard. Let us provide an update on both.

"Creation of Hometown Forests"

Reproducing a forest similar to a nearby grove of the village shrine in steelworks

We have carried out the "Creation of Hometown Forests" projects at our steelworks and factories in Japan under the guidance of Dr. Akira Miyawaki, director of the Japanese Center for International Studies in Ecology (professor emeritus of Yokohama National University), with the aim of facilitating harmonious coexistence between nature and humans. This project comprises research on the natural vegetation inherent to a certain area in a nearby grove associated with a historical shrine, careful selection of suitable trees, growth of their saplings in pots, and planting them in designated places by local residents and our employees.

This was the first project by a private company in Japan to create a forest that harmonizes with the local scene and is based on an ecologi cal approach. This is one way we try to raise the awareness of our employees regarding the environment. At present, our forests in aggregate have grown to total around 900 hectares (about the size of 190 Yankee Stadiums).

Conserving biodiversity and sequestering CO₂

Wild birds such as bulbuls and eagles gather and animals such as Ezo red fox and deer visit the forests we make and maintain at our steel works sites across Japan. Wild birds and animals inherent to the land return to the forests. Thus, the "Creation of Hometown Forests" helps conserve biodiversity, and sequester CO₂.

Iron protects and nurtures living creatures

The geomagnetic field made of iron deflects harmful

cosmic radiation and has thereby ensured that the

surface of the earth is a safe environment for living

creatures.

Source: FSA & NASA

Iron is believed to account for one-third of the earth's weight. It is iron that forms the earth's core and creates a gigantic magnetic field. This magnetic field is a protective barrier against the solar wind and pushes away a continuous flow of charged particles in the solar wind, particles which are

harmful to life forms. One thesis goes that our planet full of diverse creations exist thanks to the gigantic magnetic field created by iron.

Iron plays a central and indispensable role in many indispensable functions for living matter, such as breathing, photosynthesis, synthetic DNA, and nitrogen fixation. For example, we breathe oxygen to stay alive. The chemical reactions of the nutrients and oxygen produce the

29

"Creation of Sea Forests"

Implemented in 35 spots in Japan to improve sea desertification

Sea desertification, a problem of the sea bed losing ability to support life due to a decline in kelp, brown seaweed, and other varieties of seaweed, is happening along about 5,000 km of the sea shore in various parts of Japan. To offset a part of the decline in the supply of iron from nature, which is said to be one of the causes for sea desertification, NSSMC has developed "Beverly® Series," iron supply units composed of steel slugs, humus, and soil and steel slag and has been promoting regeneration of seaweed beds by use of these units.

Deserted sea bed

• •

Installing iron supply units By mixing with humus. the iron eluted from steel slugs is prone to be absorbed by plants without becoming oxidized.

Town in Hokkaido

energy needed to stay alive. Thus breathing is indispensable for living. Iron plays two central roles for this purpose

The first role is transportation of oxygen through our body. A large portion of iron in the human body is in hemoglobin in the blood. Hemoglobin, which mainly contains iron, carries oxygen from the lungs to the rest of the body.

The second role is to efficiently transport electrons for producing energy. We humans are powered by energy, which is created by receiving electrons via iron ions and gradually carry out oxidationreduction reactions.

That is why we could say that iron protects and nurtures living creatures on the face of the earth.

ron in the body

An adult male of 60 kg weight has 4 g of iron in the body, about two-thirds of which is contained in hemoobin within the red blood cells. The remaining onenird is mainly stored in the liver and the spleen for use case of a shortage

Innovative technical development

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.

The COURSE 50 Project (Technological **Development and Innovative Steelmaking Process)**

Since FY2008, 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 (COURSE 50) 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.

Regarding iron ore hydrogen reduction technology, by FY2012, we comprehended hydrogen reduction characteristics at a laboratory bench level, participated property eluicidation and performance qualification tests of the hydrogen reduction process at a test blast furnace in Sweden, and conducted verification tests of hydrogen amplification of coke oven gas at Kimitsu Works. With regard to CO₂ separation and recovery technologies, verification tests of CO2 separation and recovery from blast furnace gas were conducted at Kimitsu Works,

while low-temperature exhaust heat recovery verification tests were conducted at Kashima Works, among others. These tests played a substantial part in obtaining desired research results of Phase 1.

In Phase 2 (FY2013 to FY2017), which began in FY2013 as a project sponsored by NEDO (New Energy and Industrial Technology Development Organization) in preparation for commercialization in 2030, we are verifying technologies to reduce CO₂ emissions from a blast furnace in a comprehensive manner. We are leading R&D efforts mainly in the research on a test blast furnace which aims for establishing reaction control technologies that maximize effects of hydrogen reduction, as well as in the additional verification tests that target advanced hydrogen amplification of the coke oven gas and in research on highly-efficient heat exchangers. (The test blast furnace is being constructed by incorpo-

rating individual element technologies that were acquired during the Phase 1 and is scheduled to start operation for the main test in FY2016 at the Kimitsu Works. The additional verification test is conducted in the Muroran Works)

CAT30 (CO₂ absorption and separation tower)

R&D group of approximately 800 researchers

Total number of patents held

Next-generation coke-making technology ("SCOPE 21")

Coke, which is carbonized coal, is indispensable in production of steel materials. As raw materials for coke, high-quality caking coal has long been used. However, for this type of caking coal used in steelmaking there are very low reserves and they are in limited areas of the world, compared to general coal used as fuel. Thus, we are facing a credible threat of a surge in price of the coal.

"SCOPE 21" is the next-generation coke-making technology developed as a national project to better address resource problems and open up great potential. For the first time in the world, this technology has enabled the raising of the blending ratio of poor-coking coal up from 20% as in the conventional method to 50%. This is a promising innovative technology that can contribute to the stable supply of energy in the future.

There are three basic processes in the SCOPE21 technology: coal pretreatment, carbonization (destructive distillation of coal by

VOICE

General Manager

Environment Research Lab

Advanced Technology Research

Laboratories, Technical Research & Development Bureau

The Environment Research Lab. in the Advanced Technology Research Laboratories is the only research division at NSSMC with the name "environmental." It promotes research on fundamental technologies that support various endeavors to reduce the impact of steel works on the environment and also promotes the development of new products in the environmental and energy fields for engineering businesses and chemical businesses. The former supports steelmaking processes that are the most environmentally friendly in the world through fundamental research on highly efficient waste water treatment technology, technology to measure air pollution substances, and technology to reduce the amount of these substances emitted, technology to make use of slag, a by-product of the steelmaking process, in fertilizer and other products, and technology to convert steel by-product gases to hydrogen and convert carbon dioxide to useful chemical products. The latter entails the development of products that will be key to the realization of an energy-saving society with reduced environmental impacts, such as catalyst materials that convert fuel gas to liquid fuel, electrode materials for fuel cells and lithium-ion batteries, and materials that selectively adsorb oxygen. Chemistry-related researchers that specialize in fields such as biochemistry, organic chemistry, inorganic chemistry, catalytic chemistry, and electrochemistry are pursuing leadingedge research and development based on theories and principles.

Approximately 25,000 patents issued in around 70 countries

blocking oxygen down), and heat collection. During the coal preheatment process, the rapid preheating enables to improve coke quality, shorten coke-making time, achieve high energy-saving effects, and ultimately contribute to CO₂ reduction. NOx (nitrogen oxides) in the exhaust gas in the coke oven can also be reduced by 30%, further improving environmental conditions.

We began operation of the first commercial model that fully embodies the innovative environmental technology "SCOPE 21" at our Oita Works in May 2008. Based on this experience, the second

commercial model began operation at our Nagoya Works in June 2013. Both models have been operating smoothly up to the present

SCOPE 21 (Oita No.5 coke oven)

31

Environmental Governance

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.

Annual environmental management cycle

In accordance with the international standard ISO 14001, NSSMC has built an environmental management system, with each steelwork or facility general manager serving as the responsible person. Each year, in addition to an internal auditing of each steelworks or facility and a management review by its general manager, each steelworks or facility and factory is audited by the Head Office Environment Department.

Environment officers of other steelworks and facilities also participate in these audits to cross-check. In addition, periodical reviews are conducted by the ISO certification agency.

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

NSSMC regards environmental management as an important basis for our business and continuously provides environmental education to each rank of new employees, mid-career engineers, and managers on the subject of basic environmental policies, medium-term environmental management plans, environmental compliance, etc. In addition, seminars on the environment are led by the general manager of the Head Office Environment Department at all steelworks and facilities. We encourage our employees to acquire national qualifications, such as those of pollution prevention managers and energy managers, as well as to take ISO 14001 internal auditor training.

Environmental accounting

Philosophy of 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

Capital expenditures for environmental preservation amounted 17.3 billion yen in total for FY2014: 12.8 billion yen for investment in equipment for environmental measures and 4.5 billion yen for investment in energy-saving equipment. The aggregate amount accounted for approximately 6% of the total cost of equipment investment.

On the expenses side, environmental expenses were 89.9 billion yen in total and included 46.2 billion yen for atmospheric prevention costs and 11.8 billion yen for water contamination prevention costs. In addition, 9.2 billion yen was spent as environmental research and development costs.

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

Environmental preservation costs							
	tom	Definition		FY2014			
'	tem	Demitton	Capital ir	vestment	Expe	ense	
Dellution Deconstine Contr	Countermeasures against air pollution	Dust collection equipment running costs, maintenance costs, exhaust gas desulfurization and denitration treatment, raw materials yard dust preventive measures costs, etc.	11.6 Tot		46	5.2	
Polition Prevention Costs	Countermeasures against water pollution	Electricity charges incurred for treatment of waste water discharged from steelworks, chemical costs, main- tenance costs, working expenses (excluding expenses required for treatment of circulated water)	1.2	1.2 12.8		.8	
Global Warming Prevention Costs	Energy saving measures	Running costs and maintenance costs of energy-saving facilities	4	.5	3.3		
Casts of Docusing Docourses	Treatment of by-products and indus- trial waste	Expenses incurred in landfill work, incineration, and treatment of by-products and industrial waste commis- sioned to third parties	-	-		9.2	
Costs of Recycling Resources	25 Treatment of general waste from business activities Expenses incurred in the treatment of general waste from business activities		-		0.7		
	Construction of EMS and acquisition of ISO14001 certification	Expenses required for the construction and maintenance of EMS	-		0.03		
Environmental Management Activities Cost	Monitoring and measurement of environmental loads	Expenses required for monitoring air, water, etc., at steelworks		-		1.0	
	Personnel expenditures related to environmental measures	xpenditures related to tal measures Personnel expenditures for employees in charge of environmental matters –		- 2.		.6	
	Development of eco products	R&D costs (including personnel costs) for environment-friendly steel products	-		4.4		
Research and Development Costs	Development of products which have low environmental impact during manufacture	Development costs (including personnel costs) required for measures for by-products and energy conserva- tion technology during manufacture	-		4.8	Total 9.2	
Social Activity Costs	Greening, supporting environmental organizations, and advertising	Expenses required for creating green areas at steelworks, environmental publicity, and participation in exhibition	- 2.2		.2		
Other Environmental Costs	ironmental Costs SOx levy Payments to health damage prevention businesses specified by the Law Concerning Pollution-Related –		3.	.7			
Total				17.3 89		9.9	
		Reference: Net income (consolidated basis)		214	.2		

33

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.

Among the environmental preservation costs, atmospheric prevention costs including measures to prevent dust generated at steelworks accounted for the largest share. We also promote in-house recycling to reduce expenses on waste disposal.

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 under "promotion of measures against global warming." Water consumption volume and reductions in water consumption and various resources spent are shown under "water quality risk management" and "energy and material balance," respectively. 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.

Targets and achievements in FY2014

After achieving goals of its voluntary action plan (FY2008 to FY2012) on measures against global warming, Nippon Steel & Sumitomo Metal Corporation (NSSMC) are committed to continue working on energy saving to achieve the goals in the context of action plans for a low-carbon society.

With the aim of creating a recycling-oriented society, we made efforts to reduce the volume of final disposal through increased recycling of by-products. With regard to environmental risk management, the management cycle is efficiently implemented with the Environmental Management Committee at the core of its efforts, raising the level of environment management of the entire group. Eco products and eco solutions were successfully developed and offered to the market in an active manner.

			[Evaluation legend] () : Overachieved, () : Largely achieved	eved, △:No I	ot achieve
	Medium-Ter (m Environmental Management Plan (from FY2013 to FY2014)	Achievements in FY2014 (by NSSMC and some group companies)	Evaluation	website
onmen- nent	Enhance and pr system	omote an environmental management	•Thoroughly implemented the NSSMC Group Guidelines on atmospheric air, water, and waste materials •Regularly held meetings of groupwide issue-based working groups	0	16, 32
rementa n of envir managen	Conduct environmental management in coordination with group companies		 Regularly held the environmental conference of group companies to enhance their ability to respond to environmental risks 	0	32
notion tal	Popow ISO 140	01 cartification	 Sequentially conducted nearings on environmental issues to group companies in Japan and overseas Muraran, Kamaichi, Ocaka Steel, Wakayama (Sakai Area), and Otta Works had respective certifications renowed 		22 W/E
n E S	1) Eco process: en	hance efficiency of natural resources and energy	•Muloidi, Kalidisii, Osaka steel, Wakayalia (sakal Alea), aliu olla works lidu tespective tertifications reliewed		32, WE
oal asure	2) Eco products	: Develop products that help preserve	Recame ready to manufacture and shin the world longest 150-meter railway rails		7 21
of glo Iterme	natural resou	irces and energy	•The 7% Ni Steel for LNG tanks was adopted to build the LNG tank for shale gas imported from Canada	0	WEB
motion ng coun	 Eco solution: Internationally contribute through over seas transfer of CO₂ reduction technologies 		 Participated in a national research project for transfer of energy conservation technology to India and ASEAN countries and contributed to the development of a master plan for feasible technology transfer 	0	24
Pro warmi	 Advance development of innovative technologies for CO₂ reduction on a longer-term basis 		Began constructing the 10 m ³ experimental blast furnace as planned for the development period up to FY2017	0	30
_ <u>b</u> _	Reduce the fina	l disposal volume of by-products by	 Recycled 99% of the 26.05 million tons of the by-products generated 		
a recyclir a society	330,000 tons b	y 2015	 The final disposal volume was 230,000 tons/y in FY2014, maintaining a decreasing trend, and exceeded the target value ahead of schedule. 	0	10, 14
r aruu creating oriente	Promote the effect from the viewpoi	ctive use of waste plastics and discarded tires nts of recycling and CO2 emission reduction	 About 210,000 tons of waste plastics were recycled (corresponding to about 30% of the nationwide recycling level) About 80,000 tons of discarded ties were recycled (corresponding to about 10% of the nationwide recycling level) 	0	14, 15
	Reduce environ	mental risks of the air water soil etc	 ¥12.8 hillion capital expenditures as environmental measures 		33
ıtal	Maintain and e	nhance preservation of the local	Smoke was generated by the overall power failures and fire accident at Nagova Works		
nmer	environment		A which date and the self and second for an intervention of the second s		5, WEB
of enviro	Benzene: Voluntary reduction based on national volun- tary management plan (168 tons/y)		 Achieved the sen-management target for emissions (102 tons/y). The amount of benzene emission picked up due to the effects of the Great Earthquake of March 2011 but has returned to a downtrend since 2013 due to progress in implementing measures. 	0	WEB
ntion o dents	Dioxins: Voluntary reduction based on Japan Iron and Steel Federation guidelines (16.1 g-TEQ/y)		 Achieved the voluntary target (5.3 g-TEQ/y) set by the Japan Iron and Steel Federation 	0	WEB
prever acci	Promote control of specified chemical substances in accordance with the PRTR Act		•The amounts discharged were 497 tons/y to the atmosphere and 40 tons/y to public waters; the amount transferred outside the worksites was 6,615 tons/y	0	WEB
for	VOC: Voluntary reduction (1,098 tons/y)		 Continuously achieved the voluntary emission target (728 tons/y) 	0	16
atives	Environment management jointly with group companies		•Sequentially conducted hearings on environmental issues to group companies in Japan and overseas	0	32, WE
Initia	Understand the trend of law revision and appropriately deal with it		Dealt with the revision of the Basic Plan for Proper Treatment of PCB Waste and the Act for Rationalized Use and Proper Management of Flurocarbons	0	16
ergy	Environmental contribution	Engineering and construction business	 Completed construction of the 1st commercial ESCAP[®], energy-saving CO₂-absorbing equipment The STAN-package[™] for standardized buildings was adopted for Lawson Farm Akita's plant farm 	0	WEB
and en	ness in each sector	Chemical business	 Began sample supply of the polarized carbon materials ESCARBON[®], which raises power generation efficiency of fuel-cell vehicles 	0	WEB
ital ss		System solutions business	•Contributed to energy saving by expansion of cloud business with the latest data center as its core	0	WEB
onmer		New materials business	 Introduced the repair and reinforcement construction method using the carbon fiber sheet in Japan and overseas 	0	WEB
of envire solution l	Contribute to national resilience and infrastructure develop- ment with consideration to the natural environment and the scenery		Promote use of the non-frame method in Japan and overseas	0	WEB
elopment s	Accelerate contribution to the environment and energy sav- ing overseas by using the Group's advanced technologies		 Continuously received orders for 6 CDQ units in China (87 units on an accumulated basis for orders from overseas) Supplied long-life rails with superior resistance to wear and abrasion to a freight-only railway company in India, making it the first order of its kind in the country 	0	25, WEE
Dev	Contribute to recycling of resources by expanding use of steel slag and other steel by-products		•Developed new pavement material KATAMA [™] SP	0	8, 14, 20
ital	Appropriately and timely disclose environmental informa-		*Further improved the Environment & CSR section of NSSMC's corporate website	0	WEB
onmer ties	Steadily enhance environmental relation activities		*Participated in Eco Products 2014 with the theme of "the NSSMC Group contributes to energy- creation and energy-saving with its three ecos"	0	37
envird	Create hometown forests by planting trees and sea forests by		NSSMC's "Creation of Hometown Forests" received the Good Life Award Judging Committee's Special Award		28, 29,
of e on a	restoring seaweed	beds as for contributing to local communities	In the "Creation of Sea Forests," spread efforts to restore seaweed beds across the country (35 locations)		37
romotion relati	Enhance trainin awareness of er level, from worl	g of environmental staff and thorough nvironmental compliance for each career kers in steelworks to managers	 Conducted environmental education tailored to the local community's conditions at respective steel works and other plants Conducted environmental recurrent training to respective environmental staff 	0	WEB
₫.			• Prepared a booklet of easy-to-understand case examples on what should not be done		1

Corporate Governance

Corporate governance structure

In line with its Corporate Philosophy, Nippon Steel & Sumitomo Metal Corporation (NSSMC) aims to building a dynamic NSSMC Group. To that end, we have adopted a "Company with Audit and Supervisory Board" corporate governance system and have introduced an executive The Board of Directors adequately and swiftly makes decision regarding the Company's important business activities and oversees the execution of duties by Directors, while the Audit & Supervisory Board Members oversees the execution of duties by Directors from the position of maintaining integrity, objectivity, and independence. By doing this, we seek to ensure management's efficiency, soundness, and transparency, and enhance our corporate governance with the ultimate aim of achieving sustainable improvement in corporate value and being trusted by society.

office system to ensure the proper execution of business activities and clarify responsibilities for the results of each business unit/division.

Corporate governance structure and internal control system

	General Meeting of
\$	
Board of Directors (12 Directors and 2 Outside Directors and 2 Outside Directors after i been discussed by the Corporate Policy Committee, a group that in tion by the Chairman, the President, Executive Vice Presidents, and Outside Directors, who have vast experience and deep insign as corporate management, international affairs, and the econor to decision making from their diverse perspectives on NSSMC are enhance the overseeing function of management, by providing 1 and exercising voting power from their independent status at the Directors and other meetings.	ectors) matters have cludes participa- lother members. ht in fields such my, contribute nd thereby their opinions le Board of Audit & Su Outside Audi insight in fiel administration of the Board auditing action assets, contri Outside I filed as "ind have been a
Į	
Corporate Policy Committee Represent	ative Director and Chairman Represe
Directors, Executive Officers, and General Managers in Charge	e divisions Company
Compliance education "We continue to emphasize the importance of integrity and reliability in our actions" This is	19 Companyu lished as delit Corporate Pol decision-orier
the first principle we stated in the Management Principles. Through messages from top man- agement, periodic legal training programs, and other activities, we make certain that all employees fully understand NSSMC's basic policy of ensuring fair management. We have prepared original written materials for our employees to conduct fair and appropri- ate business. We also conduct educational	Ir Structure of in
programs and e-Learning programs for each rank of employees to cultivate their strong awareness on compliance. Internal controls and risk management system The status of internal controls and the risk	Investigation and responses
management system are 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 infor- mation about risk management among NSSMC and its Consule company and the company of the SSMC	1 Employees of
meetings and other means.	Suppliers, and
	Group companies

Social Report

Nippon Steel & Sumitomo Metal Group and its stakeholders

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.

NSSMC will continue to make social contribution activities that Collaboration with an NPO, "Mori wa Umi no Koibito" are closely tied to local communities, and fulfill our corporate social Since1989, Mr. Shigeatsu Hatakeyama, a fisherman cultivating oysters and scallops in Kesennuma City, Miyagi Prefecture, and the leader of the NPO, "Mori wa Umi no Koibito" (which literally means "The forest is longing for the sea, the sea is longing for the forest"), along with his fellow fishermen, commenced "Mori wa Umi no Koibito" campaign to plant trees in the vicinity of the upper reaches materializing a sustainable Contribute to of the Okawa River, which flows into Kesennuma Bay. In June 2015, approximately 1,500 students and others, including employees of society through corporate activities our Group, joined their tree-planting festival. Internship programs 227 students (FY2014) External We endeavor to closely communicate lanan and abroad on enviror organizations with our customers and our supplier ental activities We have been offering internship opportunities at steeland NGOs works and research centers to students to help them **Suppliers** concerns are addressed at all levels learn about our business and gain some work experience. of our supply chain from procureexchanges and collaborate with **Students** young people and their teachers with **Community-based educational support** and teachers Providing education on the ng" and environmental initiatives environment and manufacturing Automobiles NSSMC hosts a number of programs in its steelworks • Energy and natural nationwide and nearby elementary and junior high • Electric, shipbuild schools, such as "tatara ironmaking1" demonstra-**NSSMC Group** ing, and aircraft tions, workshops, and lectures Steel Customers Contribute to build a sustainable Construction and in classroom **Products** society with its three ecos and civil engineering 1 Tatara ironmaking is a traditional innovative technological development Japanese method of making iron that uses iron sand as the source material. A bellows is used to help burn charcoal to make iron. In our Investor Relations (IR) activities we strive for timely disclosure briefings, dialogues, and other Shareholders opportunities to interact with our and investors Number of shareholders cies, based on fair treatment of per sonnel, to ensure that our employee 520,000 **Employees** work consistently with pride, motiva tion and vitality. Local shareholders We are implementing various communities ealth and safety measures so that We invite shareholders to take tours of our steelemployees of our company, group works in various locations and attend IR briefings acteristics of local communities, and engage in major cities in Japan, so that they can better stakeholders in our local communities. understand our business.

responsibilities as a member of society. We are also actively promoting environmental activities with various organizations in local and international communities.

In particular, we find it important to make young people and their teachers, who are fostering future generations, understand and appreciate the importance of *"monodzukuri* (product manufacturing)" and our various initiatives on environmental issues.

Diverse communication activities Participation in Eco-Products 2014

At NSSMC, we aim to become a company trusted by all stakeholders

including our customers, suppliers, and local communities at all times,

and endeavor both to offer our shareholders and investors sufficient

opportunities for communication and to ensure timely disclosure of

information. We also strive to create workplaces in which employees

can work with pride and enthusiasm.

In December 2014, NSSMC exhibited products and technologies at Eco-Products 2014, the largest ecological exhibition in Japan, which was held at Tokyo Big Sight (Tokyo International Exhibition Center). Our presentations showed how we addressed environmental and energy issues through our focus on three ecos, and attracted the attention of many visitors.

Environmental conservation in local communities Environmental conservation agreements

Each of our steelworks in Japan has concluded an environmental conservation agreement (anti-pollution agreement) and an agreement for the greening of plant sites with their local municipality. We work hard to fully comply with these agreements, in order to ensure environmental conservation in the local communities.

Awards from external organizations

NSSMC's technological advances and response to needs of our customers have been highly evaluated and we have received various awards from many organizations. NSSMC's "Creation of Hometown

Forests" received the Good Life Award Judging Committee's Special Award in March 2015.

^{Mecenat} Kioi Hall

The Nippon Steel & Sumitomo Metal Arts Foundation operates the Kioi Hall (in Chiyoda-ku, Tokyo), where it holds classical concerts by Kioi Sinfonietta Tokyo. The foundation also helps popularize traditional Japanese music by using the Kioi Hall's small hall exclusive for Japanese music performance, a rare type of hall even in Japan.

Third-party opinion

Yuko Sakita Iournalist and environmental counsellor

Overall report

I have read the Sustainability Report of Nippon Steel & Sumitomo Metal Corporation (NSSMC) published three years after the merger.

Owing to the advance of global industrialization, the need for the development of community infrastructure is high in each country and steel demand is growing. This is an industry that consumes a large amount of energy, and as a business operator with a large environmental impact that includes CO₂, NSSMC aims to contribute to the reduction of CO2 emissions worldwide through world-leading energy efficiency technologies and high-quality steel materials. I highly commend the accuracy of NSSMC's point of view as "the world-leading steelmaker with comprehensive strengths," as outlined in the Message from Top Management.

This report communicates corporate activities related to the environment and society to various stakeholders, and making use of it is important for citizens, society and investors as well as operating communities and employees. It initially presents negative information as well and illustrates in an easily understandable way overall business activities by categorizing them into "the three ecos (eco process, eco products and eco solution) + innovative technology development" as the value chain. In addition, I believe it was carefully prepared with the aim of disseminating information and providing communication. For example, it not only quantifies the energy efficiency and CO₂ emissions volumes of overall operations but also the lifetime environmental impact of products based on LCA.

Environmental report

In the case of the "eco process," which endeavors to reduce environmental impacts in the process of manufacturing, the power self-sufficiency rate is 84%, the rate of use of waste heat in steam generation is 87%, the rate of use of by-product gases is 100%, the rate of use of water circulation is 90%, and 99% of by-products generated from input resources are recycled, while only 1% of slag and brick dust, which are difficult to recycle, is finally disposed of. The report indicates that production processes are thoroughly managed based on low carbon, cycles and environmental risk reduction.

As a business operator that accounts for 5% of the total energy used throughout Japan, NSSMC is striving to undertake voluntary initiatives to counter global warming. However, I hope that that it will more aggressively promote COURSE50 innovative technology development and drive the attainment of worldwide targets, such as Japan's pledged draft target of a 26% reduction in CO₂ emissions in 2030 compared to fiscal 2013. Furthermore, Japan aims to ratify the Minamata Convention on Mercury and the steel industry is not subject to the convention, but I expect that it will continue to conduct monitoring.

As regards eco products, products that use high-performance steel materials play a useful role in mitigating environmental impacts. For example, the Osaka Steel Works, which I visited, produces 100% of wheels and axels for domestic railways, and contributes to the increased efficiency of rail transportation in Japan through weight reduction and other factors.

Moreover, in Japan the roles of blast furnaces that use iron ore, which is a natural resource, and scrap as the main materials, and electric furnaces that use only scrap as the main material have been divided, and the eco products that are generated by each process have realized energy saving and a reduction in CO_2 emissions over the entire life cycle.

The provision of high-quality steel materials such as high tensile strength steel enhances the fuel consumption and safety of automobiles, while titanium alloy parts in sports bikes reduce the use of rare metals. Furthermore, as part of initiatives aimed at the hydrogen society, which will become invigorated leading up to the 2020 Tokyo Olympics, NSSMC has developed stainless steel for use in high-pressure hydrogen environments. In these ways and others, I feel that NSSMC is solidly undertaking the long-term development of technologies as well.

Coexistence with society

NSSMC is also striving for coexistence with regional communities that emphasizes biodiversity through such initiatives as the "Creation of Hometown Forests," a program to create greenery around steel works, and the "Creation of Sea Forests," which regenerates seaweed beds. I therefore feel respect for NSSMC's strong motivation to contribute to society.

Now that we are facing mounting social issues such as regional revitalization due to the low birth rate and aging society as well as the excess concentration of cities, there are various measures aimed at the realization of a sustainable future that I would like to see mentioned, such as the passing on of technology to the next generation and the establishment of a good working environment for women. In the area of social reports as well, I hope that NSSMC will further drive industrial sectors.

Overview of the communication tools

Sustainability Report 2015

Easy-to-understand brochure on environmental initiatives

Each double-page spread has a link to the website for further details. Sustainability Report 2015

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

Details on environmental initiatives

http://www.nssmc.com/en/

Fact Book

Financial Results

Securities Reports

Various reports

•PR brochures "Quarterly Magazine: NSSMC"² Picture book "A New Story About Iron"² Technical articles and technical reports¹

PR brochures

Picture book

"Ouarterly Magazine: NSSMC"

(only in Japanese) 1 PDF files are available for downloading from the website.

2 Printed copies are available upon request from the website

Nippon Steel & Sumitomo Metal Corporation Sustainability Report 2015

Environmental Affairs Division

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subjects

Brochure on the compact overview of the company

Brochure on the overall businesses and management for investors

Annual Report 2015 Book form and PDF file)^{1, 2}

Details on the following

Company Brochure

(Book form and PDF file)

 Products Research & Development About NSSMC Recruiting information

Details on business and management

http://www.nssmc.com/en/ir/

Various reports for shareholders¹

•Corporate Governance Reports Reports for Shareholders

act Book 2015