MORE INFORMATION ON SUSTAINABILITY

Nippon Sanso Holdings creates new value for society through innovative gas solutions, contributing to the development of all manner of industries and fostering more comfortable futures for humankind, for society, and for the earth. This aspiration is embodied in our Group Vision, shared by our employees and serving as motivation for the Group to work together for sustainability management. The Group engages in a wide variety of sustainability initiatives across the globe. We believe that working to help resolve issues for humankind, for society, and for the earth leads to higher levels of social value and economic value, while also enhancing the corporate value of the Nippon Sanso Holdings Group.

* The following operating companies are engaged in the activities highlighted in the More Information on Sustainability section in each geographic hub (Japan, the United States, Europe, and Asia and Oceania) and in the Thermos Business.

NSHD: Nippon Sanso Holdings Corporation
TNSC: Taiyo Nippon Sanso Corporation
MTG: Matheson Tri-Gas, Inc.
NGE: Nippon Gases Euro-Holding S.L.U.
NSHS: Nippon Sanso Holdings Singapore Pte. Ltd.
Thermos: Thermos K.K.

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Stance on Sustainability

In the main text of this integrated report, we discussed a wide range of our activities and social roles, including the characteristics of the Nippon Sanso Holdings Group, our aspirations, and value creation. We have also addressed the opportunities incorporated into the Group sustainability strategy for contributing solutions to climate change and other global issues by providing innovative gas solutions.

In More Information on Sustainability, we provide more information in detail to a degree not covered in the main text of the report. In this way, we hope to encourage a deeper understanding of Nippon Sanso Holdings Group sustainability management among our stakeholders. This section focuses on topics related to the global sustainability activities of the Nippon Sanso Holdings Group that we believe will lead to a greater appreciation of the activities we conduct worldwide. We believe readers will gain a better understanding of sustainability management when reading this section in conjunction with the main body of the report. This section alone, however, provides sufficient context and information about activities.

Read on to learn more about sustainability activities at the Nippon Sanso Holdings Group.

Takeshi Miki

Senior Executive Officer,
Technology and Environment
Office Manager,
Chief Sustainability Officer (CSO)
Nippon Sanso Holdings Corporation
(Additionally appointed as
Senior Executive Officer,
Head of Technological Affairs Unit,
Taiyo Nippon Sanso Corporation)

Message from the CSO

We contribute to achieving a carbon-neutral society, aiming for sustainable growth and higher levels of corporate value.

As stakeholders demand solutions to global-scale environmental problems and social issues, corporations are under increasing pressure to contribute to the United Nations Sustainable Development Goals (SDGs). Both financial and non-financial initiatives are important for the sustainable development of a company. In particular, environmental, social, and governance (ESG) management is essential.

The Nippon Sanso Holdings Group possesses numerous technologies that it has cultivated over many years. We use these technologies to provide products and services that help resolve environmental and social issues. Examples include technologies to increase combustion efficiency and technologies that use hydrogen and ammonia, substances that do not emit CO_2. In October 2020, we made a fresh start under a holding company structure. As a corporate group active around the globe, we will continue to engage in more effective sustainability initiatives from a broader perspective than ever before.

ESG Materiality

With the aim of contributing to the realization of a sustainable society, Nippon Sanso Holdings works to ensure a solid grasp of its impact on the earth, society, and people (the Company and its organizational structure) through all of its business processes, that is, across the entire value chain. To this end, we have defined the roles we are expected to play in addressing issues we have identified as being of material importance, which are grouped under four themes, including management issues.

(→See P.58 to 61 in this integrated report for more about ESG materialities and our process for identifying materialities.)

Theme	Materiality (Material Issues)	Principal Initiatives	Relevant SDGs
Management Issues	• Compliance • Corporate governance • Process safety	• Reinforcement of systems based on Japan's Corporate Governance Code • Initiatives to ensure safe and reliable supply • Continuous implementation of compliance training	8 DECENT WORK AND ECONOMIC GROWTH 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
The Earth	• Efficient use of resources and energy • Climate change • Securing of clean water resources • Preservation of biodiversity	• Promotion of environmental management • Initiatives to protect the global environment	7 AFFORDABLE AND CLEAN ENERGY 12 RESPONSIBLE CONSUMPTION AND PRODUCTION 13 CLIMATE ACTION
Society	• Contribution to maintenance of physical health • Contribution to medical care • Response to food- and agriculture-related issues • Increase in consumer satisfaction • Contribution to upgrading and expanding social infrastructure • Response to smart societies	• Development of products that contribute to solutions for environmental and social issues • Reinforcement of quality assurance and management systems	3 GOOD HEALTH AND WELL-BEING 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
People (The Company and Its Organizational Structure)	• Respect for human rights • Occupational health and safety • Human resources development and training • Diversity and inclusion • Product and service reliability • Promotion of measures to improve information security and privacy • Stakeholder engagement • Contribution to communities • Promotion of sophisticated information and communications technology (ICT) use • Participation in initiatives and demonstration of leadership • Promotion of sustainability in the supply chain	• Thorough internal promotion of the "Policy on the Prevention and Eradication of Harassment in the Workplace" • Employee education and training • Maintenance and improvement of information security systems • Promotion of sophisticated ICT use • Dialogue with shareholders and investment analysts • Initiatives to ensure safe and reliable supply • Creation of environments to promote innovation and diversity • Social contribution activities • Health management initiatives • Enhancement of information disclosure	3 GOOD HEALTH AND WELL-BEING 8 DECENT WORK AND ECONOMIC GROWTH 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE 12 RESPONSIBLE CONSUMPTION AND PRODUCTION

Sustainability Topics

Management Issues

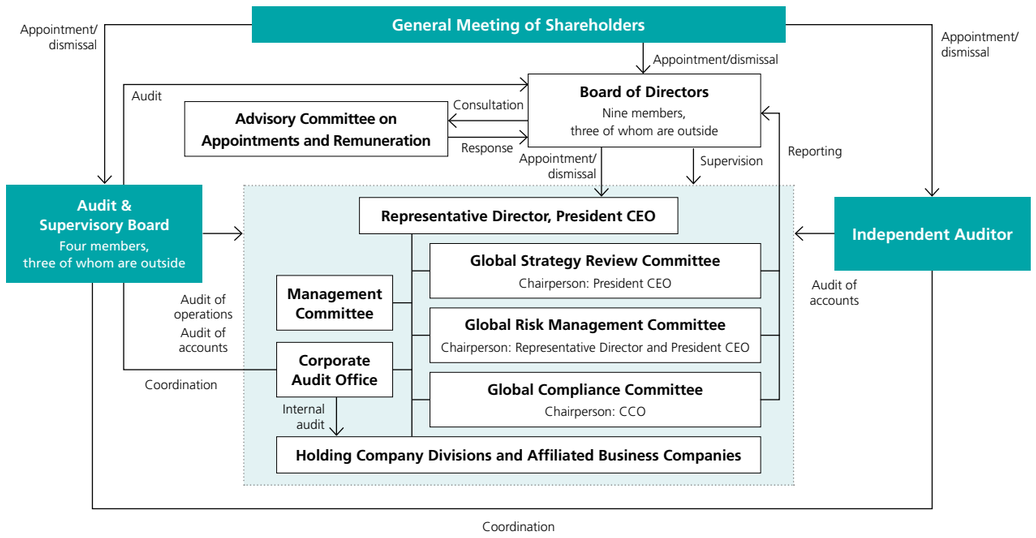
We strive to engage in corporate activities in a fair, impartial, and honest manner based on the highest ethical standards. To this end, we pursue compliance, stronger corporate governance, and security and safety for the continued reliable supply of gases as important management issues, and we are strengthening our efforts in these areas. As "The Gas Professionals," we are responsible in particular for the safe and reliable supply of industrial gases to our customers across all manner of industries. In accordance with our belief that selling gases is commensurate with selling safety, we follow the presidential policy of practicing safety under our own higher standards, establishing a safety management system headed by the president to ensure comprehensive safety management.

NSHD Strengthening of Corporate Governance

In March 2015, the Financial Services Agency and the Tokyo Stock Exchange collaborated to issue Japan's Corporate Governance Code. We take the principles of the Code seriously, and we have endeavored to make our systems more effective based on the intent of the Code. We will continue striving to improve compliance as we aim to achieve sustainable societies. We have established the Principles of Corporate Governance, believing that the essence of corporate governance is to ensure transparency and fairness in decision-making from the stance of our stakeholders and the perspectives of sustainable Group growth and long-term corporate value improvement. Our approach includes leveraging management resources effectively to increase the vitality of management through swift and conclusive decision-making.

(→See pages 112 to 131 in this integrated report for more about the Group's corporate governance.)

Auditing Structure and Risk Management Structure



NSHD Reporting Based on the Recommendations of the Task Force on Climate-related Financial Disclosures (TCFD)

Nippon Sanso Holdings announced its endorsement of the TCFD in November 2019. As a group, we have worked hard to reduce our environmental impact, engage in energy-saving activities, and expand our lineup of products that contribute to the reduction of greenhouse gas (GHG) emissions. Based on the final recommendations of the TCFD, we will strive even harder to make progress in these initiatives, expanding information disclosure in stages as we endeavor to improve Group corporate value. We have also established a governance structure with respect to climate change issues. Here, we are clarifying the roles and activity policies of each board and committee in our efforts to address climate change.

Board/Committee	Roles	Activities for FYE2021
Board of Directors	• Formulate basic management policies • Receive business status reports and supervise overall management	• Reported on GHG emissions (first half and second half business status reports, Technological Risk Management Committee reports) • Selected MOS indexes for climate change issues; reported on activities conducted in the previous fiscal year • Deliberated and made decisions on various policies, including the Nippon Sanso Holdings Group Code of Conduct
Management Committee, etc. (Global Strategy Review Committee, Global Risk Management Committee, etc.)	• Discuss risks and opportunities related to climate change and decide policies for important climate change issues referred to the Global Strategy Review Committee • Hold meetings between Nippon Sanso Holdings and the Technological Risk Liaison Committees of each operating company to decide and implement globally those matters resolved by the Global Strategy Review Committee	• Reported on the FYE2020 GHG emissions and GHG emission reduction targets of each company within the Nippon Sanso Holdings Group • Deliberated FYE2031 GHG emission forecasts for Nippon Sanso Holdings Group companies
Board meetings of each operating company (Japan, the United States, Europe, Asia and Oceania, Thermos)	• Pursue and report on sustainability activities at each operating company	• Reported the status of initiatives in each region to Nippon Sanso Holdings

TNSC Compliance Education Initiatives

We provide compliance education and training on an ongoing basis for employees at all levels. Organization-specific compliance training helps employees learn the essentials of compliance, anti-monopoly laws, and anti-harassment laws. Our training is also designed to instill an awareness and desire to improve compliance in our employees. One unique feature of this training is that they are conducted by compliance staff in each division, branch, and main subsidiary. This framework allows us to communicate and convey the implications and importance of compliance from a perspective closer to the front lines of our businesses. In light of the change in work styles due to COVID-19, we conducted training via online technology and video broadcasts throughout FYE2021.

TNSC/NSHD Technical Academy: An Education Center for Improving Technical and Safety Capabilities

The mission of the Group is to provide industrial gases reliably and safety to our customers on a continued basis. We strive diligently to prevent industrial accidents by improving the technical and safety capabilities of our employees in accordance with our belief that selling gases is commensurate with selling safety. The Technical Academy serves as a center for employee education and offers technical seminars for employees to learn the basic technologies related to industrial gases and a wide range of specialized technologies. Certain training sessions involve the use of equipment that simulates high-pressure gas-related hazards, offering an environment in which employees learn the basics of safety. The academy uses virtual reality (VR) to simulate accidents, such as falling or caught-in accidents, to make employees aware of the dangers lurking in their daily work and to promote safe work practices.

The Technical Academy has been holding seminars online to improve risk awareness during the COVID-19 pandemic. These seminars are conducted via live streaming, and instructors use the same equipment used for regular hazard simulation training in their demonstrations. Instructors emphasize two-way dialogue with participants to increase an awareness of risks, simulating potential workplace accidents and considering responses. Many employees that have participated in these seminars comment on the real sense of danger they felt during the lecture, an element not normally expected from an online course. More than 550 employees from domestic and overseas Group companies have participated in these online seminars, and the Technical Academy will continue to use these seminars as a pillar of safety education, continuing online courses in conjunction with live hazard simulation training.

VR-based hazard simulation device

TNSC CCPS Evaluation Correspondence (High-Pressure Gas Version)

Taiyo Nippon Sanso Corporation has developed its own accident intensity standards, based on the Center for Chemical Process Safety (CCPS) evaluation method* and in consideration of the potential impact of high-pressure gases. The company evaluates accidents in Japan based on a five-level scale and five characteristics: (1) physical injuries, (2) property damage, (3) potential impact of high-pressure gases, (4) environmental impact, and (5) social impact and media coverage. The evaluation results in an overall number of points by which the company quantifies intensity.

* This is a method proposed by the U.S. Center for Chemical Process Safety to prevent process-related accidents and disasters.

Intensity		Characteristics							
				Potential Impact of High-Pressure Gases					
Level	Points	Physical Injuries	Property Damage	Spewing and Leakage Inert Gases, Flammable Gases	Spewing and Leakage Flammable Gases, Toxic Gases	Spewing and Leakage Specialty High-Pressure Gases	Explosion/Fire, Rupture/ Breakage, Other	Environmental Impact	Social Impact and Media Coverage
1	27	Multiple job site deaths Death of one or more persons off-site	Internal damage of ¥1 billion or more	Potentially fatal leakage Impact on wide area off-site	Potentially fatal leakage Impact on wide area off-site	Potentially fatal leakage Impact on wide area off-site	Potentially fatal Impact on wide area off-site	Environmental response costing ¥250 million or more	Significant impact on local community Large-scale investigation and monitoring by government, etc. National media coverage lasting several news cycles
2	9	Single job-site death Multiple lost-time on-site injuries	Internal damage of between ¥100 million and ¥1 billion	Leakage with the potential for serious injuries Impact off-site	Leakage with the potential for serious injuries Impact off-site	Leakage with the potential for injuries Impact off-site	Potential for serious injuries Impact off-site	Environmental response cost of between ¥100 million and ¥250 million	Local evacuation required Investigations and monitoring conducted by prefectural governments and police Brief coverage by national media
3	3	Lost-time injuries affecting one or more persons off-site Lost-time injury affecting one person on-site	Internal damages of between ¥10 million and ¥100 million	Leakage with the potential for minor injuries Leakage with the potential to cause site-wide damage on-site	Leakage with the potential for minor injuries Leakage with the potential to cause damage within the facility	Leakage with no physical injury or property damage (including minor leakage)	Potential for serious injuries Site-wide impact on-site	Environmental response cost of less than ¥100 million	Request to evacuate residents living around the plant as a precautionary measure Investigations and monitoring conducted by the company Local media coverage
4	1	Lost-time accident off-site affecting one or more persons Lost-time accident on-site affecting one or more persons	Internal damages of between ¥2.5 million and ¥10 million	Leakage with no physical injury but potential for property damage or other impact inside the facility	Minor leakage with physical injuries or property damage		No physical injury but impact inside the facility	Short-term remedial action required	Long-term investigations or monitoring by the company not needed Brief coverage by local media
5	0.3	First aid required for one or more persons on-site	Internal damages of between ¥250,000 and ¥2.5 million	Minor leakage with no physical injuries or property damage			Incident with no physical injuries or property damage Explosion or fire: Sound of explosion and/or small fire Rupture or destruction: Sound of rupture sound and/or deformation		

NGE Filling Station Safety Conferences (Safety Activities)

High-pressure gas filling stations require attention to safety at all times. Filling station safety is a minimum prerequisite for us, our colleagues, customers, and others to work in a safe environment. Not only are we reminded of the importance of safety every day, but we also strive to improve safety-related communications.

For example, we held a Safety Excellence Journey event, attended by employees from plants, offices, workplaces, and their own residences. The facilities manager served as the instructor for this training provided to all operators. The purpose of this safety seminar was to help employees understand and recognize the rules for maintaining and improving safety with respect to the following three important matters:

1) The proper use of personal protective equipment (PPE)
2) The importance of inspecting cylinders before filling
3) The safe handling of cylinders.

We hold these safety seminars and display safety posters at filling stations to raise safety awareness among all employees working at filling stations across Europe.

The safety poster displayed at filling stations

Asia Safety Conferences

Leeden National Oxygen Ltd. (Leeden NOX) has been holding annual safety conferences since 2017, completing four such events through 2020. Participants are mainly plant equipment supervisors, safety officers, and managers from company subsidiaries. The purpose of the conference is to encourage a strong safety culture in the workplace, emphasizing the safety and health of workers. The ultimate goal is to share experiences among Leeden NOX group companies and pursue the group's common safety policy, As Low As Reasonably Practicable (ALARP), to reduce and eliminate risks.

3rd safety conference

MTG Safety Activities at Matheson Tri-Gas

Matheson Tri-Gas, Inc. (MTG) formulates and follows an annual safety activity plan to reduce and prevent accidents. MTG pursues a culture of safety through common safety standards and internal audits, conducted in conjunction with subsidiaries Continental Carbonic Products, Inc., and Western International Gas & Cylinders, Inc.

MTG also fosters safety culture through safety training activities to prevent slips and falls when handling gas cylinders and getting on or off vehicles. In the future, MTG will play a central role in further safety initiatives with a view toward creating an integrated safety organization with the aforementioned subsidiaries.

Device introduced to prevent injuries when moving gas cylinders

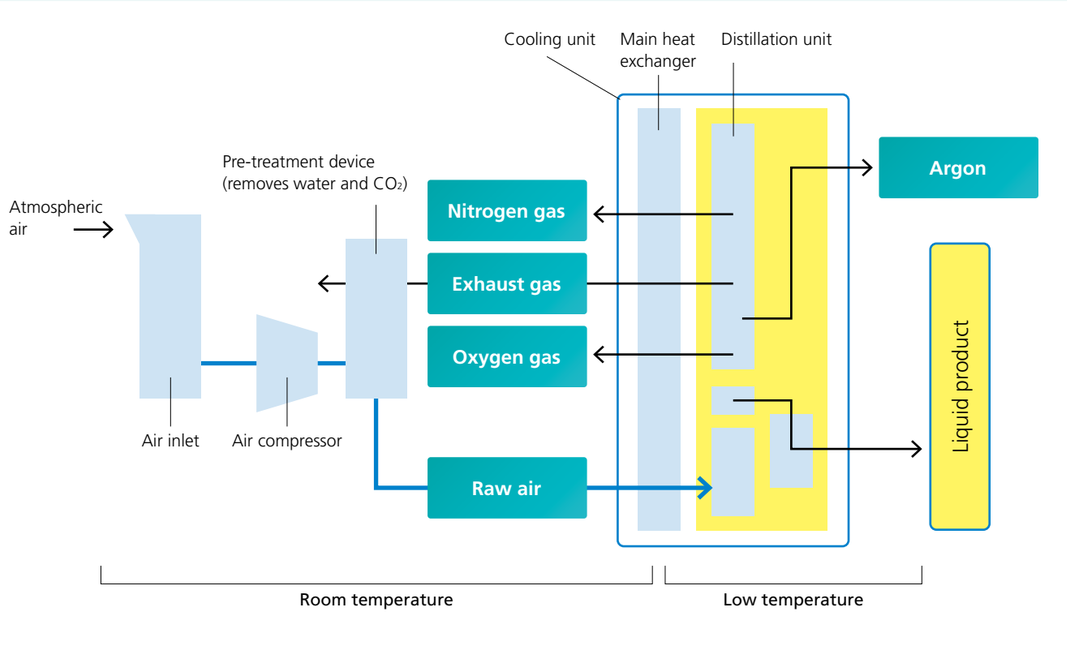
The Earth

The Nippon Sanso Holdings Group responds to climate change, working under the main banner of preventing global warming. In this regard, our efforts include reducing energy consumption per unit of production at gas production plants, encouraging energy conservation in our offices, and increasing the transport efficiency of our tanker trucks. The Group brings visibility to the environmental impact associated with manufacturing its mainstay products and with the processes supporting its business activities. We calculate our total GHG emissions and reduction contribution, using this information to reduce our environmental impact further. In addition, we develop and market products that contribute to global environmental conservation through lower environmental impact.

Environmental Impact of Oxygen, Nitrogen, and Argon Manufacturing Processes

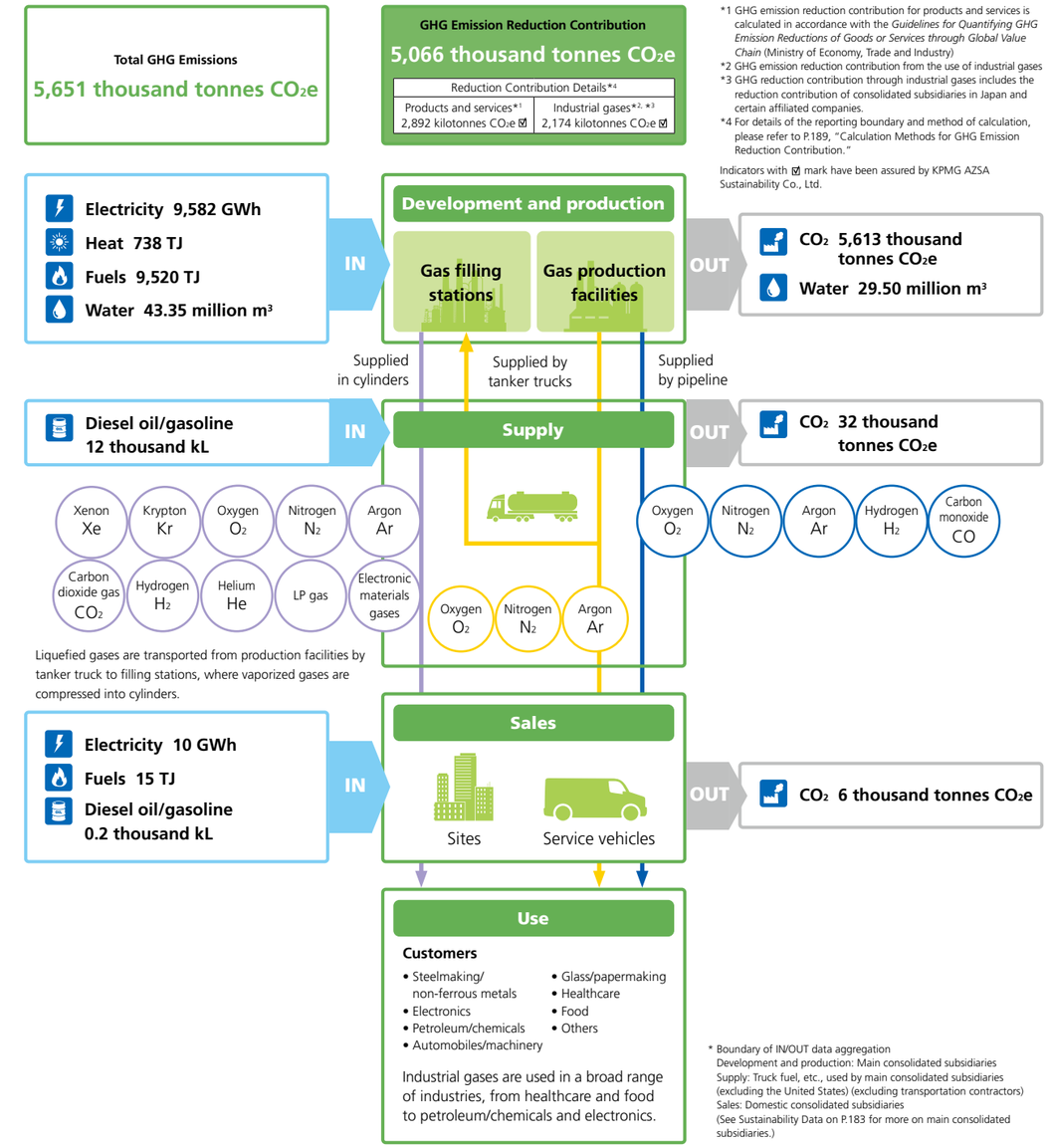
The production of oxygen, nitrogen, and argon, which constitute the main products of the Group, requires a tremendous amount of electricity. Oxygen, nitrogen, and argon are manufactured by separating air in deep-cooled air separation equipment. First, we compress air, which is the raw material. Compressing air requires much energy and much electricity. Then, we cool the compressed air to near liquefaction temperature and send it to the distillation unit. Inside the distillation unit, gaseous air and liquid come into contact, causing distillation and separation. Nitrogen, which has a low boiling point, is extracted from the top layer. Oxygen, which has a high boiling point, is concentrated into a liquid and extracted from the bottom layer. Argon is extracted from the middle.

Structure of a Deep-Cooled Air Separation Unit (ASU)



Material Balance of the Nippon Sanso Holdings Group

The main products of the Nippon Sanso Holdings Group are oxygen, nitrogen, and argon. We manufacture these products using air as the raw material, which we return mostly to the atmosphere. Since both raw material and finished product are gases, we generate little waste. Since the raw material is air, we do not need to procure any other raw materials. In other words, the industrial gases business model of separating and selling air is a sustainable, resource-recycling business that consumes essentially no raw materials and generates no waste.



Sustainability Topics:
The Earth

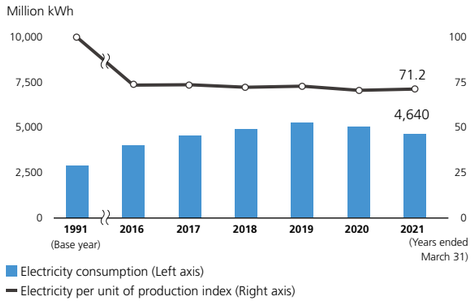
Efforts and Achievements in Preventing Global Warming

The process of producing industrial gases requires significant amounts of electricity. The Nippon Sanso Holdings Group takes measures to reduce the risk of climate change through initiatives to reduce the environmental impact of its business activities. These measures include reducing energy consumption per unit of production at gas production plants, undertaking energy conservation in our offices, improving tanker truck transport efficiency, and expanding the use of energy from renewable sources.

We also strive to increase disclosures and expand the scope of data collection related to non-financial information. We disclose information by calculating and publishing our GHG emission reduction contribution associated with environment-friendly products and support the TCFD.

* See Response to Environmental and Social Issues on page 66 for more on TCFD disclosures.

Trends in Electricity Consumption and Energy Consumption per Unit Index



Reporting boundary: Gas production plants of consolidated subsidiaries in Japan, including Taiyo Nippon Sanso Corporation, and certain affiliated companies

Other Major Initiatives

Issues and Targets	Major Initiatives	Achievements	Target Companies
Implement energy conservation at Company business locations: Reduce electricity usage (annual average of 1% over the medium to long term)	• Turned off unnecessary office automation equipment; turned off unnecessary lighting • Replaced air conditioning, office automation equipment, lighting equipment, and shared facilities with energy-saving equipment • Implemented *No Overtime Days* and *Cool Biz*	5.0% reduction (vs. FYE2020)	All business locations of Taiyo Nippon Sanso Corporation (excluding gas production plants)
Pursue more efficient tanker truck transportation: Reduce fuel consumption per unit of product transported	• Optimized delivery routes • Revised delivery intervals • Conducted more in-person weight • Introduced new tanker trucks • Implemented consistent eco-driving training	27.4% reduction (vs. FYE1991)	Taiyo Nippon Sanso Corporation group logistics companies and major transportation contractors
Contribute to the environment through products: Expand sales of products that contribute to the environment	Expanded sales of hydrogen stations, SCOPE-Jet®, MG Shield®, SF_6 recovery services, Thermos products, nitrogen gas supply systems for laser processing, combustion-type gas treatment equipment, and new refrigerants	Reduction contribution*2 of 2,892 thousand tonnes CO_2 ☑	Main consolidated subsidiaries of Nippon Sanso Holdings Corporation*1
Contribute to the environment through products: Expand sales of industrial gases	Oxygen-enriched combustion in blast furnaces	Reduction contribution*2 of 2,174 thousand tonnes CO_2 ☑	Consolidated subsidiaries and certain affiliates of Nippon Sanso Holdings Corporation*1

*1 For details about the reporting boundary and calculation method, please refer to page 189, "Calculation Methods for GHG Emission Reduction Contribution."
*2 We calculated CO_2 reduction contribution based on the *Guidelines for Quantifying GHG Emission Reductions of Goods or Services through Global Value Chain* (Ministry of Economy, Trade and Industry; March 2018) and other standards.

Indicators with ☑ mark have been assured by KPMG AZSA Sustainability Co., Ltd.

TNSC Hydrogen Filling System at the Kawasaki-Mizue Business Base

The Kawasaki-Mizue Business Base of Taiyo Nippon Sanso Corporation applied for recognition as a regional renewable energy hydrogen station enterprise, which is a project under the auspices of the Ministry of the Environment. The plant constructed a CO_2-free renewable energy hydrogen filling facility as a model for on-site hydrogen filling stations in accordance with the Kawasaki Hydrogen Strategy for the Realization of a Hydrogen Society in Kawasaki City. This project is just one measure to reduce the environmental footprint of business activities in the local community. The plant generates renewable energy (solar panels) to power the facility, using this electricity to produce hydrogen via a water electrolysis hydrogen generator. In addition, the plan works to optimize the series of related systems, from pressure boosting to pressure storage and filling. Fuel cell forklifts filled with CO_2-free hydrogen as fuel transport objects within the plant premises.

Hydrogen filling system at the Kawasaki-Mizue Business Base

TNSC Hydrogen for Racing Cars at the Fuji 24 Hours

The Gas Engineering Center and the Chubu Branch Office filled hydrogen engine cars with hydrogen gas at Fuji Speedway during the qualifying round of the Fuji 24 Hours, the third round of the Super Taikyu (S-Tai) Series 2021. The entry of a hydrogen-fueled racing car was a world first for Toyota Motor Corporation, which is looking for ways to offer exciting motor sports even in a carbon-neutral society. We used a commercial mobile filling station for the gas pit. However, we discovered certain issues unique to racing, including the need to fill and store gas as quickly as possible. We will continue to work toward a decarbonized society through various hydrogen gas engineering services, addressing issues as they arise.

Filling a hydrogen-fueled racing car

TNSC Training and Workshops Link SDGs Contributions to Business Opportunities

Many of our customers are engaging in measures to combat climate change. For Nippon Sanso Holdings to meet the needs of these customers and propose the right Group applications, every sales representative must be aware of the significance of the SDGs and the role of the Group. To this end, Taiyo Nippon Sanso Corporation holds sales training sessions and workshops to further an understanding of the SDGs and the link between our products and services. We will continue to contribute to society by providing the best solutions for our customers as they respond to the SDGs.

Seminar on the SDGs and related business opportunities

TNSC Recycling Project in Collaboration with Business Partners

Taiyo Nippon Sanso Corporation is a co-sponsor of the BLUE SEED PROJECT, a project headed by business partner SEED Co., Ltd. Plastic waste has been discovered widely throughout the world's oceans, and the volume of plastic waste continues to increase steadily, becoming an extremely serious problem for the marine environment. In response, SEED launched a project to collect and recycle disposable contact lens blisters (empty cases). By supporting this project, we aim to contribute to environmental improvement and help achieve sustainable societies.

Collecting disposable contact lens blisters

NGE CO_2 Recycling Equipment to Reduce CO_2 in the Atmosphere

Nippon Gases Iberia has agreed to partner in the construction and operation of a CO_2 capture unit in Cartagena. The facility will run on 100% renewable energy and is expected to be operational in spring 2022. The CO_2 captured will play an important role in the circular economy by avoiding wasteful emissions of this gas into the atmosphere.

NGE New Initiative to Reduce Plastic Bottles and CO_2 Emissions

Nippon Gases Euro-Holding S.L.U. (NGE) won a contract to supply the CO_2 used to make the carbonated water supplied to public water fountains. Under the agreement, NGE supplies carbonated water to more than 200 water fountains in and around the city of Rome, Italy, including the gardens of the Quirinal Palace, the official residence of the President of the Republic of Italy. The supply of carbonated water to these water fountains has reduced the use of plastic bottles by 1,800 tonnes. NGE has also contributed to a reduction in CO_2 emissions on the order of 5,000 tonnes.

NGE Construction of First Full-Scale Liquefied Coal Import Terminal in Ireland to Reduce CO_2 Emissions

The annual demand for CO_2 in Ireland is 40,000 tonnes. To date, the country has been heavily dependent on transport from the United Kingdom. NGE developed plans to build a liquefied coal import terminal at Warrenpoint, Ireland's fifth largest port. Warrenpoint is located between Ireland's two largest cities, Belfast and Dublin, and the terminal is expected to reduce transportation costs.

The terminal became fully operational in January 2021 and has already contributed significantly to improving the supply chain in the Irish market, reducing Ireland's carbon footprint by 560,000 km and CO_2 emissions by about 500 tonnes.

Warrenpoint terminal

NGE Oxygen Usage Technology in Aluminum Scrap Processing Reduces CO_2 Emissions

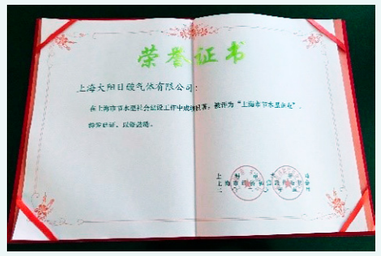
In Germany, the presence of paint, oil, and plastic residue on processed aluminum scrap is a constant issue faced by customers. When these scraps are melted in an aluminum melting furnace, the impurities evaporate to form hydrocarbons, which exit the furnace together with exhaust gases and cause air pollution. One solution to this problem is the use of oxygen gas to remove environmentally harmful components from the exhaust gas of aluminum melting furnaces. The use of oxygen gas also conserves the natural gas used in heating the melting furnace.

Together with customers, we have introduced laser technology that measures the concentration of hydrocarbons in a furnace instantly, allowing for the control of oxygen burners to ensure complete combustion of hydrocarbons. The resulting energy reduces the natural gas consumption of the process by up to 10%.

In addition, this technology allows customers to increase the ratio of contaminated scrap, or to use even dirtier scrap, for recycling. In this way, we offer an environmental benefit for all our customers.

Asia Commendation by the Shanghai Water Authority as a Water-Saving Company

Shanghai Taiyo Nippon Sanso Gas Co., Ltd. has been engaged in the efficient use of industrial water. As part of these efforts, the company has upgraded water meters, installed more water meters to better understand the status of industrial water use, and modified water pumps to save water. The Shanghai Water Authority recognized the company for its outstanding work in the conservation and efficient use of industrial water, and Shanghai Taiyo Nippon Sanso Gas will continue striving to save water and improve efficiency to reduce the environmental impact of its businesses.



Certificate for water conservation received from the Shanghai Water Authority

ISO 14001 Status

Nippon Sanso Holdings strives to secure ISO 14001 certifications, an international environmental management system standard, for companies throughout the Group. To date, certifications have been acquired by 13 gas businesses in Japan, one gas business in the United States, 15 gas businesses in Europe, 12 gas businesses in Asia and Oceania, and two Thermos businesses.

Gas Business in Japan
Taiyo Nippon Sanso Corporation
Shizuoka Sanso Inc.
Japan Fine Products Co., Ltd.
Sogo Kariya Sanso Corporation
Taiyo Nippon Sanso Engineering
Taiyo Nippon Sanso Gas and Welding
Taiyo Nippon Sanso Higashikanto
Daiichikaimei Co., Ltd.
Nippon Ekitan Corporation
Nissan Tanaka Corporation
Funtaigiken Co., Ltd
Kyokuyo Semiconductors Co. Ltd
Taiyo Nippon Sanso Engineering Taiwan, Inc.

Gas Business in the United States
Matheson Tri-Gas, Inc.

Gas Business in Europe
Nippon Gases Belgium NV
Nippon Gases Denmark A/S
Nippon Gases Deutschland GmbH
Nippon Gases España S.L.U.
Nippon Gases France SAS
Nippon Gases Industrial S.r.l.
Nippon Gases Norge AS
Nippon Gases Offshore Asia Pacific Pte Ltd
Nippon Gases Offshore Ltd
Nippon Gases Operations S.r.l.
Nippon Gases Pharma S.r.l.
Nippon Gases Refrigerants S.r.l.
Nippon Gases Sverige AB
Nippon Gases UK Ltd
Oximesa S.L.U.

Gas Business in Asia and Oceania
Ayutthaya Industrial Gases Co., Ltd.
Leeden National Oxygen Pte. Ltd.
National Industrial Gases. Ltd.
Nippon Sanso (Thailand) Co., Ltd.
Nippon Sanso Ingasco Clark, Inc.
Nippon Sanso Ingasco Philippines, Inc.
Nippon Sanso Vietnam Joint Stock Company
Shanghai Taiyo Nippon Sanso Gas Co., Ltd.
Nippon Sanso Taiwan, Inc.
Dalian Taiyo Nippon Sanso Gas Co., Ltd.
Matheson Specialty Gas (Xi'an) Co., Ltd.
Yangzhou Taiyo Nippon Sanso Semiconductor Gases Co., Ltd.

Thermos Business
Thermos K.K.
Top Thermo Mfg. (Malaysia) Sdn. Bhd.

Society

The Nippon Sanso Holdings Group proposes solutions that combine gas and gas-related equipment, working together with our customers and other stakeholders to develop and market a wide range of products for sustainable societies. In this section, we highlight Group initiatives, focusing on products and services that contribute solutions to the environment and society.

We will also discuss quality control and quality assurance activities that ensure our products are used safely and with confidence by our customers.

Products and Services That Contribute Solutions to Environmental and Social Issues

TNSC Operational Efficiencies through the New IGSS Gas Supply System

Taiyo Nippon Sanso Corporation has developed the Intelligent Gas Supplying System (IGSS). IGSS is a new gas supply system that combines advanced digital technologies such as robotic process automation (RPA), the Internet of Things (IoT), and artificial intelligence (AI) to improve operational efficiency at semiconductor plants and other facilities that use high-pressure gas. IGSS integrates multiple systems, including Cdrive®, which manages container transportation; LUMsystem®, which manages containers; Ceyes®, which is a daily inspection system; and TELEOS-i®, which is a gas monitoring system. Operators use tablet devices to monitor information centrally. This system automates the transportation of high-pressure gas containers and the inspection of related facilities based on aggregated information. In this way, IGSS offers labor savings, energy conservation, and reduced operating risks.

Cdrive®, a robotic system for automated conveyance of gas containers

TNSC Oxygen Combustion Technology That Contributes to Energy Savings and Lower CO_2 Emissions

Taiyo Nippon Sanso Corporation is developing oxygen combustion technology for use in a variety of applications. Compared to regular air combustion, oxygen-enriched combustion reduces the amount of exhaust gas and exhaust gas heat loss. At the same time, this type of combustion increases the formation of nitrogen oxide (NOx) as the flame temperature rises. Controlling NOx formation is essential when using oxygen-enriched combustion in high-temperature furnaces or smelters. Innova-Jet®, offered by Taiyo Nippon Sanso Corporation, reduces the generation of NOx significantly, while also lowering fuel consumption by more than 50%.

Innova-Jet® swing produces a flame that heats a wide area efficiently and uniformly using automated oscillation

TNSC SF_6 Gas Recovery Service Created Using Proprietary Technology

Sulfur hexafluoride (SF_6) gas is a type of GHG. It is one of the gases targeted for global warming prevention and emission control, as its global warming potential (GWP) is high at 23,900 the gas remains in the atmosphere over a long period of time. GWP is the ratio of the effect of a GHG on global warming compared to carbon dioxide. Work sites using SF_6 gas have reported issues including a loss of purity after recovery, preventing reuse. To address this issue, we provide a service that collects SF_6 gas using Taiyo Nippon Sanso Higashikanto Corporation's own proprietary technology. Through this service, work sites can reuse or detoxify and recycle the gas on a consistent basis. The recovered SF_6 gas is decomposed in a treatment plant and converted back to calcium fluoride (CaF_2), with the resulting material used as a raw material for fluorine products. In this way, we contribute to a recycling-oriented environment.

Providing a full range of equipment and services related to SF_6 recovery

TNSC Creation of a New-Energy Society through the Hydro Shuttle® Package-Type Hydrogen Refueling Station

The Hydro Shuttle® package-type hydrogen refueling station integrates the four major components of a hydrogen refueling station—dispenser, pre-cooler, hydrogen compressor, and storage—into a single unit. These compact (9 m × 2 m × 2.6 m) units can be used not only as permanent stations but also as truck-mounted mobile stations. The package format significantly reduces the cost of installation, while the simplification of components means the cost of fabrication is only half that of conventional permanent stations. Because it can be used as a mobile station, a single Hydro Shuttle® offers promise for multiple applications, including on-site stations equipped with hydrogen production facilities, off-site stations that supply hydrogen produced at facilities elsewhere, and traveling stations that transport hydrogen from one location to another.

In 2017, Taiyo Nippon Sanso started operation of Nimohyss Hydrogen Station Minami-Rokugo and Nimohyss Hydrogen Station Setagaya, operated by Nippon Mobile Hydrogen Station Services, LLC (nicknamed "Nimohyss"). Looking ahead, we will continue working to realize an energy-conscious society.

Hydro Shuttle® mobile hydrogen station

TNSC Contribution to Reliable Supply and Energy Conservation through New High-Performance PSA Nitrogen Gas Generators

The pressure swing adsorption (PSA) nitrogen gas generator is a device that supplies nitrogen gas. The generator uses the properties of adsorbents and a repeating cycle of pressurization and depressurization to adsorb oxygen from the air to generate nitrogen on a continual basis. The Taiyo Nippon Sanso Nitrocube® RE-LT Series nitrogen generators use a new adsorbent that conducts separation efficiently, even at raw air press of less than 0.7 MPa. The RZ Series of nitrogen generators is equipped with a new feature called Heat Drive that provides reliable production gas even at high temperatures in the surrounding area.

Nitrogen gas supply system for laser processing equipment (LT-F)

TNSC Solutions Provided through More Efficient Nitrogen Production Equipment

We use nitrogen production equipment at the point of demand to produce and supply nitrogen to customers who consume large volumes of nitrogen gas. This equipment uses a non-fluorocarbon process that eliminates the use of chlorofluorocarbon (CFC) refrigerators that had been necessary in the former manufacturing process. The JN model is equipped with standard noise-reduction measures, while the MG model is a highly efficient unit that improves nitrogen yield by improving the process. This MG model also reduces the power per unit required for gas production by approximately 20% compared to the previous equipment offered by Taiyo Nippon Sanso Corporation. Furthermore, this large-volume model provides power savings of nearly 30% compared to older models.

This nitrogen production equipment can also produce an appropriate amount of oxygen gas for customers who are large users of nitrogen gas and who also use oxygen gas. This feature eliminates the need to ship oxygen gas by tanker truck, as had been necessary in the past, contributing to a more reliable supply and greater transportation efficiency.

Nitrogen generator

TNSC Sun Cutter® Fuel for Gas Cutting Reduces Environmental Impact and Improves Work Efficiency

Gas cutting is a method used widely for cutting steel using flammable gas and oxygen. Taiyo Nippon Sanso Corporation has developed and markets the Sun Cutter® HL-1, which uses hydrogen as the main combustible gas. The product is defined by its low environmental impact, emitting almost zero carbon dioxide, and low radiant heat, making for a more comfortable operating environment. In addition to environmental performance, Sun Cutter® HL-1 offers superior cutting performance at 1.4-times the speed of conventional products, reduced heat distortion, and improved cutting surface quality.

Sun Cutter® HL-1 in use

TNSC VPSA Biogas Purifier

Vacuum pressure swing adsorption (VPSA) biogas purifiers use vacuum regenerative PSA technology to recover methane gas and carbon dioxide from biogas. These purifiers can produce methane gas at over 90% purity and carbon dioxide concentrations of more than 99%. VPSA biogas purifiers are used as a source of biogas for sewage treatment and other small- and medium-sized distributed treatment facilities.

The highly pure methane gas separated and refined from biogas is used as an alternative fuel to city gas in power generation equipment and boilers. This use as alternate fuel contributes to global environmental conservation as a carbon-neutral, locally produced/locally consumed energy source.

At the same time, the purified carbon dioxide generated by VPSA biogas purifiers can be used as a raw material for liquefied carbon dioxide gas, used for algae and agricultural applications (CCU), or used for carbon dioxide storage (CCS).

VPSA biogas purifier

TNSC Bistranza® Food Technology Contributes Solution to Food Waste

The Group has a long track record in food technologies, starting in 1962 with the introduction of technology for rapid freezing by a continuous freezer unit. This technology has been refined over many years and commercialized under the Bistranza® brand. In addition, the past few years have seen a rapid uptake of modified atmosphere packaging (MAP) in major convenience stores and supermarkets. By injecting gases used for food preservation, such as nitrogen, into food packaging, food can be kept fresh for longer without the use of chemical preservatives. Expiration dates can be extended significantly, reducing food waste due to expiration as well as energy used in waste processing, ultimately reducing CO_2 emission.

Liquid nitrogen tunnel freezer Bistranza-FZT

TNSC Gas Exchange Equipment Helping to Reduce Food Loss

MAP has seen rapid uptake in the food industry. By injecting gases such as nitrogen into food packaging, food can be kept fresh for longer without the use of chemical preservatives. Expiration dates can be extended by 1.5 to 3 times, reducing food waste due to expiration as well as energy used in waste processing, ultimately reducing CO_2 emissions.

MAP technology Bistranza® MAP enables food to be kept fresh for longer

NGE Supply of High-Purity Oxygen for Salmon Farming in Norway

Increasing the oxygen concentration in fish ponds promotes the growth and vitality of farmed fish. In addition, injecting nitrogen gas during package sealing is an effective means to maintain freshness during food processing. NGE has installed two ASUs to meet demand for industrial gases in Norway, which has a flourishing fisheries industry. As global demand for fish increases, Norway expects to grow its farmed salmon production by an average of 6% annually.

Norwegian marine aquaculture facility

Thermos Contributions to Energy Conservation with World-Renowned Proprietary Vacuum-Insulation Technology

The Thermos business of subsidiary Thermos K.K. capitalized on its vacuum-insulation technologies cultivated in the industrial gases business to develop the world's first stainless steel vacuum-insulated bottle in 1978. The Thermos lineup also includes portable vacuum-insulated mugs for hot and cold beverages and sports-use vacuum-insulated beverage bottles, as well as the Shuttle Chef® series of vacuum-insulated thermal cooking pots, which continue to cook food with residual heat after being heated for only a short time. All of these products have earned certification under Japan's Eco Mark program.

In line with its goal of providing solutions that enhance lifestyles and are environment friendly, Thermos continues to promote the development of a variety of products that reduce resource use and contribute to environmental protection.

Shuttle Chef®

Sports-use vacuum-insulated beverage bottles

Asia and Oceania Products and Services That Contribute to the Environment for Asia and Oceania

In Asia and Oceania, where significant economic growth is expected, we are developing products and services that contribute to the environment. This effort targets various industry sectors, including welding and insulated windows. In addition to contributing to the environment, we are also expanding our products and services that contribute to social issues such as food loss and healthcare front lines.

	Application	Major Countries and Regions
Products and services that contribute to the environment	Blast furnace (Oxygen)	Singapore
	Electric furnace (Oxygen)	Thailand, Philippines, Vietnam, and China
	Welding (Argon and helium)	Singapore, Thailand, China, Vietnam, Philippines, and Australia
	Filling inside multilayered glass windows (Krypton)	Philippines
	Combustion exclusion devices	Taiwan
Products and services that contribute to society	Food freezing and preservation (Nitrogen)	Thailand, Australia, Philippines, Myanmar, and Malaysia
	Aquaculture (Oxygen)	Philippines, Thailand, Vietnam, and Myanmar
	MRI equipment (Helium)	India, China, and Singapore
	Medical (Oxygen)	India, Myanmar, Australia, Philippines, Thailand, and Singapore

Improvements in Product and Service Reliability

NSHD Quality Management System

The main products of the Group are oxygen, nitrogen, argon, the air separation unit to produce these gases, and facilities to store and supply them. In addition, we provide semiconductor-related equipment and construction work, medical gases and equipment, helium gas, and hydrogen gas. Group companies involved in these businesses have acquired ISO 9001 certification, which is the international standard for quality management systems.

At the same time, we strive to raise customer satisfaction and make continual improvements through the effective operation of these systems. Taiyo Nippon Sanso Corporation acquired ISO 9001 certification for its sales and logistics departments related to liquid oxygen, liquid nitrogen, liquid argon, and specialty gases. The company leverages this certification not only in product quality but also in establishing systems and support for the reliable supply of these products. In addition, the Taiyo Nippon Sanso Group has established an internal system we call the accreditation system for analysis ability of industrial gas manufacturing plants. We apply this system to production plants that analyze and ship industrial gases, including oxygen, nitrogen, argon, hydrogen and helium. The purpose of this system is to maintain and improve the accuracy of analyses by certifying facilities possessing a certain level of analysis and control technology.

As of March 2021, 108 Nippon Sanso Holdings Group companies have acquired ISO 9001 certification. We will continue to strive for the effective operation of our quality management systems, aiming to raise customer satisfaction and accomplish continual improvements.

NSHD Product Safety

In accordance with the Product Safety and Quality Policy to reduce risk throughout the product life cycle and to provide safe and reliable products, the Nippon Sanso Holdings Group established a product safety management system to ensure that customers use its products with peace of mind.

The Taiyo Nippon Sanso Group examines its many products from the early design stages to reduce risks and ensure safety throughout the product life cycle, from manufacture to transport, repair, and disposal. Product safety reviews are conducted, and qualified in-house personnel evaluate product safety, after which a representative of each unit, center or affiliated company issues a Declaration of Conformity for Product Safety. This is the process by which we ensure product safety.

Contributions to Medical Care

TNSC Contribution to HOT

Japan's coming super-aged society is driving demand for a better system of home healthcare. As such, we are taking steps to enhance our home healthcare services, which center on home oxygen therapy (HOT). HOT is a medical treatment involving the provision of high-concentration oxygen using oxygen concentrators, cylinders, and other devices in non-hospital settings used primarily in the management of chronic obstructive pulmonary disease (COPD), a cause of chronic respiratory insufficiency, HOT is also used in the treatment of a variety of other conditions, including interstitial pneumonia and advanced lung cancer. The use of HOT has expanded significantly since it was first approved for coverage under Japan's national health insurance (NHI) program in 1985, with an estimated 160,000 patients currently receiving this therapy. In addition to enabling patients to better balance the demands of everyday life with treatment, there is also strong evidence of additional medical benefits, including prolonged survival, improved mobility, and a reduction in the frequency of hospitalization. In addition to systems for use when patients are at home or out, there is a need for systems that can be used in a variety of everyday situations, including at school and work, as well as when traveling. Moreover, because they are operated by patients or family members, HOT systems must be easy to use to ensure safety and peace of mind.

We promote product development with the aim of addressing diverse needs, with an emphasis on user-friendliness. For example, when HOT patients leave the house, they can transport oxygen cylinders easily using a dedicated cart, but this is shunned by more than a few patients for a variety of reasons, including the weight of portable cylinders and the attention they attract. In response to concerns such as these, we upended conventional ideas of oxygen cylinders with an ultra-compact portable model that can be carried with only a shoulder strap, thus leaving both hands free in an entirely inconspicuous fashion. Other feedback included comments that the oxygen cylinders were complex and difficult to use, and that patients wanted them to last longer. In response, we integrated the cylinder valve with a built-in oxygen regulator that allows oxygen to be delivered efficiently when breathed in, thereby making cylinders last longer. In addition, we extended the continuous usage time and reduced the weight of the unit by combining it with a lightweight conserver. With an increasing number of patients now able to choose home healthcare, we will also continue to promote the development of easy-to-use devices that can be used free of worry and to enhance our supply configuration.

* As of summer 2021, oxygen concentrators are being used in the home and at oxygen stations by patients experiencing respiratory distress in regions where in-home treatment is rising due to the increase in COVID-19 infections.

Ultra-compact portable oxygen cylinder

Oxygen concentrator (Oxywell 5A)

TNSC OXYMED Medical Gas Supply System

Drawing on its many years of business experience in the medical gases field, we analyzed near-miss events* in hospitals to develop the OXYMED medical gas supply system, which has been pursued for safety and ease of use. Our wide-ranging product lineup and detailed service system enables us to provide a high-quality gas supply system.

* Incidents that may not lead to serious disasters or accidents but are one step short of becoming a direct cause of serious disasters or accidents

High-pressure gas manifold

TNSC Water-^{18}O PET Diagnostic Reagent Material

The Company produces Water-^{18}O, a raw material for positron emission tomography (PET) diagnostic reagents, based on the air separation technology we have cultivated to date. PET diagnosis is widely used as a method for the early detection and diagnosis of cancer. Water-^{18}O, or water labeled with ^{18}O, which is an oxygen isotope, is indispensable as a raw material for PET diagnosis. We manufacture Water-^{18}O at three plants in Japan and boast the world's largest production capacity of 600 kg per year. The SI Innovation Center manufactures the final product under a GMP-compliance quality control system, providing a stable supply of high-quality Water-^{18}O to more than 40 countries. Incidentally, Water-^{17}O, which we produce at the No. 3 plant in Shunan, Yamaguchi Prefecture, is expected to be used as a magnetic resonance imaging (MRI) contrast medium in the diagnosis of a variety of brain diseases.

Stable isotope Water-^{18}O

TNSC Contribution to Bioresearch Development

Since induced pluripotent stem (iPS) cells were invented in 2008, we have seen a continued acceleration of R&D in the field of regenerative medicine using human cells. The practical implementation of regenerative medicine requires technology for the reliable management of high-quality cultured cells and the cryopreservation of large quantities of living cells, vaccines, and blood. Taiyo Nippon Sanso Corporation, Japan's sole manufacturer of liquid nitrogen cryopreservation vessels, develops technologies in areas that include regenerative therapy and biomedicine, delivering a lineup of diverse products.

Taiyo Nippon Sanso Corporation has achieved a roughly 50% share of the market (cumulative sales basis) for cryopreservation vessels used in the cryopreservation of biological samples with liquid nitrogen. Leveraging its strengths as Japan's sole manufacturer of this product, the company has developed a fully automatic cryopreservation system called CryoLibrary® ADVANCE, meeting a wide range of cryopreservation needs.

Liquid nitrogen cryopreservation system

CryoLibrary® ADVANCE

NGE Care Center in Spain for Patients Using Home Respiratory Equipment

Oximesa S.L.U. is a subsidiary of NGE that provides home healthcare and other medical services. The company operates two care centers for home healthcare patients in Spain. The care centers allow patients to register for home respiratory therapy services. Patients may request to have their medical equipment checked on a regular basis and receive technical support if any issues arise. Once the COVID-19 pandemic subsides, patients will be able to attend in-person trainings to help improve their quality of life. The program has received high praise from all users, who appreciate direct access to home respiratory therapy professionals.

Care center in Coruña

Intellectual Property Activities and R&D

NSHD Strategic Acquisition and Retention of Intellectual Property

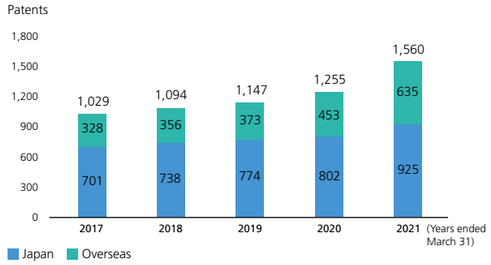
Nippon Sanso Holdings recognizes that intellectual property is an important corporate asset. We strive to acquire and retain intellectual property in a strategic manner, aiming to secure a competitive advantage in business that contributes to earnings and global growth. In accordance with the principles of legal compliance, we respect the valid intellectual property rights of third parties, exercising care to avoid infringement. We also take appropriate action against any infringement of our intellectual property rights by third parties.

We are engaged in applied research across a variety of fields, including research in advanced fields, building on the proprietary technologies we have developed over the more than 110 years since our founding. We will continue our efforts to strengthen intellectual property, supporting our growth as a global group.

NSHD Intellectual Property Management System

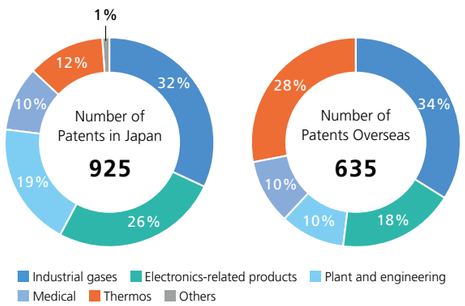
Nippon Sanso Holdings aims to strengthen the Group's comprehensive capabilities and achieve sustainable growth on a global scale. In this pursuit, we encourage collaboration among operating companies to ensure the appropriate acquisition, management, and utilization of intellectual property throughout the Group. The Global Strategy Review Committee, chaired by the President CEO, meets on an annual basis to determine important policies for managing technical risks, including risks related to security, product quality and safety, the environment, and intellectual property. Each operating company formulates and implements plans for the fiscal year based on these policies.

NSHD Patents in Japan and Overseas



* Figures for 2017 through 2019 are as of December 31. Figures for 2020 and 2021 are as of March 31. Figures through 2020 represent Taiyo Nippon Sanso Corporation patents only. The figure for 2021 represents the total for all NSHD Group operating companies combined.

Ratio of NSHD Patents by Business in Japan and Overseas



TNSC Overview of Research Labs and Research Topics

Taiyo Nippon Sanso Corporation pursues the potential of gases, conducting R&D to create new demand for gases. Each laboratory continues to take on new challenges in technology development, based on a wealth of expertise and experience, to offer new solutions that answer the needs of our customers. The Yamanashi Laboratory and Tsukuba Laboratory serve as global R&D hubs, engaging in new R&D related to our foundational industrial gases business, the Electronics Business, On-Site Plant Business, and Medical Business. Furthermore, these facilities are taking on the challenge to develop technologies for new materials, additive manufacturing, composite semiconductor manufacturing equipment, and other new businesses. The SI Innovation Center is a facility dedicated to the R&D of stable isotopes.


Yamanashi Laboratory


Tsukuba Laboratory


SI Innovation Center

TNSC AM Technology Research

AM is an additive manufacturing technology based on 3D printing, considered to be one of the core areas of the Fourth Industrial Revolution. This technology is attracting attention on a global scale, as it is expected to contribute to a sustainable society by bringing innovation to supply chains. Taiyo Nippon Sanso Corporation identified metal AM as a priority area, opening the AM Advanced Room within its Yamanashi Laboratory as a center for the development of AM-related technologies and businesses. The facility focuses on the development of AM molding technology in general, and is equipped with a wide range of the latest in 3D printer equipment, including the VELO3D Sapphire, as well as the company's own proprietary 3DPro® metal AM solution.

AM Advanced Room

MTG Advanced Technology Center R&D

MTG is expanding its footprint in the field of electronics, conducting R&D activities in its Advanced Technology Center located in Longmont, Colorado. In particular, the semiconductor market looks promising over the long term. In response, the company is developing semiconductor manufacturing tool supply equipment, as well as technologies for the manufacture, refinement, analysis, and equipment manufacturing technologies related to highly refined gases.

The results of these development activities have contributed to business through new products and by improving the quality of existing products at production plants in the United States and South Korea. Advanced Technology Center staff exchange ideas and build relationships with personnel from the Tsukuba Laboratory of Taiyo Nippon Sanso Corporation.


Advanced Technology Center

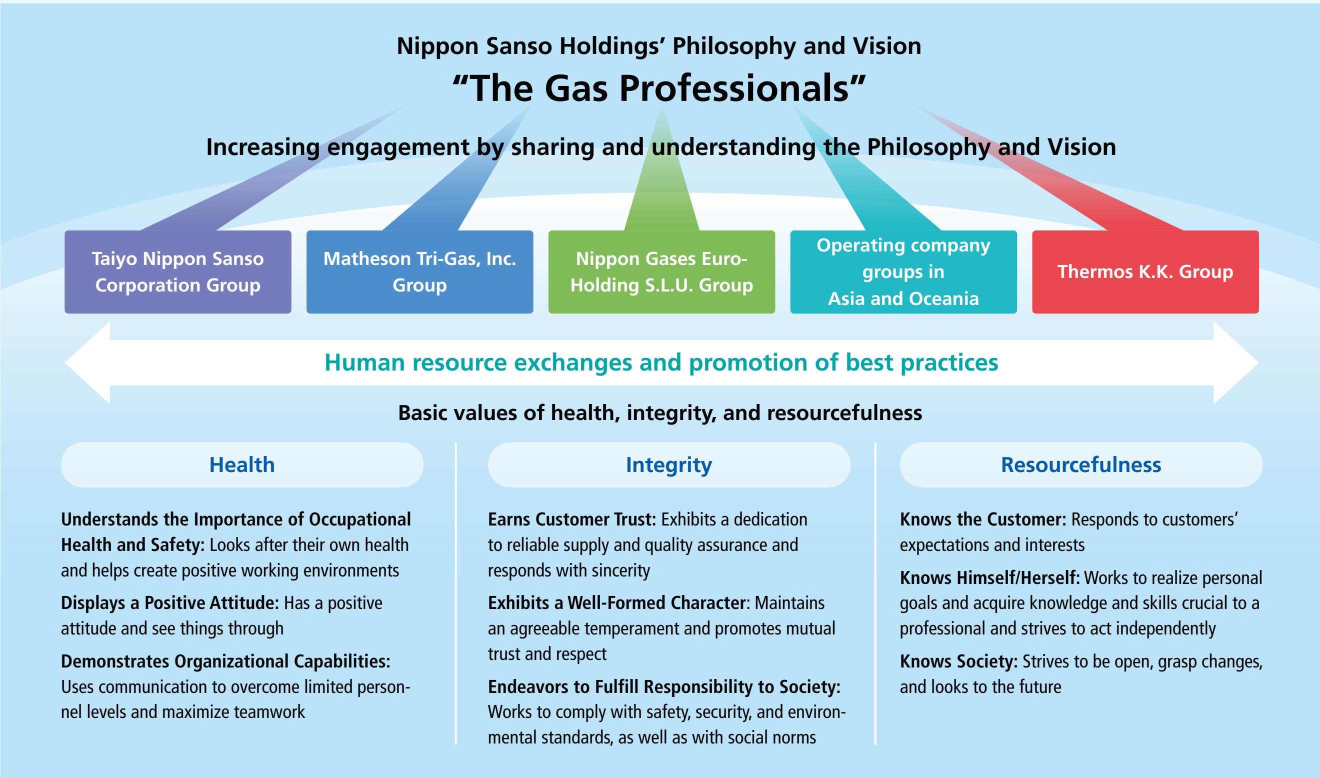
People (The Company and Its Organizational Structure)

Human resources are indispensable for the sustainable growth of a company. The Nippon Sanso Holdings Group operates the industrial gases business and the Thermos business, divided into four geographic hubs. Non-Japanese employees account for nearly 70% of our workforce on a consolidated basis, and the Group continues to become increasingly multinational. Remaining sensitive to the values and cultures of each region, we have established a system for fostering human resources to achieve our Group Vision as one. We intend to continue to interact closely with our employees and our stakeholders, including our supply chains, customers, shareholders, and investors, earning their trust and striving together for a better society.

NSHD Basic Concepts behind Human Resources Development

We selected "The Gas Professionals" as the tagline representing the philosophy of the Nippon Sanso Holdings Group. In developing "The Gas Professionals" who have a sense of mission to society and the earth, we emphasize the key personal qualities of health, integrity, and resourcefulness. These values have been handed down from generation to generation since the days of our predecessor, the former Taiyo Nippon Sanso Corporation. Health, integrity, and resourcefulness are qualities held in common among all Group companies, including the globally active Thermos. We will strive to communicate these concepts within each operating company based on the essence of health, integrity, and resourcefulness, tailored to reflect the unique values of each company.

In fulfilling our social responsibilities as a group, we believe that "sincerity" is a particularly important element of the concept of "integrity" included among these three qualities. We believe that securing, cultivating, and engaging with human resources in our Group who, based on a foundation of sincerity, are open to diversity and regional differences in values, customs, cultures, gender identity, races, and other qualities and perspectives, is vital toward creating a comfortable future for humankind, society, and the earth.

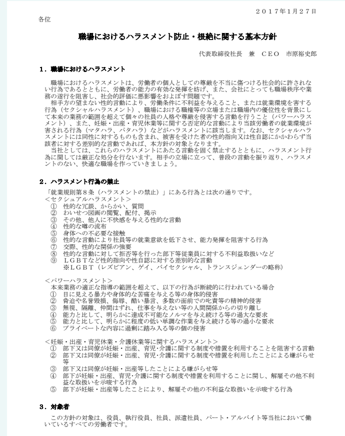


NSHD Respect for Human Rights

In conjunction with the adoption of a holding company structure in October 2020, Nippon Sanso Holdings reviewed existing policies and standards of conduct from a global perspective. As a result, we established several policies and standards in February 2021. Within these policies and standards, we reaffirmed the importance of human rights in conducting corporate activities and our support of the spirit behind internationally accepted norms, such as the Universal Declaration of Human Rights. We reconfirmed that we respect human rights and strive to create appropriate work environments. Through these affirmations and others, we will fulfill our social responsibilities as a corporate citizen (see page 176).

TNSC Stronger Anti-Harassment Measures

The Power Harassment Prevention Act (Revised Act on Comprehensive Promotion of Labor Policies) came into effect in June 2020. This revised act strengthened measures to prevent harassment in the workplace. In January 2017, Taiyo Nippon Sanso Corporation established the Policy on the Prevention and Eradication of Harassment in the Workplace to create healthy workplaces that encourage respect for personal character and individuality. Under this policy, we take strict disciplinary action against any acts of harassment, and we strive to create comfortable, harassment-free workplaces that foster mutual respect. Ongoing training is another important part of strengthening anti-harassment within the Group.



Dissemination Policy (Excerpt)

NSHD Safety Meetings

The Nippon Sanso Holdings Group holds regular safety meetings. The meetings are attended by safety and operations managers from each of the four global geographic hubs to provide information and exchange opinions on ways to improve the level of safety across the Group. The meeting includes hazard simulation training at the Technical Academy (see page 146), Job Safety Analysis (JSA) workshops, and case studies related to accidents and good practices from each company. We will continue to hold this meeting once a year, depending on the situation with COVID-19, to promote safety throughout the Group.

4th Annual Safety Meeting attended by safety and operations staff from around the world.

TNSC Training by Experience Level (First Year to Fifth) Basic Education

Taiyo Nippon Sanso Corporation provides a unique training system that covers basic training for employees throughout their first five years of employment. New employees begin with a three-month training program, and then experience annual training in each of their first five years in the company. The purpose of this training is to provide employees with a deep understanding of the characteristics of the industrial gases business as well as the awareness and sense of mission for maintaining gas supplies at all costs. Training includes the basics in non-technical aspects across the organization, regardless of whether the employee is assigned an administrative or technical position. Through five years of basic training, employees become aware of their role as "The Gas Professionals" and contribute actively to various fields.

Training Overview

- First Year **Training for new recruits**: In a three-month group training program, employees tour research laboratories and production facilities to learn about the front lines of our business.
- Second Year **Followership training**: Employees learn the skill of expressing information clearly as a follower and develop communication skills.
- Third Year **Training in logical thinking**: Employees acquire logical thinking and presentation skills.
- Fourth Year **Finance training**: Employees learn how to read essential financial figures for business, acquire basic financial knowledge, and gain an understanding of the correlation between their work and figures.
- Fifth Year **Strategy and marketing training**: At the culmination of five years, employees form teams to propose and present management strategies.

TNSC Global Human Resources Selection and Development Training

We introduced this program in 2007 to enable employees who are capable of functioning in a global business environment to learn the necessary skills for playing an active role both in Japan and overseas. The training is conducted entirely in English by instructors who are foreign nationals and encompasses seven sessions, including final presentations, held over approximately six months. It covers such topics as mindset, logical presentation skills, business model generation, case studies, negotiating proficiency, and leadership skills. In addition to improving language capabilities, the training seeks to cultivate the confidence and presentation skills necessary to express one's own opinions clearly and effectively whenever and wherever necessary.

Global employee selective training

TNSC Overseas Trainee Program

Launched in 2016, the overseas trainee education program aims to develop human resources who can contribute quickly after arriving at their assignments overseas. This program consists of a year of on-the-job training at an overseas Nippon Sanso Holdings Group company, offered mainly to employees between their fifth and tenth year of service. The program is voluntary, and any employee wishing to participate is provided a chance to work overseas. This environment of encouraging and supporting employees who seek new experiences is a unique feature of Taiyo Nippon Sanso Corporation.

Overseas Trainee Program

TNSC Establishment of a Helpline

Taiyo Nippon Sanso Corporation established a helpline for the early detection and correction of compliance violations. The company investigates each report, considerate of privacy protection issues. Corrective actions and recommendations are made, leading to improvements and measures to prevent recurrence of the issue in question. The specific operation of the helpline is provided in the helpline guidelines, and we ensure that whistleblowers are not subject to unfair treatment as a consequence of their report.

TNSC Employment of People with Disabilities

Taiyo Nippon Sanso Corporation strives to provide recruitment information to as many people with disabilities as possible. After joining the company, employees with disabilities make contributions across a wide range of positions, including general affairs, administration, accounting, sales, logistics, technical management, production management, R&D, and engineering. As of June 1, 2021, employees with disabilities accounted for 2.47% of all company employees, exceeding the legally mandated employment rate of 2.30%. We will continue to foster a corporate culture in which employees understand and respect each other, aiming to create workplaces in which every employee works with vitality and enthusiasm.

NGE Management Development Training

NGE completed its management development training program in June 2021, which was first launched in February 2020. Despite a temporary delay due to the spread of COVID-19, NGE completed the program by converting the course to online training. Participants worked on a variety of projects, and those deemed as having the most impact are scheduled to be presented to NGE management.

NGE One-Year Training Program for New Employees in Norway

In November 2020, Nippon Gases Norge AS (Norway) began the Young Professional online training program for employees aged 35 or younger (approximately 18% of the workforce). The purpose of the program is to share knowledge and information about the business as well as to create a forum for newer employees to interact with each other. The program will continue over the next few months, with four sessions scheduled per year. The sessions are structured based on employee input.

NGE Digital Skills Improvement Project

The IT and human resources departments in NGE came together to form the Collaborative Digital Champions (CDC) Team. This team serves as a location to teach how commonly used digital tools may be utilized more effectively. Participants come from all over Europe, returning home to their colleagues and sharing this new knowledge. Former participants have reported back that they are making the most of what they learned from the CDC Team.

NGE Events to Consider Employee Diversity

NGE held a special diversity week, conducting a number of events and meetings to consider employee diversity. The goal of this week was to raise awareness for a culture of diversity that appreciates the talents of employees regardless of sexual orientation, age, gender identity, or other attribute. Week events focused on LGBTI, generational, and gender diversity issues.

Diversity Week logo

NGE Employee Engagement Survey Reveals 86% "Highly Engaged"

NGE conducted an employee engagement survey in May 2020, which revealed that 86% of respondents (81% response rate) are "highly engaged" with their work. This result is higher than the average for the chemicals industry and qualifies NGE as a high-performance company. Comments from long-term employees indicate appreciation for support from colleagues and being treated as "a member of the family" since early in their careers.
(Chairman and President Elejoste also mentions the survey. Please refer to page 101.)

Employee Engagement Survey

Category	Safety	Corporate Social Responsibility	Diversity	Sustainable Engagement	Empowerment	Global Satisfaction	Quality	Compliance
Score	95	88	88	86	85	82	82	81

* Score represents the percentage of employees who rated each category as "favorable" or "very favorable."

NSHS Leadership Development Program for the Next Generation of Leaders and Key Managers

Nippon Sanso Holdings Singapore Pte. Ltd. (NSHS) will roll out two leadership development programs beginning in FYE2022 to encourage the development of leadership among the next generation of leaders and key managers. The Nippon Sanso ASEAN+ Leaders Sandbox VR© is a two-year leadership development program that runs from April 2021 to December 2022. Under the catchphrase, *Manage Yourself, Lead Others*, the program covers global trends through content encompassing business strategy, engineering, safety, compliance, and human resources. Participants also have the opportunity to take part in a leadership development program known as the C-Suite-LED-Talk series. In this series, participants will learn about business strategy, business process strategy, and human resources strategy.

April 2021 webinar

NSHS Establishment of a Human Resources Platform in Asia

NSHS established the ASEAN+ HR* Community of Practice to share achievements and best practices from the past year to raise the skill level of the community of human resource professionals in the Asian region. NSHS designed and developed three competency models that will be used as a guide in building employee competencies. This unique platform allows community members to comment on and "like" posts from other members. In this way, NSHS encourages constructive feedback and suggestions related to human resources.

* Human resources training

Collage of participants in the ASEAN+ HR Network Meeting 2021

NSHS Annual ASEAN Learning Festival

NSHS sponsors the annual ASEAN Learning Festival to encourage employees to take part in lifelong learning. The company invites outside speakers to address participants visiting from across Asia. Throughout the festival, participants are encouraged to develop themselves to remain competitive and relevant.

Participants in the 2nd Annual Learning Festival 2020

NSHS KOPI Quarterly Webinars

NSHS began holding Keep Our People Interactive (KOPI) webinars in August 2018 as a means to update employees about human resources policy changes due to government labor laws and legislation. The KOPI webinar serves as a two-way communication channel for employees to provide feedback on human resources policies, human resources processes, and related matters.

KOPI webinar held in 2019

NSHS Annual Unity in Diversity Campaign

In August 2018, NSHS held its first Unity in Diversity campaign across the region. The campaign has become a foundation for employee engagement strategy in the region. In 2019, NSHS worked with its subsidiaries in Asia to produce a video under the concept, *Unity in Diversity Starts with Us.* To transition Unity in Diversity to a more collaborative activity, NSHS developed the Intercultural Awareness program series in 2020, releasing content via monthly webinars.

Monthly webinar

MTG 24/7 Telemedicine Services

MTG adopted Horizon CareOnline, a medical service accessible from the comfort of one's home to avoid the risk of COVID-19 infection arising from outside travel or crowded waiting rooms. Employees can consult doctors 24/7 regarding various ailments, including abdominal pain, fever, colds, and flu, as well as issues related to ear, nose, and throat conditions or dermatology. Registration is available through the app or website, and qualified doctors are on call via video, phone, or chat. Urgent care services are provided by U.S. board-certified and licensed physicians with an average of 15 years of experience in primary care or urgent care. Patients can read physician profiles and reviews before deciding on a healthcare provider.

Sustainability Topics:
People (The Company and Its Organizational Structure)

MTG Scholarship Program for Children of Employees

MTG has established a scholarship program to assist the children of employees who plan to attend a university or technical school. The company offers annual scholarships for students to study at their selected institute of higher learning. The scholarship program is administered by Scholarship America®, the largest presenter and administrator of scholarships in the United States, and supports tuition and other educational assistance through programs designed for corporations, foundations, associations, and individuals. Scholarships are awarded without regard to race, color, creed, religion, sexual orientation, age, gender identity, disability, or national origin.

Thermos Standardized Quality Inspection Training in Japan and Overseas

Thermos K.K. conducts rigorous quality inspections to ensure that customers use the company's products with confidence. One example is the 40-centimeter drop standard under Japanese Industrial Standards (JIS) for testing Thermos bottle durability. In contrast, Thermos conducts drop tests from a height of 70 centimeters, considering the height of tables and other objects in the home. Thermos provides training to quality inspectors based on internal standards. Training includes videos (available via PC and other means) of inspection procedures and methods to help inspectors improve their skills. By standardizing training in Japan and overseas, Thermos maintains its ability to deliver high-quality products consistently to the world.

Standardized quality inspection training in Japan and overseas

TNSC Pursuit of Health Management and Work-Style Reform

Taiyo Nippon Sanso Corporation believes that a focus on employee work styles and health is part of its management strategy for enhancing individual skills, improving productivity, and increasing corporate value. Therefore, we encourage health management for better mental and physical health, aiming to become a corporate group in which every employee works with vitality. We will continue to pursue health-related initiatives to maximize the contributions of our employees, whom we believe are one of the most important assets of a corporation. In conjunction with our efforts, we formulated the Health Management Declaration to serve as a health management code of conduct.

Health Management Declaration

Becoming a Company in which Employees Work with Vigor and Vitality

Health is one of the qualities and conduct under the key employee qualities and conduct of health, integrity, and resourcefulness. We have declared our commitment to foster a health-first culture in recognition that employee health is the driving force behind all we do, and through this culture, we encourage sound management and contribution to the creation of a prosperous society.

We also recognize that the mental and physical health of every employee is an asset to the company. Therefore, we strive to create safe and comfortable workplaces.

We want our employees to understand that their own health and the health of their families are the driving force behind their work and home life. Employees are asked to take responsibility for maintaining and improving their own health as well as to participate in fostering a health-first corporate culture.

TNSC Wearable Devices for Greater Health Visibility

In FYE2018, Taiyo Nippon Sanso Corporation began distributing wearable wristband devices to provide employees with greater visibility for individual health-related data. These devices provide information related to step count, heart rate, sleep time, calories burned, and more, motivating employees to become more health conscious through an understanding of their day-to-day health status. As of March 31, 2021, approximately 1,600 employees wear these devices on a regular basis. In July 2018, the company introduced a points system for walking, allowing users to convert their daily step count into points redeemable for various services, or to donate the points to the Japanese Red Cross Society or other charitable organization. In this way and others, we will continue to make health management more enjoyable for our employees.

Distributed wearable devices

TNSC Online Mental Healthcare Training

Taiyo Nippon Sanso Corporation has introduced an employee assistance program (EAP) conducted by external specialists who provide outside counseling. At the same time, the company endeavors to improve employee mental healthcare, offering internal programs to support employees returning to work.

Number of Employees Participating in Mental Healthcare Training

	Middle Managers	Senior Managers
FYE2015	25	38
FYE2016	37	38
FYE2017	32	24
FYE2018	32	28
FYE2019	35	29
FYE2020	37	32
FYE2021	32	31

TNSC Designated as a 2021 Health & Productivity Management Outstanding Organization (Large Enterprise Category) ("White 500")

Taiyo Nippon Sanso Corporation was certified as "White 500" (Large Enterprise Category) under the 2021 Certified Health & Productivity Management Outstanding Organizations Recognition Program administered by the Ministry of Economy, Trade and Industry (METI) and Nippon Kenko Kaigi. We were recognized for our initiatives based on three areas of health: Self, Workplace, and Family/Community. Specific reasons for our selection included our distribution of wearable devices for step counting and sleep monitoring, sessions for employees to measure their physical condition at work, and on-demand health seminars available to employees and their family members.

White 500 certificate

TNSC Work-Style Reforms Designed to Create Positive Work Environments for All Employees

Taiyo Nippon Sanso Corporation strives to create a workplace comfortable for all employees. To this end, the company has established a variety of systems that allow employees to take advantage of work styles that best suit them.

Systems include shortened work hours after returning from childcare leave, as well as paid leave to care for sick children of elementary school age or younger, for childcare assistance, for participation in school events, and for home nursing care for relatives. The company also offers a program under which employees may take a total of up to 365 days of nursing care leave.

In FYE2018, Taiyo Nippon Sanso began offering a leave of absence program for employees returning to work after coming back to Japan with a spouse who had been on an overseas assignment. Other programs include reemployment rules for employees who resigned due to pregnancy, childcare, or nursing care. In FYE2019, the company began recognizing annual paid leave in one-hour increments, and in October 2019, certain company locations adopted a flextime work system. In this way, Taiyo Nippon Sanso strives to achieve work-style reform through flexible work arrangements.

As of September 1, 2021, the company has recommended staggered hours using flextime to reduce the risk of COVID-19 infection during rush-hour commutes on public transportation.

Number of Employees Using Systems Designed for a More Comfortable Work Environment

		FYE2018	FYE2019	FYE2020	FYE2021
Special maternity leave before/after birth		2	4	4	9
Childcare leave		7 (Female employees: 7)	7 (Female employees: 5)	7 (Female employees: 7)	16 (Female employees: 10)
Reduced working hours		12 (Female employees: 12)	12 (Female employees: 12)	14 (Female employees: 14)	14 (Female employees: 14)
Flextime		0	1 (Female employees: 1)	2* (Female employees: 1)	—*
Special childcare leave	Cumulative number of individuals	39 (Female employees: 25; male employees: 14)	75 (Female employees: 46; male employees: 29)	119 (Female employees: 70; male employees: 49)	87 (Female employees: 28; male employees: 59)
	Cumulative number of days	52.0 (Female employees: 34.0; male employees: 18.0)	52.5 (Female employees: 33.0; male employees: 19.5)	100 (Female employees: 59.5; male employees: 40.5)	69.0 (Female employees: 23.0; male employees: 46.0)

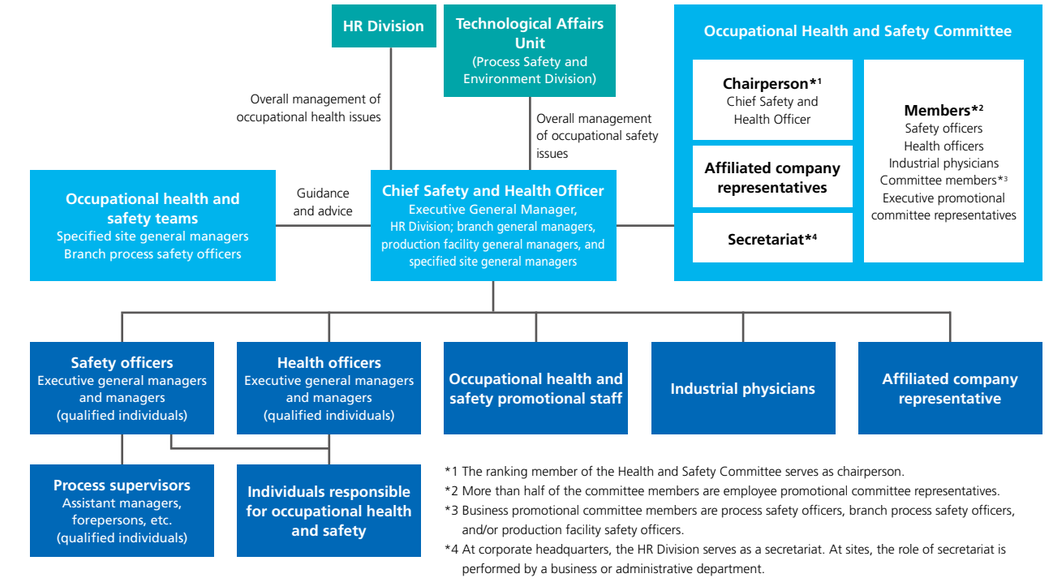
* The number of employees using flextime represents the number of employees using the childcare flextime system. Separately, one person (male) exercised nursing care flextime (not included in the count above). As of October 2019, flextime has been available at each office within the head office and other locations, so the numbers of employees using flextime at these offices is not included in the system.

In addition, in February 2020 we began encouraging employees to work on a staggered basis, using flextime as a response to COVID-19, and we have not tracked the number of employees using flextime since that time.

TNSC Occupational Health and Safety

Taiyo Nippon Sanso Corporation conducts health and safety activities based on Rules for Occupational Health and Safety. Each workplace establishes its own safety and health management organization based on these regulations, holding safety and health committee meetings. Each workplace also implements comprehensive and consistent safety education, morning meetings, hazard prediction activities, and "5S" (sort, set in order, shine, standardize, sustain) campaigns with the goal of zero lost time accidents. In addition, the company distributes materials from the Japan Industrial Safety and Health Association (JISHA) in the form of the Safety and Health News electronic newsletter to raise employee awareness of occupational safety.

Site Occupational Health and Safety Management Framework



*1 The ranking member of the Health and Safety Committee serves as chairperson.
*2 More than half of the committee members are employee promotional committee representatives.
*3 Business promotional committee members are process safety officers, branch process safety officers, and/or production facility safety officers.
*4 At corporate headquarters, the HR Division serves as a secretariat. At sites, the role of secretariat is performed by a business or administrative department.

TNSC Support for Labor Union Activities

The Taiyo Nippon Sanso Employees' Labor Union, established in May 2005, concluded an agreement in October 2005 to make Taiyo Nippon Sanso a union shop. The policy of Nippon Taiyo Sanso Corporation on consultation and negotiation is to disclose as much information as possible to the Taiyo Nippon Sanso Employees' Labor Union and to deal in good faith. Taiyo Nippon Sanso Corporation maintains sound labor–management relations, and the company hopes to continue working together diligently with the union for mutual development.

NSHD Communication with Shareholders and Investors

Results of Main IR Activities

In addition to returning profits to shareholders, we aim to improve management transparency through dialogue with shareholders and investors. At the same time, we strive for the timely disclosure of corporate and financial information.

Total Number of Dialogues	FYE2020	FYE2021
For investors in Japan	159	**156**
For investors overseas	116	**112**
Total	275	**268**
Including ESG-related media coverage	12	**17**

First Quarter (Apr. to June 2020)
Full-year financial results presentation for FYE2020*
Second Quarter (July to Sep. 2020)
SMBC Nikko Securities Domestic Conference* (Japan)
Third Quarter (Oct. to Dec. 2020)
In conjunction with the launch of Nippon Sanso Holdings, we expanded the corporate website and IR page, held an online IR seminar for individual investors, published Integrated Report 2020 (Japanese/English), created new corporate and sustainability websites, and participated in the Nomura Securities Co., Ltd., Domestic Conference (Japan)*.
Fourth Quarter (Jan. to Mar. 2021)
Created and published IR policy, participated in the Daiwa Securities Co., Ltd. Domestic Conference (Japan)*, participated in Nomura Securities Co., Ltd., Domestic IR Conference (Japan)*, participated in the BofA Securities, Inc., U.S. Conference, and participated in the SMBC Nikko Securities Domestic IR Conference (Japan)*

* Held online

Financial Results Presentations

We use visuals in our financial results presentations to help deepen an understanding of our business, our performance, and our future prospects.

Financial results presentations for analysts and institutional investors
* Beginning in February 2020, we moved our financial results presentations online to prevent the spread of COVID-19.

Operating Site Visits

We conduct regular tours of our plants and laboratories to foster a deeper understanding of the Group's business.

Plant tour for analysts and institutional investors at an overseas operating site
* We have suspended tours since February 2020 to prevent the spread of COVID-19 infections.

Corporate IR Seminar for Individual Investors (Online)

After launching Nippon Sanso Holdings on October 1, 2020, we held a corporate seminar in November 2020 with au Kabucom Securities Co., Ltd., of the Mitsubishi UFJ Financial Group, Inc., as part of our IR activities for individual investors and to raise awareness of our new corporate name. In August 2021, we held a corporate seminar together with Nomura Investor Relations Co., Ltd., of Nomura Holdings, Inc., where we provided an overview of the Group's businesses, growth strategy, and recent earnings performance.

Takayoshi Umehara, general manager, Investor Relations, Group Finance and Accounting Office, giving a presentation

President CEO Hamada Appeared Live on the "Ask the Top" Segment of Nikkei CNBC Morning Express

In August 2021, Nippon Sanso Holdings Group President CEO Toshihiko Hamada appeared live on the "Ask the Top" segment of Nikkei CNBC Morning Express. During the segment, Mr. Hamada discussed our group strategy for supplying industrial gases and other products, as well as strategies focused on value-added services that answer customer needs such as reducing environmental impact.

Nippon Sanso Holdings Group President CEO Hamada during his live television appearance

Participation Nomura IR Fair 2021

In January 2021, we participated in the Nomura IR Asset Investment Fair 2021, which was held online. The fair is one of the largest IR events in Japan, and many publicly traded companies and investment trust management firms exhibit, conduct seminars, and sponsor lectures from prominent industry figures. The 2021 even was held online due to the spread of COVID-19.

IR Policy

In February 2021, we established an IR policy based on the concept of fair disclosure, expanding on the disclosure policies already in effect. Our intent with this policy is to achieve sustainable growth and enhance corporate value over the medium to long term. This IR policy communicates our basic stance on IR activities, IR information disclosure policy, initiatives related to IR activities, methods and procedures for timely disclosure, and quiet period for IR activities (see page 177 for details).

Professor Hideaki Kobayashi,

Tohoku University

Message from a Stakeholder

Expected Performance as a Leader in the Drive for Carbon Neutrality

Taiyo Nippon Sanso Corporation provides supplies of industrial gases, but it is also expanding operations in a wide range of application fields. The company's technology development is extremely highly rated by the Combustion Society of Japan, which is my main academic society, and received the Society's technology award in fiscal 2015. My relationship to Taiyo Nippon Sanso came about through the activities of the Society, as it was the main participating institution from the start of the national Strategic Innovation Program (SIP)'s Energy Carrier Project, which was conducted over five years from 2014. In this project, I was leading the ammonia direct combustion team, which gave me an opportunity to become more familiar with Taiyo Nippon Sanso's new technologies. I was put in charge of developing basic technologies for using carbon-free ammonia as fuel for an industrial furnace, and we achieved the initial target at a high level. At the end of 2020, ammonia fuel was included explicitly in a statement on the green growth strategy associated with achieving carbon neutrality by 2050. Amid these developments, I would like to continue working with Taiyo Nippon Sanso on early social implementation of the results of our SIP project. Open innovation is much talked about these days. I hope that Taiyo Nippon Sanso will continue to develop and grow its technologies and its outstanding human resources, which are its strengths, and that the company will play a leading role in achieving carbon neutrality for the industrial sector.

Policies

Code of Conduct

We contribute to the creation of value of our customers in all industries through innovative gas solutions and to the realization of an affluent and sustainable society through the creation of a harmonious relationship between people and the earth based on the Group Philosophy, "Proactive. Innovative. Collaborative. Making life better through gas technology." We act honestly and fairly with high ethical values toward the goal that we can gain trust from society and make continuous progress.

https://www.nipponsanso-hd.co.jp/Portals/0/images/company/policy_en/Nippon-Sanso-Holdings-Group-Code-of-Conduct_en.pdf

Internal Audit Policy

Our mission is to contribute to the realization of our group companies' philosophy and vision and the achievement of business targets. Through internal audit activities, we endeavor to add value to our group companies' operations or make improvement proposals, thereby contributing to securing sound and appropriate business operation and improving business efficiency.

https://www.nipponsanso-hd.co.jp/Portals/0/images/company/policy_en/Nippon-Sanso-Holdings-Group-Internal-Audit-Policy_en.pdf

Anti-Corruption Policy

We aim to prevent any form of corruption including bribery and anticompetitive acts and to establish and maintain fair trade practices in accordance with the Code of Conduct of the Nippon Sanso Holdings Group.

https://www.nipponsanso-hd.co.jp/Portals/0/images/company/policy_en/Nippon-Sanso-Holdings-Group-Anti-Corruption-Policy_en.pdf

Global Competition Law Compliance Policy

In many countries and regions in which we conduct business activities, laws and rules that are generally called competition laws prohibit anticompetitive acts using a dominant position in the market, cartels, anticompetitive mergers and acquisitions, and other anticompetitive acts to ensure fair and free competition. In some countries and regions, laws of such countries and regions may be applied and enforced even on an act conducted outside the countries and regions if such act affects the market in the countries and regions.

We understand that compliance with such competition laws contributes to the benefit not only of consumers but also of the entire society, will respect the competition laws, and endeavor to ensure fair and free competition. We provide to our officers and employees necessary education on the importance of compliance with competition laws.

https://www.nipponsanso-hd.co.jp/Portals/0/images/company/policy_en/Nippon-Sanso-Holdings-Group-Global-Competition-Law-Compliance-Policy_en.pdf

Global Policy on Respecting Human Rights, Contributing to Communities, Employment, Labor, and Health

We support the spirit and meaning of the Universal Declaration of Human Rights, the International Covenants on Human Rights, the Guiding Principles on Business and Human Rights, and the United Nations Global Compact, and we shall fulfill our social responsibilities as a business entity through the promotion of respect for human rights in the workplace and creation of adequate working environments.

https://www.nipponsanso-hd.co.jp/Portals/0/images/company/policy_en/Nippon-Sanso-Holdings-Group-Global-Policy-on-Respecting-Human-Rights,Contributing-to-Communities,Employment,Labor-and-Health_en.pdf

Procurement Policy

We are addressing the resolution of environmental and social issues based on the Group Philosophy, "Proactive. Innovative. Collaborative. Making life better through gas technology." We believe resolving these problems and realizing a sustainable society requires joint efforts with wide range of suppliers, and established the below procurement policy. We will comply with this policy and contribute to realization of a sustainable society.

https://www.nipponsanso-hd.co.jp/Portals/0/images/company/policy_en/Nippon-Sanso-Holdings-Group-Procurement-Policy_en.pdf

Procurement Guidelines

We are addressing the various issues we are facing, including of global warming, exhaustion of resources, energy, and human rights that threaten the continuance of sustainable natural and social environments based on the Group Philosophy, "Proactive. Innovative. Collaborative. Making life better through gas technology." We believe this approach cannot be completed by a sole effort of our group; it can only be achieved by sharing perceptions and cooperating broadly with our suppliers.

Based on this standpoint, we have established the Nippon Sanso Holdings Group Procurement Policy to promote our suppliers' understanding and cooperation and have created the Nippon Sanso Holdings Group Procurement Guidelines on matters that we would like our suppliers to address with us.

https://www.nipponsanso-hd.co.jp/Portals/0/images/company/policy_en/Nippon-Sanso-Holdings-Group-Procurement-Guidelines_en.pdf

Global Tax Policy

We understand that it is our social responsibility to comply with the tax laws and regulations of, and contribute through tax payments to the development of, all the countries and regions we operate in. Therefore, we are committed to addressing the interests of various stakeholders through legal compliant, timely, and appropriate tax payments and proper and highly transparent tax management to ensure such compliance and tax payment.

https://www.nipponsanso-hd.co.jp/Portals/0/images/company/policy_en/Nippon-Sanso-Holdings-Group-Global-Tax-Policy_en.pdf

Investor Relations (IR) Policy

We engage in constructive dialogue with market participants (including shareholders, investors, and securities analysts) based on the concept of fair disclosure to realize sustainable growth and medium- to long-term corporate value improvement. In addition, we endeavor to enhance our IR activities by providing fair, timely, and appropriate explanation and disclosure of accurate information, including the status of management and business operation, and to utilize for enhancing corporate value by communicating the requests and assessment by the market participants to the management to reflect them in business management.

https://www.nipponsanso-hd.co.jp/Portals/0/images/company/policy_en/Nippon-Sanso-Holdings-Group-Investor-RelationsPolicy_en.pdf

Information Security Policy

We recognize that information management is a material factor for internal control. This policy on information security is established to protect our group companies and our customers from loss of social credibility, business disruption, or the like, caused by information leakage or falsification, to be complied with by all employees.

https://www.nipponsanso-hd.co.jp/Portals/0/images/company/policy_en/Nippon-Sanso-Holdings-Group-Information-Security-Policy_en.pdf

Occupational Safety and Health / Industrial Safety and Disaster Prevention Policy

We earnestly work on securing industrial safety for our business continuity, sound development, and corporate value enhancement based on the idea of putting the safety of our employees including contract employees, contractors, and external stakeholders first. We also ensure the safety and health of all individuals involving in our businesses by eliminating personal injuries, diseases, and accidents during business activities in our workplaces.

https://www.nipponsanso-hd.co.jp/Portals/0/images/company/policy_en/Nippon-Sanso-Holdings-Group-Occupational-Safety-and-Health-Industrial-Safety-and-Disaster-Prevention-Policy_en.pdf

Environmental Policy

We address the reinforcement of sustainability management and contribute as "The Gas Professionals" to both the development of a globally sustainable society and the resolution of global challenges. We will technically contribute to the resource-recycling society and to the development of a sustainable society by harmonizing with the environment and endeavoring to reduce environmental impact in our business activities under the direction of top management.

https://www.nipponsanso-hd.co.jp/Portals/0/images/company/policy_en/Nippon-Sanso-Holdings-Group-Environmental-Policy_en.pdf

Product Safety and Quality Policy

We, "The Gas Professionals" at the Nippon Sanso Holdings Group, recognize that social responsibilities are not only to comply with the applicable laws and regulations of each country and region and respect international standards but also to provide a reliable supply of various kinds of products and services including industrial gases safely and securely. This reliable supply is the source of trust and we fulfill the mission to supply these products and services for the long term in accordance with the concept of product stewardship and by giving full attention to human and environmental aspects.

https://www.nipponsanso-hd.co.jp/Portals/0/images/company/policy_en/Nippon-Sanso-Holdings-Group-Product-Safety-and-Quality-Policy_en.pdf

Intellectual Property Policy

Recognizing that intellectual properties are important corporate assets, we work on acquiring, protecting, and using intellectual properties in order to contribute to businesses and society through intellectual property-related activities and to realize our group companies' global growth. Based on the philosophy of legal compliance, we also respect other companies' intellectual property rights and pay attention not to infringe them.

https://www.nipponsanso-hd.co.jp/Portals/0/images/company/policy_en/Nippon-Sanso-Holdings-Group-Intellectual-Property-Policy_en.pdf

Sustainability Data

Environment

	Unit	FYE2019	FYE2020	**FYE2021**
Greenhouse Gas (GHG) Emissions				
GHG Emissions Scope 1 ☑	Thousands of tonnes CO_2e	14	1,061	**987**
GHG Emissions Scope 2 ☑	Thousands of tonnes CO_2e	4,056	4,747	**4,664**
GHG Emissions Scope 3 –Total for the Following Categories ☑	Thousands of tonnes CO_2e	3,634	3,662	**4,340**
Category 1 Purchased goods and services	Thousands of tonnes CO_2e	—	883	**883**
Category 2 Capital goods	Thousands of tonnes CO_2e	—	60	**43**
Category 3 Fuel- and energy-related activities not included in Scope 1 and Scope 2	Thousands of tonnes CO_2e	—	276	**248**
Category 4 Upstream transportation and distribution (Including transportation services whose cost is borne by the Company)	Thousands of tonnes CO_2e	—	40	**37**
Category 5 Waste generated in operations	Thousands of tonnes CO_2e	—	N/A	**2**
Category 6 Business travel	Thousands of tonnes CO_2e	—	1	**1**
Category 7 Employee commuting	Thousands of tonnes CO_2e	—	3	**3**
Category 8 Upstream leased assets	Thousands of tonnes CO_2e	—	N/A	**N/A**
Category 9 Downstream transportation and distribution	Thousands of tonnes CO_2e	—	N/A	**N/A**
Category 10 Processing of sold products	Thousands of tonnes CO_2e	—	N/A	**N/A**
Category 11 Use of sold product	Thousands of tonnes CO_2e	—	1,583	**2,436**
Category 12 End-of-life treatment of sold products	Thousands of tonnes CO_2e	—	N/A	**N/A**
Category 13 Downstream leased assets	Thousands of tonnes CO_2e	—	N/A	**N/A**
Category 14 Franchises	Thousands of tonnes CO_2e	—	N/A	**N/A**
Category 15 Investments	Thousands of tonnes CO_2e		816	**687**

Reporting boundary: Scope 1 emissions and Scope 2 emissions represent main consolidated subsidiaries of Nippon Sanso Holdings. For information on Scope 3 emissions aggregation, please refer to pages 187-188.
Scope 1 emissions: Direct emissions occurring from sources owned or controlled by the company
Scope 2 emissions: Indirect emissions from the use of electricity, steam, and heat
Scope 3 emissions: Indirect emissions other than Scope 2 emissions
GHG emissions in Japan are calculated using emission factors specified in Japan's Act on Promotion of Global Warming Countermeasures. For GHG emissions overseas, Scope 1 emissions are calculated using emission factors set forth in Japan's Act on Promotion of Global Warming Countermeasures, while Scope 2 emissions are calculated using country-specific emission factors published by the International Energy Agency (IEA). However, for electricity in Europe, beginning FYE2021 a separate emissions factor for each electricity provider is used, and emissions are calculated making reference to the Guarantee of Origin, resulting in an increase in Scope 2 emission of approximately 244 thousand tonnes CO_2e compared with using emission factors provided by the IEA. See pages 187-188 for details on the calculation method of Scope 3 emissions.
Indicators with ☑ mark have been assured by KPMG AZSA Sustainability Co., Ltd. for FYE2021.

		Unit	FYE2019	FYE2020	**FYE2021**
Contributions to Environmental Protection through Products					
GHG Emission Reduction Contribution	Products and Services ☑	Thousands of tonnes CO_2e	1,779	2,373	**2,892**
	Industrial Gases ☑	Thousands of tonnes CO_2e	—	—	**2,174**

See pages 183 and 189 for details about reporting boundaries and the calculation methods.

Energy Usage				
Energy Consumption ☑	Terajoules	72,014	109,512	**104,142**
Electric power	Terajoules	70,890	97,483	**93,400**
Fuels	Terajoules	418	11,378	**10,004**
Heat	Terajoules	706	651	**738**

Reporting boundary: Main consolidated subsidiaries of Nippon Sanso Holdings
The energy of the consumed fuels are calculated based on the gross calorific values specified in Japan's Act on the Rational Use of Energy. Purchased electricity and purchased steam are converted into primary energy amounts.

Environmental Impact				
Nitrogen oxide (NOx) emissions ☑	Tonnes	3.0	3.2	**1.8**
Sulfur oxide (SOx) emissions ☑	Tonnes	1.0	1.4	**1.0**
Particulate emissions ☑	Tonnes	1.0	0.1	**0.1**
Volatile organic compound (VOC) emissions ☑	Tonnes	10	10	**5**
Releases of substances designated under the Pollutant Release and Transfer Register (PRTR) ☑	Tonnes	29	19	**7**

Reporting boundary: Consolidated subsidiaries in Japan, including Taiyo Nippon Sanso Corporation

Water Usage				
Fresh Water Withdrawn ☑	Ten thousand of m^3	1,362	3,002	**4,335**
Breakdown of sources of fresh water withdrawn: Water supply from local government	Ten thousand of m^3	—	1,496	**1,472**
Municipal water	Ten thousand of m^3	—	429	**490**
Industrial water	Ten thousand of m^3	—	1,067	**982**
Groundwater	Ten thousand of m^3	—	276	**258**
Surface water	Ten thousand of m^3	—	1,230	**2,602**
Other	Ten thousand of m^3	—	—	**3**

Reporting boundary: Gas production plants operated by domestic consolidated subsidiaries of Nippon Sanso Holdings, business locations with facilities specified under the Water Pollution Prevention Act, and main overseas consolidated subsidiaries
In FYE2020, we added business locations with facilities specified under the Water Pollution Prevention Act to the scope of aggregation.

Waste				
Waste generated*1 ☑	Tonnes	3,023	3,762	**14,273**
Waste disposed of as landfill*2 ☑	Tonnes	362	284	**7,152**
Hazardous waste generated*3 ☑	Tonnes	156	197	**1,325**
Waste recycled*4	Tonnes	1,695	2,381	**4,890**

Reporting boundary: Main consolidated subsidiaries of Nippon Sanso Holdings
Beginning FYE2021, main overseas consolidated subsidiaries are included in the reporting boundary. Waste generated by the Gas Business in Japan is the volume for which the Company issued a manifest..
*1 Includes valuable materials *2 Includes residue after intermediate treatment outside the Group company
*3 Includes specially controlled industrial waste *4 We consider waste collected to be the amount of resources recycled.

Environmental Accounting				
Environmental protection costs				
Investments	Millions of yen	9,655	1,351	**7,559**
Expenses	Millions of yen	844	1,033	**1,089**
Economic benefits associated with environmental conservation activities	Millions of yen	15	1,905	**8**

Reporting boundary: Taiyo Nippon Sanso, Japan Fine Products Co., Ltd., Taiyo Nippon Sanso Engineering Corporation, Nissan Unyu K.K., and Thermos K.K.

From FYE2020, the figures for chemical oxygen demand (COD) emissions, nitrogen emissions in wastewater, and phosphorus emissions have been omitted from disclosure since the amounts of these emissions have been immaterial. The Nippon Sanso Holdings Group uses water primarily for indirect cooling, and its impacts on water quality are therefore not large. Taiyo Nippon Sanso and its domestic subsidiaries have five business sites that are subject to restrictions on the concentration of COD, nitrogen, and phosphorous emissions in wastewater. The total amounts of COD, nitrogen, and phosphorous emissions for all five sites amount to less than one tonne each.

Sustainability Data

	Unit	FYE2019	FYE2020	**FYE2021**
GHG-Related				
GHG Scope 1 + Scope 2 ☑	Thousands of tonnes CO_2e	4,070	5,808	**5,651**
Gas Business in Japan	Thousands of tonnes CO_2e	2,494	2,273	**2,014**
Gas Business in the United States	Thousands of tonnes CO_2e	1,087	2,164	**2,066**
Gas Business in Europe	Thousands of tonnes CO_2e	—	871	**1,049**
Gas Business in Asia and Oceania	Thousands of tonnes CO_2e	488	499	**511**
Thermos Business	Thousands of tonnes CO_2e	1	1	**11**
Energy Consumption				
Total ☑	Thousands of gigajoules	72,014	109,512	**104,142**
Gas Business in Japan	Thousands of gigajoules	38,319	37,048	**33,635**
Gas Business in the United States	Thousands of gigajoules	24,507	37,946	**36,172**
Gas Business in Europe	Thousands of gigajoules	—	25,068	**24,960**
Gas Business in Asia and Oceania	Thousands of gigajoules	9,174	9,437	**9,201**
Thermos Business	Thousands of gigajoules	14	13	**174**
Electricity Consumption				
Total ☑	Millions of kWh	7,290	10,013	**9,592**
Gas Business in Japan	Millions of kWh	3,866	3,742	**3,402**
Gas Business in the United States	Millions of kWh	2,511	2,861	**2,824**
Gas Business in Europe	Millions of kWh	—	2,464	**2,442**
Gas Business in Asia and Oceania	Millions of kWh	912	945	**908**
Thermos Business	Millions of kWh	1	1	**16**
Water Withdrawal				
Total ☑	Ten thousands of m^3	1,362	3,002	**4,335**
Gas Business in Japan	Ten thousands of m^3	683	732	**676**
Gas Business in the United States	Ten thousands of m^3	457	724	**707**
Gas Business in Europe	Ten thousands of m^3	—	1,317	**2,730**
Gas Business in Asia and Oceania	Ten thousands of m^3	222	229	**205**
Thermos Business	Ten thousands of m^3	—	—	**17**
Waste Generated (Including Valuable Materials)*1				
Total ☑	Tonnes	3,023	3,762	**14,273**
Gas Business in Japan	Tonnes	2,943	3,675	**5,505**
Gas Business in the United States	Tonnes	—	—	**5,691**
Gas Business in Europe	Tonnes	—	—	**758**
Gas Business in Asia and Oceania	Tonnes	—	—	**395**
Thermos Business	Tonnes	80	87	**1,924**

*1 Beginning FYE2021, main overseas consolidated subsidiaries are included in the reporting boundary. Waste generated by the Gas Business in Japan is the volume for which the Company issued a manifest.

Society

	Unit	FYE2019	FYE2020	**FYE2021**
Employees and Diversity (Consolidated)				
Employees* ☑	Number of individuals	18,974	19,341	**19,155**
Gas Business in Japan	Number of individuals	6,171	6,292	**6,295**
Gas Business in the United States	Number of individuals	4,916	4,724	**4,534**
Gas Business in Europe	Number of individuals	2,589	2,794	**2,884**
Gas Business in Asia and Oceania	Number of individuals	4,026	4,195	**4,114**
Thermos Business	Number of individuals	1,272	1,336	**1,328**
Employees by gender				
Male ☑	Number of individuals	15,353	15,546	**15,307**
Female ☑	Number of individuals	3,621	3,795	**3,848**
Employees by age group (Composition ratio)				
20s and below	%	16.1	16.8	**16.6**
30s	%	24.7	24.8	**24.6**
40s	%	28.9	29.0	**28.6**
50s and above	%	30.2	29.4	**30.2**
Years of consecutive service				
Overall average	Years	12.4	12.4	**11.3**
Men	Years	12.5	12.7	**11.7**
Women	Years	11.6	11.5	**9.5**
Average age	Years	41.1	41.0	**42.3**
New hires	Number of individuals	2,548	2,095	**1,893**
Employee turnover rate	%	6.2	6.1	**5.7**
Female employees as a percentage of the total number of employees ☑	%	19.1	19.6	**20.1**
Female managers as a percentage of the total managerial positions ☑	%	13.7	13.7	**14.6**

* Aggregated from actual figures of the Nippon Sanso Holdings Group companies as of the end of each fiscal year. Due to differences in the reporting periods, part of the data includes figures as of the end of December. Due to a revision of this aggregation method, figures presented in previous fiscal years have been retroactively revised.

	Unit			
Employees and Diversity (Non-Consolidated)				
Employees	Number of individuals	—	—	**81***
Employees by gender				
Male	Number of individuals	—	—	**66**
Female	Number of individuals	—	—	**15**
Female employees as a percentage of the total number of employees	%	—	—	**18.5**
Female managers as a percentage of the total managerial positions	%	—	—	**4.1**

* Includes 47 employees working concurrently for Taiyo Nippon Sanso Corporation

Sustainability Data

	Unit	FYE2019	FYE2020	**FYE2021**
Employees, Diversity, and Work–Life Balance (Registered employees of Taiyo Nippon Sanso Corporation)				
Employees	Number of individuals	1,983	2,024	**2,065**
Employees by gender				
Male	Number of individuals	1,758	1,775	**1,789**
Female	Number of individuals	225	249	**276**
Employees by age group (Composition ratio)				
20s and below ☑	%	17.9	18.9	**19.5**
30s ☑	%	19.8	19.7	**20.1**
40s ☑	%	31.8	29.6	**27.6**
50s and above ☑	%	30.5	31.8	**32.9**
Years of consecutive service				
Overall average	Years	18.1	17.9	**17.8**
Men	Years	18.6	18.5	**18.5**
Women	Years	14.4	13.8	**12.9**
Average age ☑	Years	42.6	41.9	**42.3**
New hires ☑	Number of individuals	108	109	**102**
Employee turnover rate*1 ☑	%	2.8	3.1	**2.8**
Employee training hours	Total hours per year	5,175	5,547	**2,296**
Unions members ☑	Number of individuals	1,106	1,146	**1,195**
Union members as a percentage of the total number of employees ☑	%	55.8	56.6	**57.8**
Layoffs*2 ☑	Number of individuals	0	0	**0**
Female employees as a percentage of the total number of employees	%	11.3	12.3	**13.4**
Female managers as a percentage of the total managerial positions	%	1.4	1.5	**1.5**
Employment ratio of persons with disabilities (as of June 1 of each fiscal year) ☑	%	2.2	2.3	**2.3**
Number of employees reemployed after retirement ☑	Number of individuals	57	64	**74**
Employees using childcare leave systems ☑	Number of individuals	7	7	**16**
Men ☑	Number of individuals	2	0	**6**
Women ☑	Number of individuals	5	7	**10**
Employees using nursing care leave or long-term nursing care leave ☑	Number of individuals	0	0	**0**
Usage rate for annual paid leave*3 ☑	%	61.3	62.5	**60.2**
Employees using volunteer leave system ☑	Number of individuals	4	0	**0**

*1 Employee turnover rate is the number of employees leaving the Company during the fiscal year (including mandatory-age retirees and excluding personnel transferring to other Group companies) divided by the number of employees at the end of the fiscal year
*2 Employees leaving the Company for reasons attributable to the Company (dismissals)
*3 The number of new days granted in the reporting year is the denominator. The number of days used in the reporting year is the numerator. The denominator does not include the number of days carried over from the previous year.

	Unit	FYE2019	FYE2020	**FYE2021**
Others (Consolidated)				
Expenditures on social contribution initiatives	Thousands of yen	40,396	49,472	**109,706**

* Data is calculated on a consolidated basis from FYE2021.

Occupational Health and Safety				
Frequency rate of occupational accidents resulting in lost workdays (Number of injuries / fatalities due to occupational accidents per million work hours)				
Nippon Sanso Holdings Group (Including Taiyo Nippon Sanso Group) ☑	—	2.32	1.99	**2.30**
Taiyo Nippon Sanso Group ☑	—	0.73	0.73	**0.64**

Reporting boundary: Consolidated subsidiaries with production divisions in Japan and overseas
Nippon Sanso Holdings include overseas subsidiaries of Thermos K.K. from January 2017 and Nippon Gases Euro-Holding from January 2019.

Reporting Boundary

Main consolidated subsidiaries

Consolidated subsidiaries in Japan including Taiyo Nippon Sanso Corporation; Matheson Tri-Gas, Inc.; Nippon Gases Euro-Holding S.L.U. and its consolidated subsidiaries; Leeden National Oxygen Ltd.; Nippon Sanso Ingasco, Inc.; Nippon Sanso Ingasco Philippines, Inc.; Nippon Sanso Ingasco Clark, Inc.; Nippon Sanso (Thailand) Co., Ltd.; Ayutthaya Industrial Gases Co., Ltd.; Taiyo Gases Co., Ltd.; Nippon Sanso Vietnam Joint Stock Company; Taiyo Nippon Sanso India Pvt. Ltd.; Shanghai Taiyo Nippon Sanso Gas Co., Ltd.; Suzhou Taiyo Nippon Sanso Gas Co., Ltd.; Dalian Changxing Island Taiyo Nippon Sanso Gas Co., Ltd.; Dalian Taiyo Nippon Sanso Gas Co., Ltd.; Yangzhou Taiyo Nippon Sanso Semiconductor Gases Co., Ltd.; Nippon Sanso Taiwan, Inc.; Taiyo Nippon Sanso Engineering Taiwan, Inc.; Fu Yang Gas Co., Ltd.; Supagas Pty Ltd; Nippon Sanso Myanmar Co., Ltd.; Top Thermo Mfg. (Malaysia) Sdn. Bhd.; Vacuumtech Philippines Inc.

Beginning FYE2021, environmental data includes the HyCO plant and liquid carbon dioxide plant of Nippon Gases Euro-Holding S.L.U. and its consolidated subsidiaries, Top Thermo Mfg. (Malaysia) Sdn. Bhd and Vacuumtech Philippines Inc.

Sustainability Data

Governance

	Unit	FYE2019	FYE2020	**FYE2021**
Activities of Committees				
Management Configuration	Number of individuals	6	9	**9**
Internal directors	Number of individuals	4	7	**7**
Independent outside directors	Number of individuals	2	2	**2**
Directors serving concurrently as executive officers	Number of individuals	3	4	**3**
Percentage of directors serving concurrently as executive officers	%	50.0	44.4	**33.3**
Independent outside directors as a percentage of total Board of Directors' members	%	33.3	22.2	**22.2**
Female directors as a percentage of total Board of Directors' members	%	0.0	0.0	**0.0**
Term of appointment	Years	1	1	**1**
Frequency of Board of Directors' meetings	Times	15	12	**11**
Attendance at Board of Directors' meetings	%	97.8	99.1	**98.0**
Attendance of independent outside directors at Board of Directors' meetings	%	96.7	100.0	**100.0**
Number of directors attending less than 75% of Board of Directors' meetings	Number of individuals	0	0	**0**
Audit & Supervisory Board members	Number of individuals	4	4	**4**
Internal Audit & Supervisory Board members	Number of individuals	1	1	**1**
Independent outside Audit & Supervisory Board members	Number of individuals	3	3	**3**
Independent outside Audit & Supervisory Board members as a percentage of total Audit & Supervisory Board members	%	75.0	75.0	**75.0**
Female Audit & Supervisory Board members as a percentage of total Audit & Supervisory Board members	%	0.0	0.0	**0.0**
Frequency of Audit & Supervisory Board meetings	Times	18	16	**16**
Attendance at Audit & Supervisory Board meetings	%	100.0	92.2	**100.0**
Attendance of independent outside Audit & Supervisory Board members at Audit & Supervisory Board meetings	%	100.0	89.6	**100.0**
Number of Audit & Supervisory Board members attending less than 75% of Audit & Supervisory Board meetings	Number of individuals	0	1	**0**
Average age of directors and Audit & Supervisory Board members	Years	65.5	64.3	**64.8**
Number of executive officers*	Number of individuals	23	22	**7**
Female executive officers as a percentage of total executive officers	%	0.0	0.0	**0.0**

* Figures for FYE2021 represent executive officers of Nippon Sanso Holdings (including the president). Figures for FYE2020 and earlier represent executive officers of Taiyo Nippon Sanso Corporation (including the president).

	Unit	FYE2019	FYE2020	**FYE2021**
Activities of Committees				
Advisory Committee on Appointments and Remuneration				
Members	Number of individuals	3	3	**3**
Internal directors	Number of individuals	1	1	**1**
Independent outside directors	Number of individuals	2	2	**2**
Frequency of meetings	Times	8	11	**6**
Attendance	%	100.0	100.0	**100.0**
Management Committee				
Members	Number of individuals	17	17	**13**
Frequency of meetings	Times	21	16	**6**
Attendance*1	%	99.1	97.1	**100.0**
Investment Committee				
Members*2	Number of individuals	12	12	**15**
Frequency of meetings	Times	2	2	**1**
Attendance*1	%	95.5	100.0	**93.3**
Global Strategy Review Committee				
Members	Number of individuals	—	—	**17**
Frequency of meetings	Times	—	—	**1**
Attendance	%	—	—	**100.0**
Global Risk Management Committee				
Members	Number of individuals	—	—	**17**
Frequency of meetings	Times	—	—	**1**
Attendance	%	—	—	**100.0**
Global Compliance Committee				
Members	Number of individuals	20	20	**20**
Frequency of meetings*3	Times	1	0	**0**
Attendance	%	100.0	—	**—**

*1 Average attendance rate
*2 Excluding additional attendees and secretariat
*3 Not held during FYE2020 or FYE2021 due to COVID-19

Sustainability Data

	Unit	FYE2019	FYE2020	**FYE2021**
Remuneration for Officers				
Remuneration for directors (excluding outside directors)				
Total	Millions of yen	249	255	**263**
Basic remuneration	Millions of yen	151	162	**169**
Corporate political contributions	Millions of yen	97	93	**94**
Remuneration for Audit & Supervisory Board members (excluding independent outside members)				
Total	Millions of yen	25	25	**27**
Basic remuneration	Millions of yen	25	25	**27**
Remuneration for independent outside directors				
Total	Millions of yen	102	102	**100**
Basic remuneration	Millions of yen	102	102	**100**
Remuneration for independent auditors				
Total	Millions of yen	212	198	**210**
Remuneration for audit services	Millions of yen	209	195	**209**
Other remuneration for independent auditors	Millions of yen	3	3	**1**
Others				
Anti-takeover measures	—	Not adopted	Not adopted	**Not adopted**
Code of ethics	—	Adopted	Adopted	**Adopted**
Policy on transparency of tax affairs	—	Adopted (Internal)	Adopted (Internal)	**Adopted** (Currently disclosed on the Company website)
Corporate political contributions	Yen	0	0	**0**

Intellectual Property and Research and Development

	Unit	FYE2019	FYE2020	**FYE2021**
Intellectual Property				
Registered patents				
Total	Patents	1,147	1,255	**1,560**
Japan	Patents	774	802	**925**
Overseas	Patents	373	453	**635**

* Figures for FYE2019 and earlier are based on a December 31 fiscal year-end. Figures for FYE2020 and later are based on a March 31 fiscal year-end. Figures through 2020 represent Taiyo Nippon Sanso Corporation on a non-consolidated basis, while figures for 2021 represent the total for all operating companies.

Research and Development				
Research and Development				
Total	Millions of yen	3,494	3,389	**3,315**
Gas Business in Japan	Millions of yen	2,846	2,691	**2,694**
Gas Business in the United States	Millions of yen	614	658	**589**
Thermos Business	Millions of yen	34	39	**32**

Calculation Methods for Scope 3 GHG Emissions

Referenced Guidelines

Our Scope 3 GHG emissions are calculated based on the Corporate Value Chain (Scope 3) Accounting and Reporting Standard issued by the GHG Protocol. For emission factors, we used the emission factor database Ver. 3.1 provided in the Green Value Chain Platform, the Inventory Database for Environmental Analysis (IDEA v2) for supply-chain GHG emissions accounting, and information included in MiLCA Ver. 2, a life-cycle assessment software developed by the Japan Environmental Management Association for Industry.

Reporting Boundary

Unless otherwise specified, the data covers consolidated subsidiaries in Japan, including Taiyo Nippon Sanso Corporation

Calculation Method by Category

Category 1 Purchased goods and services	Calculated by multiplying the amounts of products and services in physical or monetary units purchased by Taiyo Nippon Sanso Corporation by the respective emission factor for each type of product or service. However, emissions from transport and shipping services and from oxygen, nitrogen, and argon purchased from Taiyo Nippon Sanso's consolidated subsidiaries or affiliates are included in the reporting boundary of Scope 1 or 2, or categories 4 and 15 of Scope 3, and are therefore deducted from the procured amounts used for this calculation.
Category 2 Capital goods	Calculated by multiplying the amounts of capital investment during each reporting fiscal year by an emission factor per price of capital goods.
Category 3 Fuel- and energy-related activities not included in Scope 1 and 2	This category includes emissions associated with the extraction, production, and transportation of purchased fuels and those consumed in the production of electricity and steam that are purchased by the Group. Fuels: Calculated by multiplying the amount purchased during the fiscal year by an emission factor for each fuel type. Electricity and steam: Calculated by multiplying the amount purchased from outside the Group by the upstream emission factor for each purchased energy reflecting electricity transmission loss.
Category 4 Upstream transportation and distribution (Including distribution services whose cost is borne by the Group)	Calculated by subtracting the CO_2 emissions from logistics subsidiaries, which are included in Scope 1 emissions, from the CO_2 emissions reported for Taiyo Nippon Sanso Corporation and Nippon Ekitan Corporation as specified shippers in accordance with the Act on Promotion of Global Warming Countermeasures. CO_2 emissions related to transportation and distribution of products for which Taiyo Nippon Sanso Corporation and Nippon Ekitan Corporation bear the transportation costs are included in this category.
Category 5 Waste generated in operations	Calculated by multiplying industrial waste output by the emission factors for each waste type (including transportation stages).
Category 6 Business travel	Calculated by multiplying the number of employees of consolidated subsidiaries in Japan, including Taiyo Nippon Sanso Corporation by the emission factor (0.13 tonnes of CO_2/person/year).
Category 7 Employee commuting	Taiyo Nippon Sanso Corporation employees: For train commuters, the annual payment for commuter passes is multiplied by an emission factor per transportation expense. For car commuters, the round-trip distance is multiplied by the annual number of commuting days and an emission factor per person-kilometer for passenger car. Employees of domestic consolidated subsidiaries: The number of employees is multiplied by the annual number of commuting days, and multiplied by the emission factor per commuting day.

Category 8 Upstream leased assets	Since the amount of applicable lease assets is negligible, emissions in this category are not calculated.
Category 9 Downstream transportation and distribution	The emissions associated with the transportation of sold products whose cost is borne by Taiyo Nippon Sanso Corporation and Nippon Ekitan Corporation fall within category 4 as the Group basically bears the cost of transporting products.
Category 10 Processing of sold products	The Taiyo Nippon Sanso Group's main product group is gas, and since it is difficult to rationally calculate the GHG emissions associated with the processing of these products, the emissions are not calculated.
Category 11 Use of sold products	The amount of CO_2 emissions generated from the use of propane gas (LP gas), liquefied carbon dioxide gas, and dry ice, and from use of electricity for the operation of its ASUs during the service life, which were sold to customers outside of the Taiyo Nippon Sanso Group.
Category 12 End-of-life treatment of sold products	The Taiyo Nippon Sanso Group's primary products are gases (oxygen, nitrogen, and argon). After use, these gases return to the atmosphere and do not become waste. Furthermore, since the gas containers are loaned, and therefore the amount of waste from sold is negligible, emissions in this category are not calculated.
Category 13 Downstream leased assets	Since the amount of applicable lease assets is negligible, emissions in this category are not calculated.
Category 14 Franchises	As the Group does not have any businesses in this format, there are no emissions in this category.
Category 15 Investments	Calculated by multiplying the emissions of each of the seven main affiliates of Taiyo Nippon Sanso Corporation in Japan by the Company's shareholding ratio (as of the fiscal year-end). The seven companies' GHG emissions are based on their actual emissions in the reporting period.

Calculation Methods for GHG Emission Reduction Contribution

We include the following products and services sold by consolidated subsidiaries of Nippon Sanso Holdings and certain affiliated companies in the calculation of GHG emission reduction contribution. The calculation method per product or service is as follows. The CO_2 emission factor used for electricity is 0.470 t-CO_2/MWh.

Product or Service	Calculation Methods of GHG Emission Reduction Contribution
Combustion-type exhaust gas abatement system Reporting Boundary: Consolidated subsidiaries in Japan	An average processing capacity of 0.6 L/min for nitrogen trifluoride (NF_3) gas per one combustion-type exhaust gas abatement system was assumed, and this value was multiplied by the number of such systems that were installed in FYE2019 and FYE2021, the number of operating hours per year, and the global warming potential (GWP) of NF_3 to calculate the GHG emission reduction contribution. The amount of CO_2 emissions from fuel used in combustion equipment was deducted.
SF_6 recovery service Reporting Boundary: Consolidated subsidiaries in Japan	The volume of sulfur hexafluoride (SF_6) gas recovered in FYE2021 was multiplied by its GWP to calculate GHG emission reduction contribution.
SCOPE-Jet® Reporting Boundary: Consolidated subsidiaries in Japan	Based on actual observed values at two electronic furnace manufacturers who had introduced SCOPE–JET®, the electricity-saving effect per volume of jet oxygen (kWh/Nm^3) was calculated. The ratio of the number of plants that have introduced SCOPE–JET® to the total number of electric furnace manufacturing plants was multiplied by the volume of crude steel products by electric furnaces in Japan in FYE2021, and the resulting number was assumed to be the production volume of crude steel contributed by the electricity saving from SCOPE–JET®. The amount of oxygen consumed by SCOPE–JET® in the production of this crude steel, and the amount of electricity saved per volume of oxygen were multiplied by the CO_2 emission factor for electricity to calculate the GHG emission reduction contribution. The amount of the CO_2 emissions generated during the manufacture of the oxygen was deducted.
MG Shield® Reporting Boundary: Consolidated subsidiaries in Japan	The amount of SF_6 gas whose use was avoided through use of MG Shield® sold in FYE2021 was multiplied by the gas' GWP to calculate the GHG emission reduction contribution.
New refrigerants Reporting Boundary: Consolidated subsidiaries in Europe	We calculated the amount of reduction contribution by assuming a 7% per year leakage rate of new refrigerants sold in FYE2021, and multiplying leakage amount by the difference between the GWP of alternative refrigerants and the GWP of new refrigerants.
Nitrogen gas supply system for laser processing (PSA) Reporting Boundary: Consolidated subsidiaries in Japan	The annual power consumption of Taiyo Nippon Sanso Corporation's conventional air compressor was compared with that of the energy-saving type nitrogen gas supply system to calculate the annual electricity saving from using the energy-saving type system. The annual electricity saved was multiplied by the CO_2 emission factor for electricity and the cumulative number of units sold from FYE2012 to FYE2021 to calculate the GHG emission reduction contribution.
Shuttle Chef® Reporting Boundary: Consolidated subsidiaries in Japan	The amount of electric power usage saved per year from using Shuttle Chef® when cooking was multiplied by the CO_2 emission factor for electricity and the total number of units sold over the three years from FYE2019 to FYE2021 to calculate the GHG emission reduction contribution.
Hydrogen station Reporting Boundary: Consolidated subsidiaries in Japan	The annual CO_2 emissions, which include emissions during the manufacture of the hydrogen, emitted by fuel cell vehicles (FCVs) filled with hydrogen at hydrogen stations sold or operated by Taiyo Nippon Sanso Corporation and operated during FYE2021 was compared with the annual CO_2 emissions of gasoline cars to calculate the GHG emission reduction contribution.
Oxygen-enriched combustion in blast furnaces Reporting Boundary: Consolidated subsidiaries in Japan and affiliated companies in Japan	We calculated the GHG emission reduction contribution as the difference between the amount CO_2 emissions in the production of crude steel using 100% coke and the production of crude steel via pulverized coal combustion based on crude steel production by the six steel companies to whom Taiyo Nippon Sanso Group supplied oxygen in FYE2021. This calculation method is described in "The Impact of Oxygen on Reducing CO_2 Emissions in Blast Furnace Ironmaking" (July 2011) by Dr. Michael F. Riley. We deducted the amount of CO_2 emitted during the production of oxygen and the pumping of gas into the blast furnace.

Independent Assurance Report

Independent Assurance Report

To the Representative Director, President CEO of Nippon Sanso Holdings Corporation

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

The Company's Responsibility

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

Our Responsibility

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

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

Conclusion

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

Our Independence and Quality Control

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

KPMG AZSA Sustainability Co., Ltd.

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Tokyo, Japan
September 29, 2021