Note : This document has been translated from a part of the Japanese original for reference purposes only. In the event of any discrepancy between this translated document and the Japanese original, the original shall prevail.

Nippon Sanso Holdings Corporation - Climate Change 2023

C0. Introduction

C0.1

(C0.1) Give a general description and introduction to your organization.

The Nippon Sanso Holdings Corporation (hereinto referred to as NSHD) was founded in 1910 as Nippon Sanso Ltd. In 1918, NSHD formally changed its name to Nippon Sanso and in 2004, merged with Taiyo Toyo Sanso Co., Ltd to become Taiyo Nippon Sanso Corporation (hereinto referred to as TNSC). From there, in 2014, TNSC became a consolidated subsidiary of Mitsubishi Chemical Holdings. On the other side, in 2018, through Nippon Gases Euro-Holdings S.L.U, NSHD acquired a stake in a corporation that operates part of Praxair, Inc's European operations. In 2019, NSHD acquired a portion of the HyCO business and related assets of Linde Gas North America LLC through Matheson Tri-Gas, Inc. and transitioned NSHD to a holding company structure effective October 1, 2020. Classified in the chemical industry, NSHD's primary business is the production and sale of oxygen, nitrogen, and argon, which are typical industrial gases, and other industrial gases such as carbon dioxide, hydrogen, helium, LP gas, and specialty gases for semiconductor applications. NSHD is comprised of 206 consolidated companies employing a total of 19,579 people worldwide (as of March 31, 2023). Under the previous Medium-term Management Plan, "Ortus Stage 2," during the period from the fiscal year ending March 31, 2018, to the fiscal year ending March 31, 2021, the Company achieved the following results: "Globalization and expansion of presence through the acquisition of European businesses and HyCO business in the United States," "Expansion of specialty gas business for electronics in East Asia," "Production capacity expansion in the United States and Asia". Moreover, in October 2020, we transitioned to a pure holding company structure, and have formulated "NS Vision 2026 - Enabling the Future," which will conclude in the fiscal year ending March 31, 2026. "NS Vision 2026" is based on the business management structure of "four geographic hubs and the Thermos business," and in addition to financial KPI targets, non-financial KPI targets have also been newly established, along with five key strategies (sustainability management, exploring new business toward carbon neutrality, total electronics, operational

excellence, and DX initiatives) as we aim to strengthen the Group's overall capabilities and achieve growth.

C0.2

(C0.2) State the start and end date of the year for which you are reporting data and indicate whether you will be providing emissions data for past reporting years.

Reporting year

Start date

April 1, 2022

End date

March 31, 2023

Indicate if you are providing emissions data for past reporting years

No

C0.3

(C0.3) Select the countries/areas in which you operate.

Australia
Belgium
Canada
China
Denmark
France
Germany
India
Indonesia
Ireland
Italy
Japan
Malaysia
Myanmar
Netherlands
Norway
Philippines
Portugal
Republic of Korea
Saudi Arabia
Singapore
Spain
Sweden
Taiwan, China

Thailand
United Kingdom of Great Britain and Northern Ireland
United States of America
Vietnam

C0.4

(C0.4) Select the currency used for all financial information disclosed throughout your response.

JPY

C0.5

(C0.5) Select the option that describes the reporting boundary for which climate-related impacts on your business are being reported. Note that this option should align with your chosen approach for consolidating your GHG inventory.

Financial control

C-CH0.7

(C-CH0.7) Which part of the chemicals value chain does your organization operate in?

Row 1

Bulk organic chemicals

Bulk inorganic chemicals

Hydrogen
Oxygen
Other industrial gasses

Other chemicals

C0.8

(C0.8) Does your organization have an ISIN code or another unique identifier (e.g., Ticker, CUSIP, etc.)?

Indicate whether you are able to provide a unique identifier for your organisation	Provide your unique identifier
Yes, a Ticker symbol	4091

C1. Governance

C1.1

(C1.1) Is there board-level oversight of climate-related issues within your organization?

Yes

C1.1a

(C1.1a) Identify the position(s) (do not include any names) of the individual(s) on the board with responsibility for climate-related issues.

Position of Individual or committee	Responsibilities for climate-related issues
Chief Executive Officer (CEO)	NSHD has established the Nippon Sanso Holdings Group Environmental Policy by resolution of the Board of Directors, which states "we will technically contribute to the resource-recycling society and to the development of sustainable society by harmonizing with environment and endeavoring to reduce environmental impact in our business activities under the direction of top management. As stated in this policy, NSHD's President and CEO is responsible for addressing climate change-related issues as delegated by the Board of Directors. The CEO chairs the Global Strategy Review Committee and the Global Risk Management Committee in accordance with the rules and regulations established by the Board of Directors and is responsible for determining group-wide business strategies at the former meeting and ensuring the effectiveness of NSHD's risk management at the latter meeting. Through these meetings, the CEO also considers NSHD's specific responses to climate change-related issues. An example of a decision made by the Board of Directors is the Medium-Term Management Plan announced on May 11, 2022, which presents the following five key strategies: **s**ustainability management, the pursuit of new business as a means of reaching a carbon neutral society, expansion of our electronics business, operational excellence and DX initiatives. In addition, we will set a target to reduce GHG emissions by 18% in FYE2026 and 32% in FYE2031 compared to FYE2019, and to become carbon neutral by FYE2050. It is through the above goals that we are attempting to accelerate our response to climate change.

C1.1b

(C1.1b) Provide further details on the board's oversight of climate-related issues.

Frequency with which climate-related issues are a scheduled agenda it	Governance mechanisms into which climate-related issues are integrated	Please explain
Scheduled – some meetings	Reviewing and guiding annual budgets Overseeing major capital expenditures Overseeing acquisitions, mergers, and divestitures Overseeing and guiding employee incentives Reviewing and guiding strategy Overseeing and guiding the development of a transition plan Monitoring the implementation of a transition plan Overseeing the setting of corporate targets Monitoring progress	The Global Strategy Review Committee is held once a year to review the strategies of each operating company in the formulation of the budget for the next fiscal year. At the meeting, the operating companies report on their sustainability strategies, which include climate change issues. The results of the meeting are reported to the Board of Directors in the form of a budget proposal. The Global Risk Management Committee is a body that deliberates on the selection of NSHD's key risks and measures to address them and is held once a year. Climate change risk is also included in the risks to be considered by the meeting, and the results of the meeting are reported to the Board of Directors. The Executive Committee deliberates on the formulation and monitoring of the Medium-term Management Plan and investment projects. In formulating the medium-term management plan, NSHD's approach to climate change issues during the time frame set by the Medium-term Management Plan and the setting of targets are discussed. In addition, the impact of each investment on climate change issues are also discussed during the deliberation of individual investment projects. The Medium-term Management Plan and investment projects are proposed to the Board of Directors after deliberation by the Management Committee. Once a year, the Board of Directors discuss the MOS indexes, which contain the targets for reducing GHG emissions and other environmental targets as well as the targets for the next fiscal year and the results of the previous year with respect to quality, safety, and security.

	towards corporate targets Reviewing and guiding the risk management process	

C1.1d

(C1.1d) Does your organization have at least one board member with competence on climate-related issues?

	Board member(s) have competence on climate-related issues	Criteria used to assess competence of board member(s) on climate-related issues
Row1	Yes	The committee comprehensively evaluates applicants who have served as a manager in charge of environment-related management for at least two years. NSHD has a Global Strategy Review Committee that makes decisions on group-wide business strategies and a Global Risk Management Committee that decides on group-wide risk management policies. At the Global Strategy Review Committee, the Chief Sustainability Officer (CSO), who is responsible for NSHD's sustainability activities, reports on the results of NSHD's overall sustainability activities during the year, including GHG emissions reductions, and determines targets for the next fiscal year. The latter is also held at the Global Risk Management Committee. At the meeting, business risks facing NSHD are assessed based on frequency of occurrence and financial or strategic impact, and countermeasures are discussed based on these assessments. The decisions made at these two meetings are reported to the Board of Directors, which determines NSHD's strategy for climate change issues.

C1.2

(C1.2) Provide the highest management-level position(s) or committee(s) with responsibility for climate-related issues.

Position or committee

Chief Executive Officer (CEO)

Climate-related responsibilities of this position

Managing annual budgets for climate mitigation activities
Providing climate-related employee incentives
Developing a climate transition plan
Implementing a climate transition plan
Conducting climate-related scenario analysis
Setting climate-related corporate targets
Monitoring progress against climate-related corporate targets
Assessing climate-related risks and opportunities
Managing climate-related risks and opportunities

Coverage of responsibilities

<Not Applicable>

Reporting line

Reports to the board directly

Frequency of reporting to the board on climate-related issues via this reporting line

Quarterly

Please explain

The President (CEO) of NSHD is responsible for climate-related issues and chairs the Global Strategy Review Committee and the Global Risk Management Committee in accordance with the rules set forth by the Board of Directors and is responsible for determining group-wide business strategies in the former and ensuring the effectiveness of NSHD's risk management in the latter. The former is responsible for determining the Group's overall business strategy and the latter for ensuring the effectiveness of NSHD's risk management. Through these meetings, the President (CEO) considers NSHD's specific responses to climate change-related issues. The Global Strategy Review Committee is held once a year to confirm the strategies of each operating company in the formulation of the next year's budget. It is also in this committee where the Chief Sustainability Officer (CSO), who is responsible for NSHD's sustainability activities, reports on the results of NSHD's overall sustainability activities during the year, including GHG emissions reductions, and determines targets for the following year. The results of the meeting are reported to the Board of Directors in the form of a budget proposal, while sustainability activities are reported separately to the Board of Directors. The Global Risk Management Committee, which meets once a year, deliberates on the selection of NSHD's major risks and measures to address them. At the FYE2023 meeting, the development of technologies necessary for NSHD to reduce GHG emissions were also identified as a risk, and strategies for NSHD to address this risk were discussed. The meeting also discussed the strategies that NSHD should take to reduce GHG emissions.

The Executive Committee deliberates on the formulation and monitoring of the Medium-term Management Plan and investment projects. Medium-term Management Plans and investment projects are proposed to the Board of Directors after deliberation by the Management Committee. The current Medium-term Management Plan was announced on May 11, 2022, after discussions by the Executive Committee and the Board of Directors and covers the four-year period from FYE2023 to

FYE2026. In the plan, NSHD defined five key strategies, two of which are "Sustainability Management" and "Exploring New Business Toward Carbon Neutrality". In addition, NSHD has set a goal to reduce GHG emissions by 18% in FYE2026 and 32% in FYE2031 compared to FYE2019, and to become carbon neutral by FYE2050, and to accelerate its response to climate change-related issues by setting a target that the amount of GHG reduction contribution from its environmental contribution products will exceed NSHD's GHG emissions in FYE2026. The CEO is responsible for the implementation and achievement of these goals. The progress of the Medium-term Management Plan is regularly monitored by the Board of Directors. The Executive Committee and the Board of Directors also deliberate on individual investment projects, discussing whether and to what extent each investment project will increase GHG emissions, contribute to the reduction of customers' GHG emissions, and impact the project will have on climate change issues.

C1.3

(C1.3) Do you provide incentives for the management of climate-related issues, including the attainment of targets?

	Provide incentives for the management of climate-related issues	Comment
Row 1	Yes	

C1.3a

(C1.3a) Provide further details on the incentives provided for the management of climate-related issues (do not include the names of individuals).

Entitled to incentive

Chief Sustainability Officer (CSO)

Type of incentive

Monetary reward

Incentive(s)

Bonus – set figure
Promotion

Performance indicator(s)

Achievement of climate transition plan KPI
Achievement of a climate-related target
Reduction in absolute emissions

Incentive plan(s) this incentive is linked to

Both Short-Term and Long-Term Incentive Plan

Further details of incentive(s)

As part of NSHD's sustainability management, the CSO, an NSHD executive officer, is responsible for risk management tasks related to safety, security, and the environment.

Reducing the number of safety, security, and environmental incidents to zero is included in the CSO's performance evaluation.

Explain how this incentive contributes to the implementation of your organization's climate commitments and/or climate transition plan

GHG reduction targets are included as a part of the CSO's performance evaluation.

C2. Risks and opportunities

C2.1

(C2.1) Does your organization have a process for identifying, assessing, and responding to climate-related risks and opportunities?

Yes

C2.1a

(C2.1a) How does your organization define short-, medium- and long-term time horizons?

	From(year)	To (years)	Comment
Short-term	0	1	It is linked to NSHD's business plans.
Medium-term	1	10	It is linked to NSHD's business plans.
Long-term	10	30	It is linked to our stand-alone climate change goal.

C2.1b

(C2.1b) How does your organization define substantive financial or strategic impact on your business?

NSHD is enhancing the risk management systems of NSHD companies to ensure early detection of risks that may hinder the achievement of business objectives over a long period of time exceeding 10 years, to prevent their manifestation, and to respond promptly when they do manifest. Risk priority is determined by the "frequency of occurrence multiplied by by financial or strategic impact on NSHD". In quantifiable terms, materiality is defined as an expected financial impact of 2,000 million yen or more (with a frequency of occurrence of at least once a year). The process for determining the financial or strategic impact of a business risk is done in the Global Risk Management Committee chaired by the CEO and attended by representatives from domestic and overseas operating companies at least once a year. They then proceed to deliberate, identify, and approve of countermeasures over significant risks that require NSHD-wide action. Matters decided by the Global Strategy Review Committee are discussed at the Technological Risk Liaison Conference (held at least twice a year), which is held separately by NSHD and its regional representative companies, to discuss measures to deal with the risks.
Climate change is one of these risks, and GHG emission reduction plans and other measures are discussed at the regional representative companies to address climate change issues.

C2.2

(C2.2) Describe your process(es) for identifying, assessing and responding to climate-related risks and opportunities.

Value chain stage(s) covered

Direct operations
Upstream
Downstream

Risk management process

Integrated into multi-disciplinary company-wide risk management process

Frequency of assessment

More than once a year

Time horizon(s) covered

Short-term
Medium-term
Long-term

Description of process

[Process Details]
The selection and evaluation of significant company-wide risks at NSHD and the deliberation of measures to address them are centralized in the Global Risk Management Committee, which meets once a year. Climate change risk is also included in the risks to be considered by the meeting, and any risks that may have an impact, whether short-term (1 year), medium-term (10 years), or long-term (20 years) risks, are discussed, and the results of the meeting are reported to the Board of Directors. Risk selection takes into account not only direct operations, but also upstream and downstream, including NSHD's customers and suppliers.
The identified risks are reflected in the business strategy through the Global Strategy Review Committee. The Global Strategy Review Committee is held once a year to confirm the strategies of each operating company for the preparation of the next year's budget. At the same meeting, the operating companies report their strategies for sustainability based on the risks identified by them, which includes climate change issues. The results of the meeting are reported to the Board of Directors in the form of a budget proposal.
The Technology Risk Liaison Conference takes the lead in risk response. Based on the results of the Global Strategy Review Committee, NSHD and each operating company discuss risks, including climate change issues, individually to resolve the risks. This risk committee meeting is held at least twice a year for each operating company, and risk countermeasures, including climate change issues, are disseminated throughout the company.

[Identification, Assessment, and Management Process for Climate-Related Risks]

In order to identify long-term climate change-related risks at an early stage, prevent them from materializing, and take prompt action when they do materialize, risk management systems at NSHD companies are mainly handled by the Technology Risk Liaison Conference, the Global Strategy Review Committee, and the Global Risk Management Committee. The importance of risks and opportunities are determined by the Global Risk Management Committee based on "frequency of occurrence multiplied by financial or strategic impact," and the impact on the business is determined once a year by the Global Strategy Review Committee, chaired by the CEO. From there, matters determined by the Global Strategy Review Committee are discussed at the Technology Risk Liaison Conference held by NSHD and each operating company to determine specific countermeasures, after which the countermeasures are implemented globally.

C2.2a

(C2.2a) Which risk types are considered in your organization's climate-related risk assessments?

	relevance & inclusion	Please explain
Current regulation	Relevant, always included	NSHD produces and supplies industrial gases such as oxygen, nitrogen, argon, hydrogen and helium, as well as medical and electronic material gases in Japan, the United States, Europe, Australia and Asia. In Japan, the "Global Warming Tax" was implemented in stages from October 1, 2012, and the increase to the final tax rate scheduled at the time of its introduction was completed on April 1, 2016. NSHD used 35,196 TJ of energy in its Japan Gas operations in FYE2023, which, when converted to OECD tons of oil equivalent, amounts to 800,611 tons of gasoline. Currently, 760 yen per kℓ of oil is taxed, but if the "Global Warming Tax" is increased to achieve carbon neutrality by FYE2050, it may lead to increased costs and a reduction in profits. If the tax is increased by 250 yen per kℓ, an additional cost of 200.2 million yen would be incurred.
Emerging regulation	Relevant, always include	As decarbonization efforts accelerate worldwide, including Europe, Japan announced in October 2020 its policy to become carbon neutral by FYE2050. In order to achieve this goal, it is expected that regulations and initiatives that are being evaluated in Europe, such as carbon taxes and emissions trading, will be introduced in Japan in the future. Taiyo Nippon Sanso emits approximately 2,054 [thousand tCO2] in FYE2023, which requires an additional cost of 20,540 million yen, assuming a CO2 unit cost of 10,000 yen/t-CO2 of the European carbon tax. This is equivalent to approximately 65% of NSHD's operating income in Japan, which could lead to a significant decrease in NSHD's profits and make it difficult to manage its business.
Technology	Relevant, always	NSHD has three fundamental technologies that support its industrial gas and electronics businesses: plant engineering technology, led by air

	include	separation equipment; gas handling technology, which produces, mixes, and purifies a wide variety of gases; and gas application (gas utilization) technology, which proposes gas utilization technologies for the three basic technologies. Among these are, gas application technology using industrial gases as the main technology that can contribute to the reduction of GHG emissions. However, if, for example, the contribution of oxygen burners in reducing GHG emissions is inferior to that of other companies' products in terms of efficiency, it would affect sales of oxygen burners and other products that NSHD sells to reduce electricity use in industrial furnaces, especially due to growing environmental concerns, and there is also a risk of losing commercial rights to oxygen itself. We recognize that this is a technological risk in that business risk may arise without continued technological development, and for this reason NSHD is working to maintain the technological superiority of its oxygen burners and other products through aggressive investment in R&D (research and development) for commercial products that contribute to the environment.
Legal	Relevant, always include	Failure to reduce the large volume of GHG gas emissions poses the same risk of new lawsuits from the public as environmental problems caused by hazardous substances in the past. In recent years, there have been cases in other countries where lawsuits have been filed by shareholders and other stakeholders for inadequate disclosure of information on climate change issues and their reflection in business strategies. Although NSHD has never been subject to such lawsuits, NSHD has four sites in Japan that emit over 100,000 tons of GHGs, and it is reasonable to consider that there is a risk of lawsuits from stakeholders and the general public.
Market	Relevant, always include	NSHD's core business, the production of industrial gases, requires significant amounts of electricity in the manufacturing process. Most of this power consumption is used to operate air separation equipment, which in FYE2023 used a total of 10,443 GWh of electricity across all of NSHD's major consolidated subsidiaries. The power is purchased from major power companies, making it difficult for NSHD to reduce its own CO2 emission coefficient due to a stable supply. If market demand for industrial gas produced by low-carbon power increases and low-carbon power is added to the selection criteria, there is a risk that NSHD, which has difficulty reducing its CO2 emission coefficient any further, will see its market share shrink. To avoid this risk, the financial impact of these market changes should be assessed during the risk assessment process and, if necessary, consideration should be given to transitioning to a utility with a higher renewable energy content.
Reputation	Relevant, always included	NSHD's core business, the production of industrial gases, requires significant amounts of electricity. With the growing awareness of climate change as a serious global environmental issue, companies with high GHG emissions are generally considered to have a negative impact on the climate and are therefore at risk of their stock price declining and not being able to attract funds from investors. However, since it is difficult to reduce

		the CO2 emission coefficient of electricity, we believe that the biggest challenge is to make customers and investors aware of how industrial gases themselves contribute to the environment. Therefore, NSHD is working to demonstrate to customers and investors that it is an environmentally conscious company by disclosing its direct environmental initiatives and the GHG emission reductions that customers can achieve through the use of NSHD's products.
Acute physical	Relevant, always included	Industrial gas is in demand throughout Japan and is regularly transported by tanker trucks. There is always a risk that the supply of liquefied gas to customers may be stopped due to earthquakes, typhoons, or other factors. However, NSHD has production facilities throughout Japan and is able to respond to physical disasters by delivering to customers by tanker trucks from other locations and by making advance deliveries based on weather forecasts and other predictions.
Chronic physical	Relevant, always included	NSHD's core business is the production of industrial gases, which accounts for 79% of total group sales. The plant uses water to flush and cool the air taken in during the production of industrial gas, and the annual water withdrawal volume is approximately 44.95 million m3. When water resources become scarce due to changes in rainfall patterns and droughts caused by climate change, the plant will be unable to produce industrial gas, resulting in lost sales opportunities and a significant impact on NSHD's sales. In addition, if the global average temperature rises, there is a risk that the power usage of the raw air compressors in the air separation equipment will increase, resulting in higher electricity consumption. As a result, product costs will increase as average temperatures rise, and NSHD earnings will be affected if this price increase is not reflected in product prices. The correlation between rising temperatures and electricity usage is monitored by plant operators through monthly monitoring of energy costs, and NSHD assesses the financial impact of these temperature increases in its risk assessment process based on the results of the IPCC scenario analysis.

C2.3

(C2.3) Have you identified any inherent climate-related risks with the potential to have a substantive financial or strategic impact on your business?

Yes

C2.3a

(C2.3a) Provide details of risks identified with the potential to have a substantive financial or strategic impact on your business.

Identifier

Risk 1

Where in the value chain does the risk driver occur?

Direct operations

Risk type & Primary climate-related risk driver

Market

Changing customer behaviours

Primary potential financial impact

Decreased revenues due to reduced demand for products and services

Company-specific description

In response to the abnormal weather caused by climate change in recent years, the Paris Agreement, an international accord to combat the global rise in temperatures, has come into effect with increasing support and action around the world. In Japan, a national declaration to become carbon neutral by FYE2050 was announced in October 2020. In this business environment, NSHD's Taiyo Nippon Sanso uses large amounts of electricity in the manufacturing process of the industrial gas business which accounts for more than 50% of sales. Specifically, more than 99% of the 10,477 GWh of electricity used by NSHD in FYE2023 was used in industrial gas operations around the world, the majority of which was spent to operate air separation equipment. As a result, there is a risk that existing industrial gas production processes that use large amounts of electricity will be shunned by customers in the steel and chemical sectors, who are pushing for decarbonization initiatives, resulting in lower sales. If 10% of existing customers were to exclude NSHD from their industrial gas supply processes, sales would decrease by approximately 28,290 million yen.

Time horizon

Long-term

Likelihood

Very likely

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

28,290,000,000

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

Of NSHD's overall sales of 1,188,600 million yen in FY2022, 68%, excluding equipment and construction sales, is due to NSHD's industrial gas business in Japan, which accounts for 35% of NSHD's total sales in Japan. If 10% of these customers were to exclude NSHD from the industrial gas supply process as a result of increased environmental awareness, sales would decrease by 1,188,600-million-yen x 35% x 68% x 10% = 28,290 million yen.

Cost of response to risk

161,000,000

Description of response and explanation of cost calculation

[Situation]
With the formulation of the Paris Agreement, efforts to reduce CO2 and other GHGs throughout the supply chain are being promoted around the world. Our group is developing the industrial gas business in Japan, Europe, and the U.S., where electricity consumption is very large, and there is a risk that sales may decrease due to moves by existing customers to review their supply chains in response to heightened environmental awareness. If 10% of our customers in the industrial gas business in Japan were to exclude our group from the industrial gas supply process due to increased environmental awareness, we estimate that our sales would decrease by approximately 28,290 million yen.
[Task]
Given this business environment, our group needs to reduce GHG emissions in the industrial gas production process so that we can continue to receive business from environmentally conscious customers.
[Action]
To address these issues, we are reviewing existing industrial gas production processes and working to reduce GHG emissions through the promotion of the introduction of carbon-free (H2, NH3) combustion technology and research and development on the use of oxygen combustion. The NSHD Group has engaged in research and development of oxygen combustion technologies for more than half a century, contributing to GHG reduction. Specifically, Taiyo Nippon Sanso's Yamanashi Solutions Center, the NSHD Group's R&D center established in 1989, is developing oxygen combustion technologies for a variety of applications. Oxyfuel combustion technology is an environment in which highly pure oxygen is added to air to increase the oxygen concentration in the air to 21% or higher to improve combustion efficiency. This technology can be applied to various applications such as high temperature heating furnaces and melting furnaces as a technology that contributes to energy conservation and CO2 emission reduction.
[Result]
With the progress of research and development of oxygen combustion technology, reductions in GHG emissions in general industrial furnaces are expected to amount to several tens of thousands of tons. By deploying oxygen combustion technology, we will convert air combustion in industrial furnaces in various industries to oxygen-enriched

combustion, and we will continue to do business with existing environmentally conscious customers to help them achieve carbon neutrality.
[Breakdown of Risk Response Costs]
The company plans to invest a total of 161 million yen (personnel expenses + test material expenses + equipment investment and loan) in efforts to establish carbon-free related technologies. We believe that the establishment of carbon-free related technologies will greatly reduce the risk of declining sales.

Comment

Identifier
Risk 2

Where in the value chain does the risk driver occur?
Direct operations

Risk type & Primary climate-related risk driver
Emerging regulation
Carbon pricing mechanism

Primary potential financial impact
Increased indirect (operating) costs

Company-specific description
In response to the abnormal weather caused by climate change in recent years, the Paris Agreement, an international treaty to combat climate change, has come into effect, and action is being taken globally. In October 2020, Japan also announced its policy to achieve carbon neutrality by 2050. In order to achieve this goal, regulations and initiatives that are being evaluated in Europe, such as carbon taxes and emissions trading, are expected to be introduced in Japan in the future, and this poses a risk of increasing NSHD's direct costs. The Taiyo Nippon Sanso Group's GHG emissions for the fiscal year ending March 31, 2023 were 2,054,000 t-CO2, and if carbon taxes or other taxes under carbon pricing mechanisms are introduced, there is a possibility of an increase in direct costs due to the increased tax burden. For example, according to the IEA's 2022 Report, if a carbon tax were introduced to achieve carbon neutrality by 2050, it is assumed that a carbon tax of 15,365 yen/t carbon tax would be imposed in 2030. In that case, the tax burden would increase by approximately 31,560 million yen, an amount equivalent to the operating income of the Taiyo Nippon Sanso Group, posing a risk that would have a significant impact on our business. If we increase our gas production in the future, we may face a further tax burden due to the increase in Scope 2 emissions, which may be a problem, and there is a risk that this may lead to a significant decrease in our profits.

Time horizon
Long-term

Likelihood

Very likely

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

31,560,000,000

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

NSHD's overall GHG emissions are approximately 2,054,000 t-CO2 in FYE2023, and according to the IEA's 2022 report, if a carbon tax were introduced to achieve carbon neutrality by FYE2050, a carbon tax of 15,365 yen/t in FYE2030 would be imposed. It is assumed that a carbon tax of ¥15,365/t would be imposed. In this case, the tax burden would increase by 31,560 million yen. The formula is as follows: 2,054,000 t-CO2 × 15,365 yen/ton = 31,560 million yen

Cost of response to risk

10,000,000,000

Description of response and explanation of cost calculation

[Situation]
Tighter environmental regulations such as carbon pricing in countries around the world, especially in Japan, are expected in the future. The total GHG emissions of the entire Taiyo Nippon Sanso Group in FYE2023 are 2,054,000 t-CO2, and if we do not work to reduce GHG emissions, we may be liable for a tax burden of approximately 31,560 million yen when environmental regulations such as carbon taxes are assigned.
[Task]
As the primary company for operating NSHD's core business, the electricity used at Taiyo Nippon Sanso to produce nitrogen, oxygen, and argon, its main products, accounts for more than 98% of CO2 emissions. This needs to be reduced first and foremost in order to meet the risk of tighter environmental regulations in Japan.
[Action]
NSHD has established the "Carbon Neutral Program I" which states the goal to achieve carbon neutrality by FYE2050. Toward this goal, NSHD replaced the air separation equipment used in its gas production business at the JFESC Kurashiki Plant in FYE2017, which reduced CO2 emissions by approximately 40,000 t-CO2. Furthermore, in FYE2024, the Fukuyama Plant of JFESC will replace its air separation unit with a state-of-the-art unit capable of producing 48,000 Nm3/h of oxygen gas, 82,000 Nm3/h of nitrogen gas, and 1,580 Nm3/h of liquid argon, thereby reducing CO2 emissions by over

10,000 t-CO emissions will be reduced. In addition, the plant's product yield could be improved by introducing simulator-based automatic control into the operation of the air separation unit. The same amount of electricity can be used to increase the flow of product gas, thus reducing the amount of carbon dioxide emissions. Currently, only one plant in Japan has introduced this system, but we are working to increase that number.
[Results]
Taiyo Nippon Sanso reduced GHG emissions by 18% in FYE2023 compared to FYE2019 by replacing equipment and improving the efficiency of energy usage. This reduction was largely due to the replacement of air separation equipment and the optimization of air separation equipment operation using a simulator.
[Breakdown of Risk Response Costs]
The investment for a complete set of air separation equipment is expected to amount to approximately 10,000 million yen.

Comment

Identifier

Risk 3

Where in the value chain does the risk driver occur?

Direct operations

Risk type & Primary climate-related risk drive

Acute physical
Cyclone, hurricane, typhoon

Primary potential financial impact

Increased capital expenditures

Company-specific description

NSHD's Taiyo Nippon Sanso mainly produces industrial gases and has 35 gas production plants. If climate change intensifies and there is an increase in heavy rainfall and strong winds in the future, the air separation equipment that produces industrial gases at these plants may break down due to these effects. Failure of such equipment could make it difficult to supply products to customers in a stable manner, which could result in a large decrease in profits. In addition, the cost burden assumed in the event of equipment failure due to abnormal weather conditions could reach several hundred million yen. It is necessary to respond to the risk of breakdowns of components of air separation equipment.

Time horizon

Short-term

Likelihood

Unlikely

Magnitude of impact

Medium

Are you able to provide a potential financial impact figure?

Yes, an estimated range

Potential financial impact figure (currency)

<Not Applicable>

Potential financial impact figure – minimum (currency)

100,000,000

Potential financial impact figure – maximum (currency)

3,000,000,000

Explanation of financial impact figure

The amount of damage caused by equipment failure of air separation equipment varies greatly depending on the equipment that fails. It also depends greatly on the scale of the air separation equipment. If an air compressor were to fail due to a lightning strike, the cost per unit would range from 100 million yen to 3,000 million yen. This cost is calculated from equipment facility costs and response personnel costs. In addition, gas production plants are equipped with multiple air separation units, and damage to the air compressors of many air separation units could increase the cost of damage by up to several hundred million yen.

Cost of response to risk

110,000,000

Description of response and explanation of cost calculation

[Situation]
Recently in Japan, typhoons and other weather disasters have become more severe due to factors such as the global rise in temperatures. Typhoon No. 14 in FYE2022 caused flooding, collapsed buildings, and other damage in many parts of Japan. This increase in climate related damage due to extreme weather events poses a risk of equipment failure at Taiyo Nippon Sanso, a group company at NSHD.
[Task]
Currently, Taiyo Nippon Sanso has 35 gas production plants, and several air separation systems are installed in gas production plants. In the event of an air separation unit failure due to flooding caused by abnormal weather or extreme wind damage, the total cost of the equipment and personnel to respond to the failure would be more than 100 million yen per unit, which is a significant increase in costs. Therefore, it is necessary to reduce the financial risk to NSHD by purchasing insurance.
[Action]
Taiyo Nippon Sanso has purchased comprehensive property insurance for restoration from fire or accident caused by abnormal weather conditions at its 35 gas production plants nationwide for air separation equipment and other manufacturing facilities. The coverage includes fire, lightning, property damage, explosion, wind, hail, snow, theft, electrical and mechanical accidents, and other accidental damage. Therefore, even if

the components of the air separation system are damaged due to extreme weather conditions, the loss will not exceed the insured amount.
[Result]
To date, no major financial losses have been incurred as a result of extreme weather events. We can also protect against the financial risk of future disasters by continuing to purchase insurance.
[Breakdown of Risk Response Costs]
The cost paid to the insurance company under the relevant property comprehensive insurance is calculated by multiplying the number of plants by the guaranteed amount, resulting in an annual cost of approximately 110 million yen.

Comment

C2.4

(C2.4) Have you identified any climate-related opportunities with the potential to have a substantive financial or strategic impact on your business?

Yes

C2.4a

(C2.4a) Provide details of opportunities identified with the potential to have a substantive financial or strategic impact on your business.

Identifier

Opp1

Where in the value chain does the opportunity occur?

Downstream

Opportunity type

Markets

Primary climate-related opportunity driver

Access to new markets

Primary potential financial impact

Increased revenues through access to new and emerging markets

Company-specific description

With the formulation of the Paris Agreement, various initiatives aimed at carbon neutrality have been attracting attention. NSHD supports a wide range of industries from our core industries such as steel, chemicals, automobiles, and construction to food and medical fields, with our industrial gas business, which accounts for more than 50% of our sales. From the perspective of our wide-ranging customers with differing gas needs,

there is an opportunity to expand sales by entering new markets related to carbon neutrality. Specifically, there is an opportunity for NSHD to enter new markets by responding to growing demand for oxygen gas burners that convert fossil fuels to green fuels, meaning carbon dioxide is not emitted during combustion, as well as demand for CO2 capture through CCUS (Carbon Capture Utilization and Storage).

Time horizon

Long-term

Likelihood

More likely than not

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

400,000,000

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

Taiyo Nippon Sanso, which operates NSHD's gas business in Japan, sells various industrial gases such as oxygen, nitrogen, and argon, and manufactures and sells related equipment. By expanding sales of hydrogen-oxygen burners that do not emit CO2 during combustion, the company expects to reduce GHG emissions of its customers by approximately 20,000 t-CO2e and achieve sales of approximately 400 million yen by FYE2030.
Projection for FYE2030: 40 oxygen burners x 10 million yen/unit = 400 million yen

Cost to realize opportunity

199,000,000

Strategy to realize opportunity and explanation of cost calculation

[Situation]
Under the Paris Agreement, various measures are being taken around the world to reach carbon neutrality. For example, demand for green fuels that do not emit carbon dioxide during combustion and demand for CO2 capture for CCUS (Carbon Capture Utilization and Storage) is growing, and attention to these new markets is increasing. NSHD, whose industrial gas business accounts for more than 50% of sales, supporting a wide range of industries from our core industries such as steel, chemicals, automobiles, and construction to the food and medical industries, sees an opportunity to

expand sales by entering new markets such as CCUS and green fuels related to carbon neutrality. We believe there are opportunities to expand sales by entering new markets such as CCUS and green fuel related to carbon neutrality.
[Task].
As a response to these changing trends and demands, it is essential for NSHD to enter new carbon neutral related markets and expand relevant sales.
[Action]
In light of these challenges, NSHD is collaborating with Taiheiyo Cement Corporation on a CO2 liquefaction process that is needed in the development of the carbon-recycling cement manufacturing process technology by NEDO (New Energy and Industrial Technology Development Organization). This collaboration is also a part of our CCUS business initiatives. In FYE2022, a CO2 liquefaction facility was installed at the Kumagaya Plant of Taiheiyo Cement Corporation. The plant recycles CO2 emitted from the cement manufacturing process and reuses it as cement and civil engineering materials. In April 2022, we succeeded in a demonstration test of glass melting by 100% hydrogen combustion using a hydrogen-oxygen burner and achieved a significant reduction in CO2 emissions from the melting furnace. The above demonstration success has also resulted in the installation of our oxygen burners for glass melting furnaces in different facilities.
[Results]
With our entry into this new market, we expect sales of approximately 400 million yen in 2030.As we will continue our efforts to enter new markets related to carbon neutrality, we have decided to allocate 38,000 million yen over four years of strategic investments, including carbon neutrality, in the NSHD Medium-term Management Plan "NS Vision 2026" formulated in 2022.
[Costs to realize the opportunity].
For the wider use and implementation of CCUS and green fuel as described above, we have successfully invested 199 million yen (labor + test material + equipment investment) to develop CO2 liquefaction facilities, hydrogen-oxygen burners, and other products.

Comment

Identifier

Opp2

Where in the value chain does the opportunity occur?

Downstream

Opportunity type

Products and services

Primary climate-related opportunity driver

Development and/or expansion of low emission goods and services

Primary potential financial impact

Increased revenues resulting from increased demand for products and services

Company-specific description

Taiyo Nippon Sanso, which operates NSHD's gas business in Japan, sells various industrial gases such as oxygen, nitrogen, and argon, as well as manufactures and sells related equipment. With the recent increase in environmental awareness in society, there is a growing demand to implement measures to combat climate change, and one of these measures is to reduce CO2 emissions that result from business activities. This is also true for industrial gas suppliers, NSHD's core business. The estimated potential demand for oxygen for industrial furnaces is 2.1 billion Nm3, of which, assuming a 50% commercial rights acquisition rate and sales of oxygen gas at ¥10/Nm3, sales of over ¥10,000 million are expected, which is 1% of NSHD's total sales revenue, making this a very significant opportunity. This represents 1% of NSHD's total sales revenue, and a significant opportunity. In addition, the oxygen burners that NSHD is focusing on developing will enable ammonia combustion in industrial furnaces, and since ammonia combustion emits zero CO2 during combustion, further demand is expected as a result of future trends toward climate change countermeasures.

Time horizon

Medium-term

Likelihood

Likely

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

10,500,000,000

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

Taiyo Nippon Sanso, the company in NSHD that handles the Japanese gas, sells various industrial gases such as oxygen, nitrogen, and argon, in addition to the manufacture and sale of related equipment. The estimated potential demand for oxygen for industrial furnaces is 2.1 billion Nm3, of which, assuming a 50% commercial rights acquisition rate and sales of oxygen gas at 10 yen/Nm3, sales of over 10.5 billion yen can be expected. The trial calculation formula is as follows:
Total market demand for oxygen: 2,100,000,000Nm³ x acquisition rate of commercial rights: 50% x unit price of oxygen gas: 10 yen/Nm³ = 10,500,000,000

Cost to realize opportunity

1,600,000,000

Strategy to realize opportunity and explanation of cost calculation

[Situation]
Following the trend toward carbon neutrality that has begun in the U.S. and Europe, companies in Japan are being asked to take steps to reduce GHG emissions. The same is true for companies operating industrial gas furnaces, many of which are considering shifting from fossil fuels to carbon-free fuels such as ammonia. NSHD's development of oxygen burners utilizing ammonia (NH3) is expected to increase demand for oxygen gas used for combustion in NSHD's industrial furnaces.
[Task]
Utilization of NH3 in combustion can produce large amounts of harmful nitrogen oxides (NOx) when combusted because it contains nitrogen. In addition, no carbon particles (soot) are generated, and heat transfer inside the blast furnace by radiation cannot be expected, which poses a challenge for development.
[Action]
At Taiyo Nippon Sanso, where NSHD's Japanese gas business is operated, development of an oxygen burner utilizing NH3 began in FYE2014, and in FYE2019, an oxygen-enriched combustion method, which increases the oxygen concentration in the air combined with a 30% ammonia - city gas mixture fuel to enhance the flame's radiation heat transfer, was established to suppress the formation of nitrogen oxides, a toxic substance, while enhancing the capacity of the flame.
[Result]
The above technology is expected to significantly reduce CO2 emissions from industrial gas furnaces. In FYE2025, NSHD will be awarded a contract to install oxygen gas generators (oxygen PSAs) in actual industrial furnaces for customers who have installed oxygen burners that utilize NH3. We also plan to install oxygen gas generators (oxygen PSAs) in industrial furnaces by FYE2030. The Company expects to receive 40 orders by FYE2030 and the associated contracts for supplying oxygen gas.
[Costs to Realize the Opportunity]
In order to realize an oxygen supply that meets demand, it will be necessary to install approximately 40 oxygen PSA units with an oxygen generation capacity of 3,000 Nm^3/h (approximately 400 million yen). Therefore, a capital investment of 1,600 million yen ([PSA installation cost: 400 million yen]/[amortization period: 10 years]×40 units) would be required.

Comment

Identifier

Opp3

Where in the value chain does the opportunity occur?

Downstream

Opportunity type

Products and services

Primary climate-related opportunity driver

Development and/or expansion of low emission goods and services

Primary potential financial impact

Increased revenues resulting from increased demand for products and services

Company-specific description

In recent years, companies have been encouraged to take action to combat climate change, and one of the ways to do this is to reduce CO2 emissions in their business activities. In response to recent efforts to decarbonize society, we recognize that the steel industry has a strong need to reduce CO2 emissions, and if NSHD successfully develops oxygen combustion technology through our R&D Yamanashi Solutions Center we expect demand for not only that technology to be high, but also demand for NSHD's oxygen gas is expected to increase accordingly. The oxygen blast furnace under development is expected to increase oxygen demand by 2.5 billion Nm^3 per year, and if oxygen gas is sold at 10 yen/Nm3, sales are expected to increase by 25,000 million yen, which is a significant opportunity representing 3% of total group sales, a significant impact.

Time horizon

Medium-term

Likelihood

Likely

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

25,000,000,000

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

In recent years, it has become expected of companies to implement climate change countermeasures in their activities, and one such measure is the reduction of CO2 emissions in business activities. Our advanced oxygen blast furnace under development

is expected to increase annual oxygen demand by 2.5 billion Nm3, and if oxygen gas is sold at 10 yen/Nm3, sales are expected to increase by 25,000 million yen. The trial calculation formula is as follows:
Annual demand for an advanced oxygen blast furnace: 2,500,000,000 Nm3 × unit price of oxygen gas: 10 yen = 25,000,000,000 yen

Cost to realize opportunity

118,000,000

Strategy to realize opportunity and explanation of cost calculation

[Situation]
The carbon neutrality movement in prevalent in the U.S. and Europe has influenced calls for companies to reduce GHG emissions in their business activities, specifically in the steel industry to which NSHD provides oxygen gas. During the production of pig iron through blast furnaces, large amounts of CO2 are emitted and reducing these emissions has become a major industry issue. As an industrial gas supplier, we believe that we can expand our opportunities to clientele by developing technologies that reduce CO2 emissions.
[Task]
It is imperative we develop technologies that contribute to the reduction of CO2 emissions in the steel business.
[Action]
The Yamanashi Solutions Center, NSHD's R&D center, is currently researching and developing oxygen combustion technology. Oxyfuel combustion technology looks to improve combustion efficiency by adding high-purity oxygen to tributary gases and using an environment in which the oxygen concentration in the air is 21% or higher, which produces a higher flame temperature and reduces the nitrogen content in the tributary gas compared to air combustion. This gives way to a reduction the energy carried away as exhaust gas, leading to better energy savings and lower CO2 emissions. This technology can be applied to various uses such as high temperature heating furnaces and melting furnaces as a technology that contributes to energy conservation and CO2 emission reduction.
[Results]
As a result of this technology, the demand for oxygen produced by NSHDs is expected to be 2.5 billion Nm3 as this technology, which can be applied to various combustion applications such as heating furnaces and melting furnaces, contributes to energy conservation and CO2 emission reductions. In the future, we aim to convert air combustion to oxygen combustion in new blast furnaces in various steel industries as we further develop combustion technology.
[Cost to Realize Opportunity]
To realize this oxygen combustion technology, we will invest 118 million yen (labor + test materials + equipment investment) to develop an oxygen burner that can be applied to oxygen blast furnaces.

Comment

C3. Business Strategy

C3.1

(C3.1) Does your organization's strategy include a climate transition plan that aligns with a 1.5°C world?

Row 1

Climate transition plan

Yes, we have a climate transition plan which aligns with a 1.5°C world

Publicly available climate transition plan

Yes

Mechanism by which feedback is collected from shareholders on your climate transition plan

We have a different feedback mechanism in place

Description of feedback mechanism

In line with our Medium-term Management Plan, we actively disclose information, such as our TCFD scenario analysis, and take questions regarding the information at our earnings presentations.

First, we publish information about our Group's sustainability efforts on the Nippon Sanso Holdings website. Specifically, we disclose information on an array of topics, including our materiality, Medium-term Management Plan, and CDP answers. Based on the TCFD framework, we also publish the risks and opportunities under "transitional scenarios" and "physical climate scenarios", as well as our process for identifying, assessing and managing climate change related risks. Furthermore, our Group has continuously published a report every year on our environmental and societal activities since 2005. Since 2017, combining it with our annual report, we publish our "integrated report" once a year, and all data after 2005 is available on our website for anyone to view. There also regular IR seminars targeting individual investors, and in the November 2021 seminar (presented by the Senior Executive Officer CSO, and Head of IR) our corporate profile, performance, and other sustainability policies were the primary topics introduced. In addition, during the May and November financial statement briefings (presented by the Representative Director, President CEO) we took questions on climate change related issues. Going beyond those presentations, we have a “general inquiries” form on our public website as a means of speaking with our stakeholders (by email). Through the above methods, we are not merely disclosing information to our

shareholders, but also creating opportunities and platforms for communication, which we believe is fulfilling as a mechanism for feedback.

Frequency of feedback collection

More frequently than annually

Attach any relevant documents which detail your climate transition plan (optional)

C3.2

(C3.2) Does your organization use climate-related scenario analysis to inform its strategy?

	Use of climate-related scenario analysis to inform strategy
Row 1	Yes, qualitative and quantitative

C3.2a

(C3.2a) Provide details of your organization's use of climate-related scenario analysis.

Climate-related scenario	Scenario analysis coverage	Temperature alignment of scenario	Parameters, assumptions, analytical choices
Transition scenarios IEA NZE 2050	Company-wide	<Not Applicable>	In November 2019, NSHD expressed its support for the FSB's (Financial Stability Board) TCFD recommendations. Regarding climate change, one of our identified materiality's, according to the TCFD recommendations, we explored the risks and opportunities related to "transitional scenarios" and "physical climate scenarios". Substantial negative financial impacts are viewed as risks, and positive impacts are viewed as opportunities. For the "Transition Scenario," we used the International Energy Agency's (IEA) Net Zero 2050 (NZE 2050) as a reference and carbon prices of FYE2040 205$/CO2-t and FYE2050 250$/CO2-t for developed countries to estimate risk impacts.
Transition scenarios IEA SDS	Company-wide	<Not Applicable>	In November 2019, NSHD expressed its support for the FSB's (Financial Stability Board) TCFD recommendations. Regarding climate change, one of our identified materiality, according to the TCFD recommendations, we explored the risks and opportunities related to "transitional scenarios" and "physical climate scenarios". Substantial negative financial impacts are viewed as risks, and positive impacts are

			viewed as opportunities. For "transitional scenarios", we referred to the International Energy Agency's (IEA) Sustainable Development Scenario (SDS); using the green hydrogen and blue hydrogen production ratio parameters of 36% in FYE2030 and 88% in FYE2050 we calculated the costs of opportunity.
Physical climate scenarios RCP 8.5	Company-wide	<Not Applicable>	In November 2019, NSHD expressed its support for the FSB's (Financial Stability Board) TCFD recommendations. Regarding climate change, one of our identified materiality, according to the TCFD recommendations, we explored the risks and opportunities related to "transitional scenarios" and "physical climate scenarios". Substantial negative financial impacts are viewed as risks, and positive impacts are viewed as opportunities. For "physical climate scenarios", we referred to the global warming scenario (RCP 8.5) from the UN IPCC's (Intergovernmental Panel on Climate Change) 5th assessment (published in FYE2014). Utilizing a CO2 concentration greater than 1000ppm, the average rise in temperatures would be between 3.2~5.4℃ by FYE2100. Per our analysis based on those numbers, the efficiency of our air separation units would decrease, leading to a decrease in profit. Additionally, regarding the rise in sea levels, we used the parameters showing a 13cm increase in FYE2030 and a 25cm increase in FYE2050 to calculate flood risks.

C3.2b

(C3.2b)) Provide details of the focal questions your organization seeks to address by using climate-related scenario analysis and summarize the results with respect to these questions.

Row 1

Focal questions

The Paris Agreement, an international framework to combat global warming, since coming into effect has caused a response from countries around the world.
In Japan, a policy to become carbon neutral by FYE2050 was announced in October 2020. In order to achieve this goal, it is expected that regulations and initiatives that are being evaluated in Europe, such as carbon taxes and emissions trading, will be introduced in Japan in the future. There is a risk that indirect costs will increase as these new regulations on CO2 emissions come into effect.

Results of the climate-related scenario analysis with respect to the focal questions

The total annual combined emissions of Taiyo Nippon Sanso's Scope 1 and Scope 2 are approximately 2.2 million t-CO2, which, assuming a CO2 unit price of the IEA carbon tax FYE2040 140$/CO2-t, would result in a tax burden of 42 billion yen and a loss of approximately 10 billion yen in our operating income in Japan. Further tax burden is considered to be an issue as Scope 2 emissions will increase if gas production is increased in the future, and efforts are being made to expand the introduction of renewable energy through the introduction of PPAs and Green Power Certificates. As a result, approximately 6% of NSHD's electricity is generated from renewable energy sources, contributing to the reduction of GHG emissions. In March 2021, NSHD developed the SCOPE-Jet SCAN. This technology controls oxygen and fuel supply by analyzing furnace temperatures, thereby increasing oxygen utilization efficiency. Efficient fuel use can contribute to the reduction of CO2 emissions.

C3.3

(C3.3) Describe where and how climate-related risks and opportunities have influenced your strategy.

	Have climate-related risks and opportunities influenced your strategy in this area?	Description of influence
Products and service	Yes	Our main products are oxygen, nitrogen, and argon, and since the raw material is air, there are almost no raw material costs. Primarily, only energy costs are present as large quantities of electricity to use the air separation units to take air in from the atmosphere is required. Therefore, since increases or decreases in energy consumption directly affect profits, in order to strengthen sales expansion activities backed by cost competitiveness, it is essential to reduce costs by improving the base electricity per unit of production (Nm3/kWh) through energy-saving measures for the air separation units that produce bulk gas. We are working on environmental and social awareness in all processes of our business activities (value chain), from development and production, to supply, sales, and product use. We are also working to reduce energy intensity through development and design, replacement of components of air separation equipment with high efficiency machines, and optimization of plant operations in response to demand trends. At the same time, climate change issues are becoming a challenge, and we believe that we have an opportunity to contribute to solving these issues by providing our innovative gas solutions. As our products

		help other companies reduce their GHG emissions, we calculate and disclose our GHG reductions as our environmental contribution. For example, in order to realize a carbon-neutral society, Taiyo Nippon Sanso's Yamanashi Technology Solutions Center, which is the Group's R&D base, is focusing on oxygen combustion technology. The laboratory is developing oxygen combustion technologies for various applications by utilizing the fundamental technologies owned by the Taiyo Nippon Sanso Group, thereby contributing to energy conservation and reduction of environmental pollutant emissions. Oxyfuel combustion technology is a method of increasing combustion efficiency by adding highly pure oxygen to tributary gases to create an environment with an oxygen concentration of 21% or higher than that of air, which allows for higher flame temperatures than air combustion and reduces the nitrogen content of tributary gases, thereby reducing the energy carried away as exhaust gas.
Supply chain and/or value chain	Yes	Because the raw material for our primary product, bulk gas, is air, we believe effects on the supply chain are extremely limited. However, there is a nationwide demand for industrial gas, which we transport routinely by tanker truck. There is always a risk that the supply of liquefied gas to customers may be stopped due to earthquakes, typhoons, or other disasters. But we are able to manage physical disasters by having production sites throughout the country, enabling us to deliver to customers by tanker truck from other locations, and by making advanced deliveries based on weather forecasts and other predictions.
Investment in R&D	Yes	Our Group's founding ideology includes the idea to be "Proactive. Innovative. Collaborative. Making life better through gas technology. The Gas Professionals". To realize this philosophy, we believe action towards carbon neutrality is an urgent matter. In recent years, the Group has been focusing on the use and application of hydrogen, which is attracting attention as a CO2-free and environmentally friendly energy source — and we are developing and marketing stationary and mobile hydrogen stations using the Group's hydrogen gas supply and handling technologies. The Group has also focused on research and development of hydrogen combustion and ammonia combustion in cooperation with Euro Business. Since hydrogen and ammonia emit no CO2 or air pollutants when combusted, we believe that they can further contribute to the realization of a carbon-neutral society, and the Group is investing in technologies to achieve carbon neutrality from multiple angles and in various aspects. Based on these carbon neutral technologies, we have set a goal that by FYE2026, the amount of GHG reduction contribution from our environmental product offerings and applications will exceed our GHG emissions, and we are promoting our

		response to climate change. In FYE2023, our GHG reduction contribution (products and services) was 3,556 [thousand tons-CO2], an increase of approximately 12% from last year, indicating that we are making steady progress toward our goal.
Operation	Yes	The industrial gas production process, our core business, is electricity-intensive and requires large amounts of power. Most of this power is consumed during the operation of air separation units; reducing our energy consumption is the biggest challenge for us, as any increase or decrease in consumption will directly affect our profits. In addition, reducing energy consumption will lead to reductions in Scope 1 and Scope 2, which will positively contribute to the mitigation of climate change related issues. In recent years, computer performance has improved significantly, making it possible to complete even complex calculations in a relatively short time, and it has become possible to optimize the operation of air separation units using parameters such as the timing of valve opening and closing, vane opening degree, and other parameters. That optimization has been shown to reduce the amount of electricity used by air separation units. We believe that the possibility of reducing electricity consumption by optimizing air separation unit operations using computers is an effective and efficient opportunity for us to reduce manufacturing costs and GHG emissions without requiring special investment. Therefore, our group is deploying computer analysis to our gas production plants to reduce GHG emissions. The project was launched in FYE2018, and by FYE2022, this activity had been deployed to 9 plants in Japan, including Shinyo Sanso Co., Ltd, Shunan, Shin Sagami Sanso Co., Ltd, and Fuji Sanso Co.,Ltd, as well as 2 overseas plants, Leeden National Oxygen Ltd. and Nippon Sanso Ingasco, Inc. The cost of realizing the opportunity was roughly 16-million-yen (labor cost 1 (person) x 1,600 (manhours/person) x 1 (10,000 yen/man-hours) = 16 million yen, assuming 1 researcher, 1,600 man-hours/person per year, and a R&D man-hour unit cost of 10,000 yen per man-hour. Additionally, we are in the process of launching a project using new digital solution technology that will further optimize the project. As a result of the above, electricity consumption was reduced by 6,764,000 kWh/year. Assuming TEPCO's FYE2021 CO2 emission intensity (0.441 kg-CO2/kWh), this result translates into a GHG emission reduction benefit of 2,983 tons-CO2, meaning that the reduction in electricity consumption and the resulting GHG emissions were realized with only an input of labor costs.

C3.4

(C3.4) Describe where and how climate-related risks and opportunities have influenced your financial planning.

	Financial planning elements that have been influenced	Description of influence
Row 1	Revenues Direct costs Indirect costs Capital expenditures Capital allocation Access to capital Liabilities	Since the raw material for industrial gas is air, there is no particular need for raw material costs; only energy, primarily electricity, is required to use air separation units to capture air from the atmosphere. Therefore, reducing our energy consumption is the biggest challenge for us, as any increase or decrease in energy consumption is directly related to our earnings. In addition, reducing energy consumption will lead to a reduction in Scope 1and Scope 2, which will positively contribute to the mitigation of climate change related issues. In recent years, computer performance has improved significantly, making it possible to complete even complex calculations in a relatively short time, and it has become possible to optimize the operation of air separation equipment using parameters such as the timing of valve opening and closing, vane opening degree, and other parameters. That optimization has been shown to reduce the amount of electricity used by air separation units. We believe that the possibility of reducing electricity consumption by optimizing air separation unit operations using computers is an effective and efficient opportunity for us to reduce manufacturing costs and GHG emissions without requiring special investment. Therefore, our group is utilizing computer analysis in our gas production plants to reduce GHG emissions. The project was launched in FYE2017, and by FYE2022, this initiative had been deployed to 9 plants in Japan, including Shinyo Sanso Co., Ltd, Shunan Sanso Co., Ltd., Shin Sagami Sanso Co., Ltd, and Fuji Sanso Co.,ltd, as well as 2 overseas plants, Leeden National Oxygen Ltd. and Nippon Sanso Ingasco, Inc. The cost of realizing the opportunity was roughly 16-million-yen (labor cost 1 (person) x 1,600 (man-hours/person) x 1(10,000 yen/man-hours) = 16 million yen, assuming 1 researcher, 1,600 man-hours/person per year, and a R&D man-hour unit cost of 10,000 yen per man-hour. Additionally, we are in the process of launching a project using new digital solution technology that will further optimize the project. As a result of the above, electricity consumption was reduced by 6,764,000 kWh/year. Assuming TEPCO's FYE2021 CO2 emission intensity (0.441 kgCO2/kWh), this result translates into a GHG emission reduction benefit of 2,983 tons-CO2, meaning that the reduction in electricity consumption and the resulting GHG emissions were realized with only an input of labor costs.

		By further promoting this initiative, we will reduce our GHG emissions and aim to achieve an 18% reduction in GHG emissions by FYE2026, the final year of our Medium-term Management Plan, compared to the FYE2019 levels.

C3.5

(C3.5) In your organization's financial accounting, do you identify spending/revenue that is aligned with your organization's climate transition?

	Identification of spending/revenue that is aligned with your organization's climate transition
Row 1	No, but we plan to in the next two years

C4. Targets and performance

C4.1

(C4.1)) Did you have an emissions target that was active in the reporting year?

Absolute target

C4.1a

(C4.1a) Provide details of your absolute emissions target(s) and progress made against those targets.

Target reference number

Abs 1

Is this a science-based target?

No, but we anticipate setting one in the next two years

Target ambition

<Not Applicable>

Year target was set

2021

Target coverage

Company-wide

Scope(s)

Scope 1

Scope 2

Scope 2 accounting method

Market-based

Scope 3 category(ies)

<Not Applicable>

Base year

2018

Base year Scope 1 emissions covered by target (metric tons CO2e)

1,045,500

Base year Scope 2 emissions covered by target (metric tons CO2e)

5,640,500

Base year Scope 3, Category 1: Purchased goods and services emissions covered by target (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Category 2: Capital goods emissions covered by target (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Category 3: Fuel-and-energy-related activities (not included in Scopes 1 or 2) emissions covered by target (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Category 4: Upstream transportation and distribution emissions covered by target (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Category 5: Waste generated in operations emissions covered by target (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Category 6: Business travel emissions covered by target (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Category 7: Employee commuting emissions covered by target (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Category 8: Upstream leased assets emissions covered by target (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Category 9: Downstream transportation and distribution emissions covered by target (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Category 10: Processing of sold products emissions covered by target (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Category 11: Use of sold products emissions covered by target (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Category 12: End-of-life treatment of sold products emissions covered by target (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Category 13: Downstream leased assets emissions covered by target (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Category 14: Franchises emissions covered by target (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Category 15: Investments emissions covered by target (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Other (upstream) emissions covered by target (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Other (downstream) emissions covered by target (metric tons CO2e)

<Not Applicable>

Base year total Scope 3 emissions covered by target (metric tons CO2e)

<Not Applicable>

Total base year emissions covered by target in all selected Scopes (metric tons CO2e)

6,686,000

Base year Scope 1 emissions covered by target as % of total base year emissions in Scope 1

100

Base year Scope 2 emissions covered by target as % of total base year emissions in Scope 2

100

Base year Scope 3, Category 1: Purchased goods and services emissions covered by target as % of total base year emissions in Scope 3, Category 1: Purchased goods and services (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Category 2: Capital goods emissions covered by target as % of total base year emissions in Scope 3, Category 2: Capital goods (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Category 3: Fuel-and-energy-related activities (not included in Scopes 1 or 2) emissions covered by target as % of total base year emissions in Scope 3, Category 3: Fuel-and-energy-related activities (not included in Scopes 1 or 2) (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Category 4: Upstream transportation and distribution covered by target as % of total base year emissions in Scope 3, Category 4: Upstream transportation and distribution (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Category 5: Waste generated in operations emissions covered by target as % of total base year emissions in Scope 3, Category 5: Waste generated in operations (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Category 6: Business travel emissions covered by target as % of total base year emissions in Scope 3, Category 6: Business travel (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Category 7: Employee commuting covered by target as % of total base year emissions in Scope 3, Category 7: Employee commuting (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Category 8: Upstream leased assets emissions covered by target as % of total base year emissions in Scope 3, Category 8: Upstream leased assets (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Category 9: Downstream transportation and distribution emissions covered by target as % of total base year emissions in Scope 3, Category 9: Downstream transportation and distribution (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Category 10: Processing of sold products emissions covered by target as % of total base year emissions in Scope 3, Category 10: Processing of sold products (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Category 11: Use of sold products emissions covered by target as % of total base year emissions in Scope 3, Category 11: Use of sold products (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Category 12: End-of-life treatment of sold products emissions covered by target as % of total base year emissions in Scope 3, Category 12: End-of-life treatment of sold products (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Category 13: Downstream leased assets emissions covered by target as % of total base year emissions in Scope 3, Category 13: Downstream leased assets (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Category 14: Franchises emissions covered by target as % of total base year emissions in Scope 3, Category 14: Franchises (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Category 15: Investments emissions covered by target as % of total base year emissions in Scope 3, Category 15: Investments (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Other (upstream) emissions covered by target as % of total base year emissions in Scope 3, Other (upstream) (metric tons CO2e)

<Not Applicable>

Base year Scope 3, Other (downstream) emissions covered by target as % of total base year emissions in Scope 3, Other (downstream) (metric tons CO2e)

<Not Applicable>

Base year total Scope 3 emissions covered by target as % of total base year emissions in Scope 3 (in all Scope 3 categories)

<Not Applicable>

Base year emissions covered by target in all selected Scopes as % of total base year emissions in all selected Scopes

100

Target year

2030

Targeted reduction from base year (%)

32

Total emissions in target year covered by target in all selected Scopes (metric tons CO2e) [auto-calculated]

4,546,480

Scope 1 emissions in reporting year covered by target (metric tons CO2e)

1,139,000

Scope 2 emissions in reporting year covered by target (metric tons CO2e)

4,764,000

Scope 3, Category 1: Purchased goods and services emissions in reporting year covered by target (metric tons CO2e)

<Not Applicable>

Scope 3, Category 2: Capital goods emissions in reporting year covered by target (metric tons CO2e)

<Not Applicable>

Scope 3, Category 3: Fuel-and-energy-related activities (not included in Scopes 1 or 2) emissions in reporting year covered by target (metric tons CO2e)

<Not Applicable>

Scope 3, Category 4: Upstream transportation and distribution emissions in reporting year covered by target (metric tons CO2e)

<Not Applicable>

Scope 3, Category 5: Waste generated in operations emissions in reporting year covered by target (metric tons CO2e)

<Not Applicable>

Scope 3, Category 6: Business travel emissions in reporting year covered by target (metric tons CO2e)

<Not Applicable>

Scope 3, Category 7: Employee commuting emissions in reporting year covered by target (metric tons CO2e)

<Not Applicable>

Scope 3, Category 8: Upstream leased assets emissions in reporting year covered by target (metric tons CO2e)

<Not Applicable>

Scope 3, Category 9: Downstream transportation and distribution emissions in reporting year covered by target (metric tons CO2e)

<Not Applicable>

Scope 3, Category 10: Processing of sold products emissions in reporting year covered by target (metric tons CO2e)

<Not Applicable>

Scope 3, Category 11: Use of sold products emissions in reporting year covered by target (metric tons CO2e)

<Not Applicable>

Scope 3, Category 12: End-of-life treatment of sold products emissions in reporting year covered by target (metric tons CO2e)

<Not Applicable>

Scope 3, Category 13: Downstream leased assets emissions in reporting year covered by target (metric tons CO2e)

<Not Applicable>

Scope 3, Category 14: Franchises emissions in reporting year covered by target (metric tons CO2e)

<Not Applicable>

Scope 3, Category 15: Investments emissions in reporting year covered by target (metric tons CO2e)

<Not Applicable>

Scope 3, Other (upstream) emissions in reporting year covered by target (metric tons CO2e)

<Not Applicable>

Scope 3, Other (downstream) emissions in reporting year covered by target (metric tons CO2e)

<Not Applicable>

Total Scope 3 emissions in reporting year covered by target (metric tons CO2e)

<Not Applicable>

Total emissions in reporting year covered by target in all selected scopes (metric tons CO2e)

5,903,000

Does this target cover any land-related emissions?

No, it does not cover any land-related emissions (e.g. non-FLAG SBT)

% of target achieved relative to base year [auto-calculated]

36.5969937182

Target status in reporting year

Underway

Please explain target coverage and identify any exclusions

This target is company-wide and covers almost 100% of Scope 1 and 2 emissions. However, there are some exclusions for some smaller sites, such as overseas sales offices, due to difficulties in obtaining data.

Plan for achieving target, and progress made to the end of the reporting year

The majority of NSHD's GHG emissions come from the use of electricity, with Scope 2 accounting for approximately 83% of total GHG emissions. In the future, the CO2 emission coefficient is expected to decrease as electric power becomes greener. For example, the IEA has published a scenario in which the global CO2 emission factor for FYE2030 will be approximately halved compared to FYE2019. As part of NSHD's efforts to reduce electricity consumption, we are replacing our air separation equipment with state-of-the-art air separation equipment, optimizing computerized operation, and improving energy efficiency. In addition, we will promote initiatives to reduce GHG emissions by shifting to electric power companies with lower emission coefficients and purchasing green power certificates.

Meanwhile, to reduce GHG emissions (Scope 1) in the HyCO business, we will study the conversion to blue hydrogen by combining CCUS (Carbon Capture, Utilization and Storage) technology. Furthermore, as the feedstock for hydrogen production is natural gas, in the future we will also promote other green alternatives, such as the use of biofuels, to reduce GHG emissions (Scope 1).

List the emissions reduction initiatives which contributed most to achieving this target

<Not Applicable>

C4.2

(C4.2) Did you have any other climate-related targets that were active in the reporting year?

Net-zero target(s)

C4.2c

(C4.2c) Provide details of your net-zero target(s).

Target reference number

NZ1

Target coverage

Company-wide

Absolute/intensity emission target(s) linked to this net-zero target

Abs1

Target year for achieving net zero

2050

Is this a science-based target?

No, but we anticipate setting one in the next two years

Please explain target coverage and identify any exclusions

As one of the sustainability programs included in the NSHD Medium-term Management Plan, we have created the Carbon Neutrality Program. We have set FYE2019, the year our European gas businesses and U.S. HyCO were added to the NSHD Group, as the base year with the goal of becoming carbon neutral by FYE2051

Do you intend to neutralize any unabated emissions with permanent carbon removals at the target year?

No

Planned milestones and/or near-term investments for neutralization at target year

<Not Applicable>

Planned actions to mitigate emissions beyond your value chain (optional)

NSHD is committed to becoming carbon neutral through our sustainability activities. Specific activities include further promotion of energy conservation and improvement of energy use efficiency, promotion of renewable energy use and green electricity, CO2 capture and carbon offsets.

C4.3

(C4.3) Did you have emissions reduction initiatives that were active within the reporting year? Note that this can include those in the planning and/or implementation phases.

Yes

C4.3a

(C4.3a) Identify the total number of initiatives at each stage of development, and for those in the implementation stages, the estimated CO2e savings.

	Number of initiatives	Total estimated annual CO2e savings in metric tonnes CO2e (only for rows marked *)
Under investigation	6	
To be implemented *	1	9,036
Implementations commenced*	1	2,983
Implemented*	2	6,597
Not to be implemented	0	

C4.3b

(C4.3b) Provide details on the initiatives implemented in the reporting year in the table below.

Initiative category & Initiative type

Energy efficiency in production processes
Process optimization

Estimated annual CO2e savings (metric tonnes CO2e)

2,983

Scope(s) or Scope 3 category(ies) where emissions savings occur

Scope 2 (location-based)

Voluntary/Mandatory

Voluntary

Annual monetary savings (unit currency – as specified in C0.4)

74,400,000

Investment required (unit currency – as specified in C0.4)

16,000,000

Payback period

<1 year

Estimated lifetime of the initiative

6-10 years

Comment

Initiative category & Initiative type

Energy efficiency in production processes
Machine/equipment replacement

Estimated annual CO2e savings (metric tonnes CO2e)

3,614

Scope(s) or Scope 3 category(ies) where emissions savings occur

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

Annual monetary savings (unit currency – as specified in C0.4)

100,000,000

Investment required (unit currency – as specified in C0.4)

1,224,000,000

Payback period

11-5years

Estimated lifetime of the initiative

1-2 years

Comment

C4.3c

(C4.3c) What methods do you use to drive investment in emissions reduction activities?

Method	Comment
Dedicated budget for energy efficiency	Various energy saving projects at the gas production plant were reviewed and the project to be invested in was decided based on the business environment and cost-effectiveness.

C4.5

(C4.5) Do you classify any of your existing goods and/or services as low-carbon products?

Yes

C4.5a

(C4.5a) Provide details of your products and/or services that you classify as low-carbon products.

Level of aggregation

Product or service

Taxonomy used to classify product(s) or service(s) as low-carbon

No taxonomy used to classify product(s) or service(s) as low carbon

Type of product(s) or service(s)

Other

Other, please specify

MG Shield, an alternative to SF6, a high GWP gas (22,800)

Description of product(s) or service(s)

Molten magnesium oxidizes when exposed to air, meaning it ignites and burns. Therefore, a protective gas is required to block off the molten metal surface from the

air during the melting process. NSHD sells the MG Shield, as a molten magnesium alloy cover gas, which is an alternative to SF6, a high GWP gas (22,800), and therefore contribute to the reduction of the release of SF6 into the atmosphere.

Have you estimated the avoided emissions of this low-carbon product(s) or service(s)

Yes

Methodology used to calculate avoided emissions

Other, please specify

Guidelines for Quantifying GHG emission reductions of goods and services through Global Value Chain (Ministry of Economy, Trade and Industry)

Life cycle stage(s) covered for the low-carbon product(s) or services(s)

Use stage

Functional unit used

1 MG shield gas cylinder

Reference product/service or baseline scenario used

The baseline scenario used was a scenario in which a SF6 was used as a cover gas for molten magnesium

Life cycle stage(s) covered for the reference product/service or baseline scenario

Use stage

Estimated avoided emissions (metric tons CO2e per functional unit) compared to reference product/service or baseline scenario

302

Explain your calculation of avoided emissions, including any assumptions

Three MG Shield cylinders contribute to the reduction of one SF6 container. 302 tons-CO2 can be reduced by one MG Shield gas cylinder, considering that 50 kg of SF6 container (10.25 kg of residual gas) with a GWP of 22,800 could be prevented from being released into the atmosphere.

Revenue generated from low-carbon product(s) or service(s) as % of total revenue in the reporting year

0.02

Level of aggregation

Product or service

Taxonomy used to classify product(s) or service(s) as low-carbon

No taxonomy used to classify product(s) or service(s) as low carbon

Type of product(s) or service(s)

Other

Other, please specify

SCOPE-JET, an oxygen burner

Description of product(s) or service(s)

Electric furnaces are furnaces that use electric energy as a heat source to heat raw steel scrap into molten metal to produce crude steel. We contribute to the electric furnace industry by replacing part of the electric heating with our oxygen burner, SCOPE-JET. By switching to our oxygen burner, it helps users reduce their power consumption. The oxygen combustion also contributes to a reduced fuel consumption.

Have you estimated the avoided emissions of this low-carbon product(s) or service(s)

Yes

Methodology used to calculate avoided emissions

Other, please specify

Guidelines for Quantifying GHG emission reductions of goods and services through Global Value Chain (Ministry of Economy, Trade and Industry)

Life cycle stage(s) covered for the low-carbon product(s) or services(s)

Use stage

Functional unit used

One electric furnace with SCOPE-JET installed

Reference product/service or baseline scenario used

A normal electric furnace without SCOPE-JET was used as the baseline scenario.

Life cycle stage(s) covered for the reference product/service or baseline scenario

Use stage

Estimated avoided emissions (metric tons CO2e per functional unit) compared to reference product/service or baseline scenario

31,800

Explain your calculation of avoided emissions, including any assumptions

The power saving effect per jet of oxygen (kWh/Nm3) is calculated based on actual measurements at two electric furnace makers that have installed SCOPE-JET. The reduction effect is calculated by multiplying the amount of crude steel production by the amount of oxygen consumed by SCOPE-JET, the amount of electricity reduction per amount of oxygen, and the CO2 emission coefficient of electricity.

Revenue generated from low-carbon product(s) or service(s) as % of total revenue in the reporting year

0.4

C5. Emissions methodology

C5.1

(C5.1) Is this your first year of reporting emissions data to CDP?

No

C5.1a

(C5.1a)) Has your organization undergone any structural changes in the reporting year, or are any previous structural changes being accounted for in this disclosure of emissions data?

Row 1

Has there been a structural change?

No

C5.1b

(C5.1b)) Has your emissions accounting methodology, boundary, and/or reporting year definition changed in the reporting year?

	Change(s) in methodology, boundary, and/or reporting year definition?
Row 1	No

C5.2

(C5.2) Provide your base year and base year emissions.

Scope 1

Base year start

April 1 2018

Base year end

March 31 2019

Base year emissions (metric tons CO2e)

1,045,500

Comment

These are primarily emissions from the U.S. HyCO business

Scope 2 (location-based)

Base year start

April 1, 2018

Base year end

March 31, 2019

Base year emissions (metric tons CO2e)

5,640,500

Comment

Japan and Europe are calculated using market-based figures while the U.S., Asia, and Oceania are calculated using location-based figures. Therefore, we do not calculate emissions using only the location-based method.

Scope 2 (market-based)

Base year start

April 1, 2018

Base year end

March 31, 2019

Base year emissions (metric tons CO2e)

5,640,500

Comment

Japan and Europe are calculated using market-based figures while the U.S., Asia, and Oceania are calculated using location-based figures. Therefore, we do not calculate emissions using only the market-based method.

Scope 3 category 1: Purchased goods and services

Base year start

April 1, 2020

Base year end

March 31, 2021

Base year emissions (metric tons CO2e)

883,000

Comment

The emission intensity of each product or service is calculated by multiplying the quantity of products or service purchased by Taiyo Nippon Sanso (physical data and monetary data) by the emission intensity of each product or service. However, oxygen, nitrogen, and argon purchased from transportation services and Taiyo Nippon Sanso's consolidated subsidiaries, or affiliates are included in the scope of Scope 1, 2, or Scope 3 categories 4 and 15, and are therefore excluded from the purchased volume used in the calculation. We reference the GHG Protocol's "corporate value chain (scope 3) accounting and reporting standard". For emission unit values, we reference the emissions unit value database Ver.3 published on the Green Value Chain Platform homepage and information in IDEAv2 (for calculating supply chain greenhouse gases).

Scope 3 category 2: Capital goods

Base year start

April 1, 2020

Base year end

March 31, 2021

Base year emissions (metric tons CO2e)

46,280

Comment

Emissions intensity is calculated by multiplying capital investment in the reporting year by the emissions intensity per unit price of capital goods, referring to the GHG Protocol's Corporate Value Chain (Scope 3) Accounting and Reporting Standard. For emission intensity, we used information from the Emission Intensity Database Ver. 3 and IDEAv2 (for supply chain GHG emissions calculation) published on the Green Value Chain Platform. We have included an adjustment for consumption tax.

Scope 3 category 3: Fuel-and-energy-related activities (not included in Scope 1 or 2)

Base year start

April 1, 2020

Base year end

March 31, 2021

Base year emissions (metric tons CO2e)

248,000

Comment

We referenced the GHG Protocol's Corporate Value Chain (Scope 3) Accounting and Reporting Standard. For emission unit values, we used information from the Emissions Unit Values Ver. 3 and IDEAv2 (for calculating supply chain greenhouse gases) published on the Green Value Chain Platform. GHG emissions resulting from the extraction, production, and transportation of purchased fuels and fuels used to produce purchased electricity and steam.
Fuel: Annual purchases multiplied by the emissions unit value of each fuel.
Electricity and steam: Calculated by multiplying the amount of electricity and steam purchased from external sources by the emissions unit value at the time of fuel procurement and when transmission and distribution losses are taken into account.

Scope 3 category 4: Upstream transportation and distribution

Base year start

April 1, 2020

Base year end

March 31, 2021

Base year emissions (metric tons CO2e)

37,000

Comment

CO2 emissions of Taiyo Nippon Sanso and Nippon Ekitan as specified shippers reported under the Act on Promotion of Global Warming Countermeasures are calculated by deducting CO2 emissions of logistics subsidiaries included in Scope 1 emissions. CO2 emissions from the transportation and distribution of products for which Taiyo Nippon Sanso and Nippon Ekitan incurred transportation costs are included in this category.

Scope 3 category 5: Waste generated in operations

Scope 3 category 1: Purchased goods and services

Base year start

April 1, 2020

Base year end

March 31, 2021

Base year emissions (metric tons CO2e)

2,000

Comment

Emissions intensity is calculated by multiplying industrial waste emissions by emissions intensity by waste type (including the transportation stage), referring to the Corporate Value Chain (Scope 3) Accounting and Reporting Standard of the GHG Protocol. The emission unit values are referenced from the emissions unit value database Ver.3 published on the Green Value Chain Platform homepage.

Scope 3 category 6: Business travel

Base year start

April 1, 2020

Base year end

March 31, 2021

Base year emissions (metric tons CO2e)

1,000

Comment

Calculated by multiplying the number of employees of Taiyo Nippon Sanso and its domestic consolidated subsidiaries by the emission intensity per employee (0.13 ton-CO2/capita/year). We referenced the Corporate Value Chain (Scope 3) Accounting and Reporting Standard of the GHG Protocol. Emission intensity was calculated using

information from the emissions unit value database Ver.3 published on the Green Value Chain Platform and IDEAv2 (for supply chain GHG emissions calculation).

Scope 3 category 7: Employee commuting

Base year start

April 1, 2020

Base year end

March 31, 2021

Base year emissions (metric tons CO2e)

3,000

Comment

Taiyo Nippon Sanso employees: For train commuters, emissions intensity is calculated by multiplying the annual commuter pass allowance by the amount of transportation expense paid. For employees who commute to work by car, the number of working days per year and the emissions intensity per person-km of private passenger cars are multiplied by the round-trip commuting distance. Employees of domestic consolidated subsidiaries: calculated by multiplying the number of employees by the number of working days per year and emission intensity per working day. We referenced the "Corporate Value Chain (Scope 3) Accounting and Reporting Standards" of the GHG Protocol. For emission intensity, we used information from the emissions unit value database Ver. 3 and IDEAv2 (for calculating supply chain GHG emissions), which are available on the Green Value Chain Platform.

Scope 3 category 8: Upstream leased assets

Base year start

April 1, 2020

Base year end

March 31, 2021

Base year emissions (metric tons CO2e)

0

Comment

Category 8 is not relevant to our company as our costs for lease assets surmount to less than 0.1% of our total sales.

Scope 3 category 9: Downstream transportation and distribution

Base year star

April 1, 2020

Base year end

March 31, 2021

Base year emissions (metric tons CO2e)

0

Comment

Most Japanese domestic downstream transportation is handled by group companies and are therefore reported in Category 4. By this logic, emissions in Category 9 are also irrelevant.

Scope 3 category 10: Processing of sold products

Base year start

April 1, 2020

Base year end

March 31, 2021

Base year emissions (metric tons CO2e)

0

Comment

According to the chemical sector guidance published by the WBCSD (the "Guidance for Accounting and Reporting Corporate GHG Emissions in the Chemical Sector Value Chain") chemical companies are not required to report Scope 3, Category 10 emissions because of the diversity of applications and customer structure, making difficult to obtain reliable figures. Therefore, Category 10 emissions are not relevant to us.

Scope 3 category 11: Use of sold product

Base year start

April 1, 2020

Base year end

March 31, 2021

Base year emissions (metric tons CO2e)

2,436,000

Comment

Emissions are calculated based on the propane gas (LPG) sold to customers outside of the Taiyo Nippon Sanso Group, the CO2 emissions from liquid carbon gas and dry ice usage, and the CO2 emissions from electricity used during air separation unit operation (worth the years of depreciation during accounting). We use the GHG Protocol's "corporate value chain (scope 3) accounting and reporting standard". For emission unit values, we reference the emissions unit value database Ver.3 published on the Green Value Chain Platform homepage and information in IDEAv2 (for calculating supply chain greenhouse gases).

Scope 3 category 12: End of life treatment of sold products

Base year start

April 1, 2020

Base year end

March 31, 2021

Base year emissions (metric tons CO2e)

0

Comment

Our main products (oxygen, nitrogen, and argon) are not applicable because they return to the atmosphere. Fuel, carbon dioxide and dry ice are answered in category 11. High pressure gas containers are rental items and are not disposed of at customer sites. Industrial gases with high global warming potential are detoxified after use and not directly released to the atmosphere. The air separation unit (in plants) itself is not disposed of at customer sites. Based on the above, we concluded that Category 12 is not relevant because it is relatively small compared to the other categories.

Scope 3 category 13: Downstream leased assets

Base year start

April 1, 2020

Base year end

March 31, 2021

Base year emissions (metric tons CO2e)

0

Comment

As our lease assets attribute to less than 0.2% of our total assets, Category 13 is not relevant to our company.

Scope 3 category 14: Franchises

Base year start

April 1, 2020

Base year end

March 31, 2021

Base year emissions (metric tons CO2e)

0

Comment

Category 14 is not applicable as we have no franchise businesses.

Scope 3 category 15: Investments

Base year start

April 1, 2020

Base year end

March 31, 2021

Base year emissions (metric tons CO2e)

687,000

Comment

The GHG emissions of each of Taiyo Nippon Sanso's seven major affiliated companies in Japan are multiplied by our shareholding ratio (as of the end of the fiscal year). The GHG emissions of the seven companies are based on the actual results for the relevant aggregation period.

Scope 3: Other (upstream)

Base year start

Base year end

Base year emissions (metric tons CO2e)

Comment

Scope 3: Other (downstream)

Base year start

Base year end

Base year emissions (metric tons CO2e)

Comment

C5.3

(C5.3) Select the name of the standard, protocol, or methodology you have used to collect activity data and calculate emissions.

Act on the Rational Use of Energy
Japan Ministry of the Environment, Law Concerning the Promotion of the Measures to Cope with Global Warming, Superseded by Revision of the Act on Promotion of Global Warming Countermeasures (2005 Amendment)
The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)

The Greenhouse Gas Protocol: Scope 2 Guidance
The Greenhouse Gas Protocol: Corporate Value Chain (Scope 3) Standard

C6. Emissions data

C6.1

(C6.1) What were your organization's gross global Scope 1 emissions in metric tons CO2e?

Reporting year

Gross global Scope 1 emissions (metric tons CO2e)

1,139,000

Comment

C6.2

(C6.2) Describe your organization's approach to reporting Scope 2 emissions.

Row 1

Scope 2, location-based

We are reporting a Scope 2, location-based figure

Scope 2, market-based

We are reporting a Scope 2, market-based figure

Comment

C6.3

(C6.3) What were your organization's gross global Scope 2 emissions in metric tons CO2e?

Reporting year

Scope 2, location-based

3,942,000

Scope 2, market-based (if applicable)

4,764,000

Comment

C6.4

(C6.4) Are there any sources (e.g. facilities, specific GHGs, activities, geographies, etc.) of Scope 1, Scope 2 or Scope 3 emissions that are within your selected reporting boundary which are not included in your disclosure?

Yes

C6.4a

(C6.4a) Provide details of the sources of Scope 1, Scope 2, or Scope 3 emissions that are within your selected reporting boundary which are not included in your disclosure.

Source of excluded emissions

Some subsidiaries outside Japan

Scope(s) or Scope 3 category(ies)

Scope 1
Scope 2 (location-based)
Scope 2 (market-based)

Relevance of Scope 1 emissions from this source

Emissions are not relevant

Relevance of location-based Scope 2 emissions from this source

Emissions are not relevant

Relevance of market-based Scope 2 emissions from this source

Emissions are not relevant

Relevance of Scope 3 emissions from this source

<Not Applicable>

Date of completion of acquisition or merger

<Not Applicable>

Estimated percentage of total Scope 1+2 emissions this excluded source represents

3

Estimated percentage of total Scope 3 emissions this excluded source represents

<Not Applicable>

Explain why this source is excluded

Non-Japan subsidiaries with very small emissions are not included. They make up less than 3% of our total emissions.

Explain how you estimated the percentage of emissions this excluded source represents

Some subsidiaries located overseas are offices and their main emissions are Scope 1 and 2. The calculation method is based on the average Scope 1, 2 of offices in Japan, divided by the total emissions to give the percentage for excluded emissions.

C6.5

(C6.5) Account for your organization's gross global Scope 3 emissions, disclosing and explaining any exclusions.

Purchased goods and services

Evaluation status

Relevant, calculated

Emissions in reporting year (metric tons CO2e)

877,057

Emissions calculation methodology

Expenditure-based method

Percentage of emissions calculated using data obtained from suppliers or value chain partners

0

Please explain

The emission intensity of each product or service is calculated by multiplying the quantity of products or services purchased by TAIYO NIPPON SANSO (physical data and monetary data) by the emission intensity of each product or service. The GHG Protocol's "GHG emissions intensity" is calculated by multiplying the volume (physical and monetary data) of TAIYO NIPPON SANSO's purchases of products and services by the emissions intensity of the respective products and services. Corporate Value Chain (Scope 3) Accounting and Reporting Standards" of the GHG Protocol. For emission intensity, we used information from the Emission Intensity Database Ver. 3 and IDEAv2 (for calculating supply chain GHG emissions), which are available on the Green Value Chain Platform.

Capital goods

Evaluation status

Relevant, calculated

Emissions in reporting year (metric tons CO2e)

67,033

Emissions calculation methodology

Investment-specific method

Percentage of emissions calculated using data obtained from suppliers or value chain partners

0

Please explain

Emissions intensity is calculated by multiplying capital investment in the reporting year by the emissions intensity per unit price of capital goods, referring to the GHG Protocol's Corporate Value Chain (Scope 3) Accounting and Reporting Standard. For emission intensity, we used information from the Emission Intensity Database Ver. 3 and IDEAv2 (for supply chain GHG emissions calculation) published on the Green Value Chain Platform. Consumption tax correction is included.

Fuel-and-energy-related activities (not included in Scope 1 or 2)

Evaluation status

Relevant, calculated

Emissions in reporting year (metric tons CO2e)

261,000

Emissions calculation methodology

Average data method

Percentage of emissions calculated using data obtained from suppliers or value chain partners

0

Please explain

The GHG Protocol's Corporate Value Chain (Scope 3) Accounting and Reporting Standard is referenced. For emission intensity, we used information from the Emission Intensity Database Ver. 3 and IDEAv2 (for calculating supply chain GHG emissions) published on the Green Value Chain Platform.
GHG emissions resulting from the extraction, production, and transportation of purchased fuels and fuels used to produce purchased electricity and steam.
Fuel: Annual purchases multiplied by the emissions intensity of each fuel.
Electricity and steam: Calculated by multiplying the amount of electricity and steam purchased from external sources by the emissions intensity at the time of fuel procurement and when transmission and distribution losses are taken into account.

Upstream transportation and distribution

Evaluation status

Relevant, calculated

Emissions in reporting year (metric tons CO2e)

36,000

Emissions calculation methodology

Fuel-based method

Percentage of emissions calculated using data obtained from suppliers or value chain partners

100

Please explain

CO2 emissions of TAIYO NIPPON SANSO and Nippon Liquefied Coal as specified shippers reported under the Law Concerning the Promotion of the Measures to Cope with Global Warming are calculated by deducting CO2 emissions of logistics subsidiaries included in Scope 1 emissions. CO2 emissions from the transportation and distribution of products for which Taiyo Nippon Sanso and Nippon Liquefied Carbon incurred transportation costs are included in this category.

Waste generated in operations

Evaluation status

Relevant, calculated

Emissions in reporting year (metric tons CO2e)

1

Emissions calculation methodology

Average data method

Percentage of emissions calculated using data obtained from suppliers or value chain partners

0

Please explain

Emissions intensity is calculated by multiplying industrial waste emissions by emissions intensity by waste type (including transportation stage), referring to the GHG Protocol's "Corporate Value Chain (Scope 3) Accounting and Reporting Standard". The emission intensity used information from the Emission Intensity Database Ver. 3 published by the Green Value Chain Platform.

Business travel

Evaluation status

Relevant, calculated

Emissions in reporting year (metric tons CO2e)

832

Emissions calculation methodology

Average data method

Percentage of emissions calculated using data obtained from suppliers or value chain partners

0

Please explain

Calculated by multiplying the number of employees of Taiyo Nippon Sanso and its domestic consolidated subsidiaries by the emission intensity per employee (0.13 ton-CO2/capita/year), referring to the Corporate Value Chain (Scope 3) Accounting and Reporting Standard of the GHG Protocol. Emission intensity was calculated using information from the Emission Intensity Database Ver. 3 and IDEAv2 (for supply chain GHG emissions calculation) published on the Green Value Chain Platform.

Employee commuting

Evaluation status

Relevant, calculated

Emissions in reporting year (metric tons CO2e)

3,047

Emissions calculation methodology

Distance-based method

Percentage of emissions calculated using data obtained from suppliers or value chain partners

0

Please explain

Taiyo Nippon Sanso employees: For train commuters, emissions intensity is calculated by multiplying the annual commuter pass allowance by the amount of transportation expense paid. For employees who commute to work by car, the number of working days per year and the emissions intensity per person-km of private passenger cars are multiplied by the round-trip commuting distance. Employees of domestic consolidated subsidiaries: calculated by multiplying the number of employees by the number of working days per year and emission intensity per working day, referring to the "Corporate Value Chain (Scope 3) Accounting and Reporting Standards" of the GHG Protocol. For emission intensity, we used information from the Emission Intensity Database Ver. 3 and IDEAv2 (for calculating supply chain GHG emissions) published on the Green Value Chain Platform.

Upstream leased assets

Evaluation status

Not relevant, explanation provided

Please explain

Since the cost to the leased assets is less than 0.1% of NSHD's revenues, Category 8 emissions are not relevant.

Downstream transportation and distribution

Evaluation status

Not relevant, explanation provided

Please explain

Most downstream transportation in Japan is performed by group companies and reported in category 4. Therefore, we assume that emissions in Category 9 are not relevant.

Processing of sold products

Evaluation status

Not relevant, explanation provided

Please explain

As stated in the Chemical Sector Guidance issued by the WBCSD (Guidance on Accounting and Reporting Corporate GHG Emissions in the Chemical Sector Value Chain)
Chemical companies are not required to report Scope 3 or Category 10 emissions because of the diversity of applications and customer structures, which make it difficult to obtain reliable figures.
Therefore, Scope 3 and Category 10 emissions do not need to be reported. Therefore, we have assumed that Category 10 emissions are not relevant.

Use of sold products

Evaluation status

Relevant, calculated

Emissions in reporting year (metric tons CO2e)

1,381,741

Emissions calculation methodology

Methods related to direct emissions at the stage of use, please answer in detail
CO2 emissions from the use of propane gas (LPG), liquefied carbon dioxide gas, and dry ice sold to customers outside the Taiyo Nippon Sanso Group, and CO2 emissions from the use of electricity during the operation of air separation equipment (for the number of years of depreciation in accounting) are recorded.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

1,381,741

Please explain

CO2 emissions from the use of propane gas (LPG), liquefied carbon dioxide gas, and dry ice sold to customers outside the Taiyo Nippon Sanso Group, and CO2 emissions from the use of electricity during the operation of air separation equipment (for the amortization period in the accounting) are recorded. Scope 3) Accounting and Reporting Standards" of the GHG Protocol. Emission intensity was calculated using information from the Emission Intensity Database Ver. 3 and IDEAv2 (for calculating supply chain GHG emissions) published on the Green Value Chain Platform.

End of life treatment of sold products

Evaluation status

Not relevant, explanation provided

Please explain

NSHD's major products (oxygen, nitrogen, and argon) are not applicable as they only return to the atmosphere. Fuel and carbon dioxide and dry ice are answered in Category 11. In addition, high-pressure gas containers are rental items and are not disposed of at the customer's site. Industrial gases with high global warming potential are detoxified after use and are not released directly into the atmosphere. Furthermore, the air separation equipment (plant) itself is not disposed of at the customer's site. Based on the above, the emissions of Category 12 are not relevant because the emissions are sufficiently small compared to other categories.

Downstream leased assets

Evaluation status

Not relevant, explanation provided

Please explain

Since the attribution of leased assets to total assets is less than 0.2%, Category 13 emissions are not relevant.

Franchises

Evaluation status

Not relevant, explanation provided

Please explain

Since NSHD has no franchise business, it states that Category 14 emissions are not relevant.

Investments

Evaluation status

Relevant, calculated

Emissions in reporting year (metric tons CO2e)

679,000

Emissions calculation methodology

Supplier-specific method

Percentage of emissions calculated using data obtained from suppliers or value chain partners

100

Please explain

The GHG emissions of each of TAIYO NIPPON SANSO's seven major affiliated companies in Japan are multiplied by our shareholding ratio (as of the end of the fiscal

year). The GHG emissions of the seven companies are based on the actual results for the relevant aggregation period.

Other (upstream)

Evaluation status

Please explain

Other (downstream)

Evaluation status

Please explain

C6.7

(C6.7) Are carbon dioxide emissions from biogenic carbon relevant to your organization?

No

C6.10

(C6.10) Describe your gross global combined Scope 1 and 2 emissions for the reporting year in metric tons CO2e per unit currency total revenue and provide any additional intensity metrics that are appropriate to your business operations.

Intensity figure

0.0000049744

Metric numerator (Gross global combined Scope 1 and 2 emissions, metric tons CO2e)

5,903,000

Metric denominator

unit total revenue

Metric denominator: Unit total

1,186,683,000,000

Scope 2 figure used

Market-based

% change from previous year

21

Direction of change

Decreased

Reason(s) for change

Change in revenue

Please explain

Sales for FYE2023 and FYE2022 were 1,186,683 million yen and 957,169 million yen, respectively. The increase in sales was due to higher selling prices in line with rising costs, such as global energy costs, rising commodity prices, and the yen's depreciation. Therefore, sales, the denominator of the unit of measure, increased, resulting in a decrease in the unit of measure.

C7. Emissions breakdowns

C7.1

(C7.1) Does your organization break down its Scope 1 emissions by greenhouse gas type?

Yes

C7.1a

(C7.1a) Break down your total gross global Scope 1 emissions by greenhouse gas type and provide the source of each used greenhouse warming potential (GWP).

Greenhouse gas	Scope 1 emissions (metric tons of CO2e)	GWP Reference
CO2	1,120,000	IPCC Fourth Assessment Report (AR4 – 100)
CH4	2	IPCC Fourth Assessment Report (AR4 – 100)
N2O	11,187	IPCC Fourth Assessment Report (AR4 – 100)
HFCs	3,426	IPCC Fourth Assessment Report (AR4 – 100)
PFCs	558	IPCC Fourth Assessment Report (AR4 – 100)
SF6	3,341	IPCC Fourth Assessment Report (AR4 – 100)
NF3	0	IPCC Fourth Assessment Report (AR4 – 100)

C7.2

(C7.2) Break down your total gross global Scope 1 emissions by country/area/region

Country/area/region	Scope 1 emissions (metric tons CO2e)
United States of America	1,034,000
Europe	63,000
Japan	18,000
Other, please specify Asia Pacific, Australia	24,000

C7.3

(C7.3) Indicate which gross global Scope 1 emissions breakdowns you are able to provide.

By business division

C7.3a

(C7.3a) Break down your total gross global Scope 1 emissions by business division.

Business division	Scope 1 emissions (metric ton CO2e)
HyCO（Hydrogen and carbon monoxide production equipment）	995,000
transport	103,000
ASU（Air Separator）	17,000
Other	24,000

C-CE7.4/C-CH7.4/C-CO7.4/C-EU7.4/C-MM7.4/C-OG7.4/C-ST7.4/C-TO7.4/C-TS7.4

(C-CE7.4/C-CH7.4/C-CO7.4/C-EU7.4/C-MM7.4/C-OG7.4/C-ST7.4/C-TO7.4/C-TS7.4) 4) Break down your organization's total gross global Scope 1 emissions by sector production activity in metric tons CO2e

	Gross Scope 1 emissions, metric tons CO2e	Comment
Chemicals production activity	1,139,000	

C7.5

(C7.5) Break down your total gross global Scope 2 emissions by country/area/region.

Country/area/region	Scope 2, location-based (metric tons CO2e)	Scope 2, market-based (metric tons CO2e)

Japan	1,576,000	2,035,000
United States of America	1,148,000	1,249,000
Europe	586,000	853,000
Other, please specify Asia Pacific, Australia	633,000	626,000

C7.6

(C7.6) Indicate which gross global Scope 2 emissions breakdowns you are able to provide.

By business division

C7.6a

(C7.6a) Break down your total gross global Scope 2 emissions by business division.

Business division	Scope 2, location-based (metric tons CO2e)	Scope 2, market-based (metric tons CO
ASU（Air Separator）	3,697,000	4,460,000
Liquefied carbonic acid production	133,000	172,000
HyCO（Hydrogen and carbon monoxide production equipment）	52,000	68,000
other	60,000	64,000

C7.7

(C7.7) Is your organization able to break down your emissions data for any of the subsidiaries included in your CDP response?

Yes

C7.7a

(C7.7a) Break down your gross Scope 1 and Scope 2 emissions by subsidiary. 。

Subsidiary name

TAIYO NIPPON SANSO

Primary activity

Inorganic base chemical

Select the unique identifier(s) you are able to provide for this subsidiary

No unique identifier

ISIN code – bond
<Not Applicable>

ISIN code – equity
<Not Applicable>

CUSIP number
<Not Applicable>

Ticker symbol
<Not Applicable>

SEDOL code
<Not Applicable>

LEI number
<Not Applicable>

Other unique identifier
<Not Applicable>

Scope 1 emissions (metric tons CO2e)
10,066

Scope 2, location-based emissions (metric tons CO2e)
53,968

Scope 2, market-based emissions (metric tons CO2e)
55,497

Comment

C-CE7.7/C-CH7.7/C-CO7.7/C-MM7.7/C-OG7.7/C-ST7.7/C-TO7.7/C-TS7.7

(C-CE7.7/C-CH7.7/C-CO7.7/C-MM7.7/C-OG7.7/C-ST7.7/C-TO7.7/C-TS7.7) Break down your organization's total gross global Scope 2 emissions by sector production activity in metric tons CO2e.

	Scope 2, location-based, metric tons CO2e	Scope 2, market-based (if applicable), metric tons CO2e	Comment
Chemicals production activities	3,942,000	4,764,000	

C-CH7.8

(C-CH7.8) Disclose the percentage of your organization's Scope 3, Category 1 emissions by purchased chemical feedstock.

Purchased feedstock	Percentage of Scope 3, Category 1 tCO2e from purchased feedstock	Explain calculation methodology
Other (please specify) Propane gas + Butane gas	23	The emission factor used was the most suitable coefficient (0.8156kg-CO2/kg) available in the emission intensity database IDEAv2 (for calculating supply chain greenhouse gases).
Other (please specify) (Semiconductor material gas)	43	The emission factor used was the most suitable variable (11.38tCO2/million yen) available in the emission intensity database IDEAv2 (for calculating supply chain greenhouse gases).

C-CH7.8a

(C-CH7.8a) Disclose the percentage of your organization's Scope 3, Category 1 emissions by purchased chemical feedstock.

	Sales, metric tons	Comment
Carbon dioxide (CO2)	225	
Methane (CH4)	4	
Nitrous oxide (N2O)	822	Medical laughing gas is not included
Hydrofluorocarbons (HFC)	37	
Perfluorocarbons (PFC)	463	
Sulphur hexafluoride (SF6)	92	
Nitrogen trifluoride (NF3)	737	

C7.9

(C7.9) How do your gross global emissions (Scope 1 and 2 combined) for the reporting year compare to those of the previous reporting year?

Decreased

C7.9a

(C7.9a) Identify the reasons for any change in your gross global emissions (Scope 1 and 2 combined), and for each of them specify how your emissions compare to the previous year.

	Change in emissions (metric to	Direction of change in emissions	Emissions value (percentage)	Please explain calculation
Change in renewable	3,190	Decreased	0.054	We had a business site that introduced renewable energy (solar panels). In

energy consumption				FYE2022, our total Scope 1 and Scope 2 emissions were 5,921,000 tons. The reduction rate was calculated as follows: 3,190/5,921,000 = 0.054%.
Other emissions reduction activities	6,597	Decreased	0.11	Through the computerized operation optimization of our air separation units, we succeeded in reduction 2,933 tons of CO2. Additionally, by updating equipment, we achieved a CO2 reduction of 3,614 tons, that is a total of 6,597 tons. In FYE2022, our total Scope 1 and Scope 2 emissions were 5,921,000 tons. The reduction rate was calculated as follows: 6,597/5,921,000 = 0.11%.
Divestment				
Acquisitions				
Mergers				
Change in output	166,000	Decreased	2.8	ASU production for FYE2023 was 95% of the previous year. The percentage decrease was calculated as 166,000/5,921,000 = 2.8%.
Change in methodology				
Change in boundary	103,000	Increased	1.7	Two U.S. subsidiaries (Continental Carbonic Products, Inc. and Western International Gas & Cylinders, Inc.) were added to the Boundary from FYE2023. The increase was calculated as 103,000/5,921,000 = 1.7%.
Change in physical operating conditions				
Unidentified				
Other				

C7.9b

(C7.9b) Are your emissions performance calculations in C7.9 and C7.9a based on a location-based Scope 2 emissions figure or a market-based Scope 2 emissions figure?

Market-based

C8. Energy

C8.1

(C8.1) What percentage of your total operational spend in the reporting year was on energy?

More than 15% but less than or equal to 20%

C8.2

(C8.2) Select which energy-related activities your organization has undertaken

	Indicate whether your organization undertook this energy-related activity in the reporting year
Consumption of fuel (excluding feedstocks)	Yes
Consumption of purchased or acquired electricity	Yes
Consumption of purchased or acquired heat	Yes
Consumption of purchased or acquired steam	Yes
Consumption of purchased or acquired cooling	Yes
Generation of electricity, heat, steam, or cooling	Yes

C8.2a

(C8.2a) Report your organization's energy consumption totals (excluding feedstocks) in MWh.

	Heating value	MWh from renewable sources	MWh from non-renewable sources	Total (renewable and non-renewable) MWh
Consumption of fuel (excluding feedstock)	HHV (higher heating value)	0	3,445,000	3,445,000
Consumption of purchased or acquired electricity		875,000	9,603,000	10,478,000

Consumption of purchased or acquired heat		0	2,000	2,000
Consumption of purchased or acquired steam		0	197,000	197,000
Consumption of purchased or acquired cooling		0	2,000	2,000
Consumption of self-generated non-fuel renewable energy		2,000		2,000
Total energy consumption		877,000	13,249,000	14,126,000

C-CH8.2a

(C-CH8.2a) Report your organization's energy consumption totals (excluding feedstocks) for chemical production activities in MWh. Consumption of fuel (excluding feedstocks)

Heating value

HHV(higher heating value)

MWh consumed from renewable sources inside chemical sector boundary

0

MWh consumed from non-renewable sources inside chemical sector boundary (excluding recovered waste heat/gases)

3,445,000

MWh consumed from waste heat/gases recovered from processes using fuel feedstocks inside chemical sector boundary

0

Total MWh (renewable + non-renewable + MWh from recovered waste heat/gases) consumed inside chemical sector boundary

3,445,000

Consumption of purchased or acquired electricity

MWh consumed from renewable sources inside chemical sector boundary

875,000

MWh consumed from non-renewable sources inside chemical sector boundary (excluding recovered waste heat/gases)

9,603,000

MWh consumed from waste heat/gases recovered from processes using fuel feedstocks inside chemical sector boundary

0

Total MWh (renewable + non-renewable + MWh from recovered waste heat/gases) consumed inside chemical sector boundary

10,478,000

Consumption of purchased or acquired heat

MWh consumed from renewable sources inside chemical sector boundary

0

MWh consumed from non-renewable sources inside chemical sector boundary (excluding recovered waste heat/gases)

2,000

MWh consumed from waste heat/gases recovered from processes using fuel feedstocks inside chemical sector boundary

0

Total MWh (renewable + non-renewable + MWh from recovered waste heat/gases) consumed inside chemical sector boundary

2,000

Consumption of purchased or acquired steam

MWh consumed from renewable sources inside chemical sector boundary

0

MWh consumed from non-renewable sources inside chemical sector boundary (excluding recovered waste heat/gases)

197,000

MWh consumed from waste heat/gases recovered from processes using fuel feedstocks inside chemical sector boundary

0

Total MWh (renewable + non-renewable + MWh from recovered waste heat/gases) consumed inside chemical sector boundary

197,000

Consumption of purchased or acquired cooling

MWh consumed from renewable sources inside chemical sector boundary

0

MWh consumed from non-renewable sources inside chemical sector boundary (excluding recovered waste heat/gases)

2,000

MWh consumed from waste heat/gases recovered from processes using fuel feedstocks inside chemical sector boundary

0

Total MWh (renewable + non-renewable + MWh from recovered waste heat/gases) consumed inside chemical sector boundary

2,000

Consumption of self-generated non-fuel renewable energy

MWh consumed from renewable sources inside chemical sector boundary

2,000

MWh consumed from non-renewable sources inside chemical sector boundary (excluding recovered waste heat/gases)

0

MWh consumed from waste heat/gases recovered from processes using fuel feedstocks inside chemical sector boundary

0

Total MWh (renewable + non-renewable + MWh from recovered waste heat/gases) consumed inside chemical sector boundary

2,000

Total energy consumption

MWh consumed from renewable sources inside chemical sector boundary

877,000

MWh consumed from non-renewable sources inside chemical sector boundary (excluding recovered waste heat/gases)

13,249,000

MWh consumed from waste heat/gases recovered from processes using fuel feedstocks inside chemical sector boundary

0

Total MWh (renewable + non-renewable + MWh from recovered waste heat/gases) consumed inside chemical sector boundary

14,126,000

C8.2b

(C8.2b) Select the applications of your organization's consumption of fuel.

	Indicate whether your organization undertakes this fuel application

Consumption of fuel for the generation of electricity	No
Consumption of fuel for the generation of heat	Yes
Consumption of fuel for the generation of steam	Yes
Consumption of fuel for the generation of cooling	Yes
Consumption of fuel for co-generation or tri-generation	No

C8.2c

(C8.2c) State how much fuel in MWh your organization has consumed (excluding feedstocks) by fuel type.

Sustainable biomass

Heating value

HHV

Total fuel MWh consumed by the organization

0

MWh fuel consumed for self-generation of heat

0

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-generation of cooling

0

Comment

Other biomass

Heating value

HHV

Total fuel MWh consumed by the organization

0

MWh fuel consumed for self-generation of heat

0

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-generation of cooling

0

Comment

Other renewable fuels (e.g. renewable hydrogen)

Heating value

HHV

Total fuel MWh consumed by the organization

0

MWh fuel consumed for self-generation of heat

0

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-generation of cooling

0

Comment

Coal

Heating value

HHV

Total fuel MWh consumed by the organization

0

MWh fuel consumed for self-generation of heat

0

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-generation of cooling

0

Comment

Oil

Heating value

HHV

Total fuel MWh consumed by the organization

763,000

MWh fuel consumed for self-generation of heat

0

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-generation of cooling

0

Comment

Fuel consumed for on-site generation of heat, steam and cold will be considered for aggregation in the future.

Gas

Heating value

HHV

Total fuel MWh consumed by the organization

898,000

MWh fuel consumed for self-generation of heat

0

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-generation of cooling

0

Comment

Fuel consumed for on-site generation of heat, steam and cooling will be considered for tabulation in the future.

Other non-renewable fuels (e.g. non-renewable hydrogen)

Heating value

HHV

Total fuel MWh consumed by the organization

1,785,000

MWh fuel consumed for self-generation of heat

0

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-generation of cooling

0

Comment

Fuel consumed for on-site generation of heat, steam and cold will be considered for tabulation in the future.

Total fuel

Heat value

HHV

Total fuel MWh consumed by the organization

3,445,000

MWh fuel consumed for self-generation of heat

0

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-generation of cooling

0

Comment

Fuel consumed for on-site generation of heat, steam and cold will be considered for tabulation in the future.

C8.2d

(C8.2d) Provide details on the electricity, heat, steam, and cooling your organization has generated and consumed in the reporting year.

	Total Gross generation (MWh)	Generation that is consumed by the organization (MWh)	Gross generation from renewable sources (MWh)	s (MWh) Generation from renewable sources that is consumed by the organization (MWh)
Electricity	2,000	2,000	2,000	2,000
Heat	0	0	0	0
Steam	0	0	0	0
Cooling	0	0	0	0

C-CH8.2d

(C-CH8.2d) Provide details on electricity, heat, steam, and cooling your organization has generated and consumed for chemical production activities.

Electricity

Total gross generation inside chemicals sector boundary (MWh)

2,000

Generation that is consumed inside chemicals sector boundary (MWh)

2,000

Generation from renewable sources inside chemical sector boundary (MWh)

2,000

Generation from waste heat/gases recovered from processes using fuel feedstocks inside chemical sector boundary (MWh)

0

Heat

Total gross generation inside chemicals sector boundary (MWh)

0

Generation that is consumed inside chemicals sector boundary (MWh)

0

Generation from renewable sources inside chemical sector boundary (MWh)

0

Generation from waste heat/gases recovered from processes using fuel feedstocks inside chemical sector boundary (MWh)

0

Steam

Total gross generation inside chemicals sector boundary (MWh)

0

Generation that is consumed inside chemicals sector boundary (MWh)

0

Generation from renewable sources inside chemical sector boundary (MWh)

0

Generation from waste heat/gases recovered from processes using fuel feedstocks inside chemical sector boundary (MWh)

0

Cooling

Total gross generation inside chemicals sector boundary (MWh)

0

Generation that is consumed inside chemicals sector boundary (MWh)

0

Generation from renewable sources inside chemical sector boundary (MWh)

0

Generation from waste heat/gases recovered from processes using fuel feedstocks inside chemical sector boundary (MWh)

0

C8.2e

(C8.2e) Provide details on the electricity, heat, steam, and/or cooling amounts that were accounted for at a zero or near-zero emission factor in the market-based Scope 2 figure reported in C6.3

Country/area of low-carbon energy consumption

United States of America

Sourcing method

Physical power purchase agreement (physical PPA) with a grid-connected generator

Energy carrier

Electricity

Low carbon technology type

Solar

Low-carbon energy consumed via selected sourcing method in the reporting year (MWh)

7,500

Tracking instrument used

Contract

Country/area of origin (generation) of the low-carbon energy or energy attribute

United States of America

Are you able to report the commissioning or re-powering year of the energy generation facility?

Yes

Commissioning year of the energy generation facility (e.g. date of first commercial operation or repowering)

2022

Comment

Country/area of low-carbon energy consumption

Japan

Sourcing method

Purchase from an on-site installation owned by a third party (on-site PPA)

Energy carrier

Electricity

Low carbon technology type

Solar

Low-carbon energy consumed via selected sourcing method in the reporting year (MWh)

150

Tracking instrument used

Contract

Country/area of origin (generation) of the low-carbon energy or energy attribute

Japan

Are you able to report the commissioning or re-powering year of the energy generation facility?

Yes

Commissioning year of the energy generation facility (e.g. date of first commercial operation or repowering)

2022

Comment

Country/area of low-carbon energy consumption

Spain

Sourcing method

Unbundled procurement of energy attribute certificates (EACs)

Energy carrier

Electricity

Low carbon technology type

Solar

Low-carbon energy consumed via selected sourcing method in the reporting year (MWh)

296,000

Tracking instrument used

GO（Guarantee of Origin)

Country/area of origin (generation) of the low-carbon energy or energy attribute

Spain

Are you able to report the commissioning or re-powering year of the energy generation facility?

Yes

Commissioning year of the energy generation facility (e.g. date of first commercial operation or repowering)

2020

Comment

Country/area of low-carbon energy consumption

Belgium

Sourcing method

Unbundled procurement of energy attribute certificates (EACs)

Energy carrier

Electricity

Low carbon technology type

Solar

Low-carbon energy consumed via selected sourcing method in the reporting year (MWh)

135,000

Tracking instrument used

GO（Guarantee of Origin)

Country/area of origin (generation) of the low-carbon energy or energy attribute

Belgium

Are you able to report the commissioning or re-powering year of the energy generation facility?

Yes

Commissioning year of the energy generation facility (e.g. date of first commercial operation or repowering)

2020

Comment

Country/area of low-carbon energy consumption

Italy

Sourcing method

Unbundled procurement of energy attribute certificates (EACs)

Energy carrier

Electricity

Low carbon technology type

Solar

Low-carbon energy consumed via selected sourcing method in the reporting year (MWh)

127,000

Tracking instrument used

GO（Guarantee of Origin)

Country/area of origin (generation) of the low-carbon energy or energy attribute

Italy

Are you able to report the commissioning or re-powering year of the energy generation facility?

Yes

Commissioning year of the energy generation facility (e.g. date of first commercial operation or repowering)

2020

Comment

Country/area of low-carbon energy consumption

United Kingdom of Great Britain and Northern Ireland

Sourcing method

Unbundled procurement of energy attribute certificates (EACs)

Energy carrier
Electricity

Low carbon technology type
Solar

Low-carbon energy consumed via selected sourcing method in the reporting year (MWh)
7,000

Tracking instrument used
GO（Guarantee of Origin)

Country/area of origin (generation) of the low-carbon energy or energy attribute
United Kingdom of Great Britain and Northern Ireland

Are you able to report the commissioning or re-powering year of the energy generation facility?
Yes

Commissioning year of the energy generation facility (e.g. date of first commercial operation or repowering)
2020

Comment

Country/area of low-carbon energy consumption
Denmark

Sourcing method
Unbundled procurement of energy attribute certificates (EACs)

Energy carrier
Electricity

Low carbon technology type
Solar

Low-carbon energy consumed via selected sourcing method in the reporting year (MWh)
4,000

Tracking instrument used
GO（Guarantee of Origin)

Country/area of origin (generation) of the low-carbon energy or energy attribute

Denmark

Are you able to report the commissioning or re-powering year of the energy generation facility?

Yes

Commissioning year of the energy generation facility (e.g. date of first commercial operation or repowering)

2020

Comment

Country/area of low-carbon energy consumption

Portugal

Sourcing method

Unbundled procurement of energy attribute certificates (EACs)

Energy carrier

Electricity

Low carbon technology type

Solar

Low-carbon energy consumed via selected sourcing method in the reporting year (MWh)

1,000

Tracking instrument used

GO（Guarantee of Origin)

Country/area of origin (generation) of the low-carbon energy or energy attribute

Portugal

Are you able to report the commissioning or re-powering year of the energy generation facility?

Yes

Commissioning year of the energy generation facility (e.g. date of first commercial operation or repowering)

2020

Comment

Country/area of low-carbon energy consumption
Ireland

Sourcing method
Unbundled procurement of energy attribute certificates (EACs)

Energy carrier
Electricity

Low carbon technology type
Solar

Low-carbon energy consumed via selected sourcing method in the reporting year (MWh)
1,000

Tracking instrument used
GO（Guarantee of Origin)

Country/area of origin (generation) of the low-carbon energy or energy attribute
Ireland

Are you able to report the commissioning or re-powering year of the energy generation facility?
Yes

Commissioning year of the energy generation facility (e.g. date of first commercial operation or repowering)
2020

Comment

C8.2g

(C8.2g) Provide a breakdown by country/area of your non-fuel energy consumption in the reporting year.

Country/area
Japan

Consumption of purchased electricity (MWh)
150

Consumption of self-generated electricity (MWh)

50

Consumption of purchased heat, steam, and cooling (MWh)

0

Consumption of self-generated heat, steam, and cooling (MWh)

0

Total non-fuel energy consumption (MWh) [Auto-calculated]

200

Country/area

Other, please specify

Asia/Oceania

Consumption of purchased electricity (MWh)

0

Consumption of self-generated electricity (MWh)

1,500

Consumption of purchased heat, steam, and cooling (MWh)

0

Consumption of self-generated heat, steam, and cooling (MWh)

0

Total non-fuel energy consumption (MWh) [Auto-calculated]

1,500

Country/area

United States of America

Consumption of purchased electricity (MWh)

7,500

Consumption of self-generated electricity (MWh)

0

Consumption of purchased heat, steam, and cooling (MWh)

0

Consumption of self-generated heat, steam, and cooling (MWh)

0

Total non-fuel energy consumption (MWh) [Auto-calculated]

7,500

C-CH8.3

(C-CH8.3) Does your organization consume fuels as feedstocks for chemical production activities?

Yes

C-CH8.3a

(C-CH8.3a) Disclose details on your organization's consumption of fuels as feedstocks for chemical production activities.

Fuels used as feedstocks

Natural gas

Total consumption

381,000

Total consumption unit

Thousand cubic metrics

Inherent carbon dioxide emission factor of feedstock, metric tons CO2 per consumption unit

2.21

Heating value of feedstock, MWh per consumption unit

12.08

Heating value

HHV

Comment

C-CH8.3b

(C-CH8.3b) State the percentage, by mass, of primary resource from which your chemical feedstocks derive.

	Percentage of total chemical feedstock (%)
Oil	0
Natural Gas	100
Coal	0
Biomass	0
Waste(non-biomass)	0

Fossil fuel (where coal, gas, oil cannot be distinguished)	0
Unknown source or unable to disaggregate	0

C9. Additional metrics

C9.1

(C9.1) Provide any additional climate-related metrics relevant to your business.

C-CH9.3a

(C-CH9.3a) Provide details on your organization's chemical products.

Output product

Other, please specify

Nitrogen gas

Production (metric tons)

8,587,000

Capacity (metric tons)

8,587,000

Direct emissions intensity (metric tons CO2e per metric ton of product)

0

Electricity intensity (MWh per metric ton of product)

0.244

Steam intensity (MWh per metric ton of product)

0

Steam/ heat recovered (MWh per metric ton of product)

0

Comment

The direct emissions (Scope 1) and steam use in the production of nitrogen gas by air separation units (ASUs) are very small, so we are disclosing them as "0".

Output product

Other, please specify

Liquid nitrogen

Production (metric tons)

3,861,000

Capacity (metric tons)

3,861,000

Direct emissions intensity (metric tons CO2e per metric ton of product)

0

Electricity intensity (MWh per metric ton of product)

0.789

Steam intensity (MWh per metric ton of product)

0

Steam/ heat recovered (MWh per metric ton of product)

0

Comment

The direct emissions (Scope 1) and steam use in the production of nitrogen gas by air separation units (ASUs) are very small, so we are disclosing them as "0”.

Output product

Other, please specify

Oxygen gas

Production (metric tons)

7,769,000

Capacity (metric tons)

7,769,000

Direct emissions intensity (metric tons CO2e per metric ton of product)

0

Electricity intensity (MWh per metric ton of product)

0.235

Steam intensity (MWh per metric ton of product)

0

Steam/ heat recovered (MWh per metric ton of product)

0

Comment

The direct emissions (Scope 1) and steam use in the production of nitrogen gas by air separation units (ASUs) are very small, so we are disclosing them as "0”.

Output product

Other, please specify

Liquid oxygen

Production (metric tons)

1,750,000

Capacity (metric tons)

1,750,000

Direct emissions intensity (metric tons CO2e per metric ton of product)

0

Electricity intensity (MWh per metric ton of product)

0.77

Steam intensity (MWh per metric ton of product)

0

Steam/ heat recovered (MWh per metric ton of product)

0

Comment

The direct emissions (Scope 1) and steam use in the production of nitrogen gas by air separation units (ASUs) are very small, so we are disclosing them as "0".

Output product

Other, please specify

Gas argon + liquefied argon

Production (metric tons)

420,000

Capacity (metric tons)

420,000

Direct emissions intensity (metric tons CO2e per metric ton of product)

0

Electricity intensity (MWh per metric ton of product)

1.122

Steam intensity (MWh per metric ton of product)

0

Steam/ heat recovered (MWh per metric ton of product)

0

Comment

The direct emissions (Scope 1) and steam use in the production of nitrogen gas by air separation units (ASUs) are very small, so we are disclosing them as "0"

C-CE9.6/C-CG9.6/C-CH9.6/C-CN9.6/C-CO9.6/C-EU9.6/C-MM9.6/C-OG9.6/C-RE9.6/C-ST9.6/C-TO9.6/C-TS9.6

(C-CE9.6/C-CG9.6/C-CH9.6/C-CN9.6/C-CO9.6/C-EU9.6/C-MM9.6/C-OG9.6/C-RE9.6/C-ST9.6/C-TO9.6/C-TS9.6) Does your organization invest in research and development (R&D) of low-carbon products or services related to your sector activities? Investment in low-carbon R&D Comment

	Investment in low-carbon R&D	Comment
Row 1	Yes	Research and development of products that contribute to environmental preservation.

C-CH9.6a

(C-CH9.6a) Provide details of your organization's investments in low-carbon R&D for chemical production activities over the last three years.

Technology area

Unable to disaggregate by technology area

Stage of development in the reporting year

Average % of total R&D investment over the last 3 years

25

R&D investment figure in the reporting year (unit currency as selected in C0.4) (optional)

Average % of total R&D investment planned over the next 5 years

25

Explain how your R&D investment in this technology area is aligned with your climate commitments and/or climate transition plan

Environment-related development themes identified by the Sustainable WG are approved by the Technology Development Strategy Meeting as R&D costs in environmental accounting.

C10. Verification

C10.1

(C10.1) Indicate the verification/assurance status that applies to your reported emissions

	Verification/assurance status
Scope 1	Third-party verification or assurance process in place
Scope 2(location based or market based)	Third-party verification or assurance process in place
Scope 3	Third-party verification or assurance process in place

C10.1a

(C10.1a) Provide further details of the verification/assurance undertaken for your Scope 1 emissions and attach the relevant statements.

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Underway but not complete for reporting year – previous statement of process attached

Type of verification or assurance

Limited assurance

Attach the statement

Third Party Verification.pdf

Page/ section reference

Third Party Verification p1

Relevant standard

ISAE3000

Proportion of reported emissions verified (%)

100

C10.1b

(C10.1b) Provide further details of the verification/assurance undertaken for your Scope 2 emissions and attach the relevant statements.

Scope 2 approach

Scope 2 market-based

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Underway but not complete for reporting year – previous statement of process attached

Type of verification or assurance

Limited assurance

Attach the statement

Third Party Verification.pdf

Page/ section reference

Third Party Verification p1

Relevant standard

ISAE3000

Proportion of reported emissions verified (%)

100

C10.1c

(C10.1c) Provide further details of the verification/assurance undertaken for your Scope 3 emissions and attach the relevant statements.

Scope 3 category

Scope 3: Purchased goods and services
Scope 3: Capital goods
Scope 3: Fuel and energy-related activities (not included in Scopes 1 or 2)
Scope 3: Upstream transportation and distribution
Scope 3: Waste generated in operations
Scope 3: Business travel
Scope 3: Employee commuting
Scope 3: Investments
Scope 3: Use of sold products

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Underway but not complete for reporting year – previous statement of process attached

Type of verification or assurance

Limited assurance

Attach the statement

Third Party Verification.pdf

Page/section reference

Page 1

Relevant standard

ISAE3000

Proportion of reported emissions verified (%)

100

C10.2

(C10.2) Do you verify any climate-related information reported in your CDP disclosure other than the emissions figures reported in C6.1, C6.3, and C6.5?

Yes

C10.2a

(C10.2a) Which data points within your CDP disclosure have been verified, and which verification standards were used?

Disclosure module verification relates to	Data verified	Verification standard	Please explain
C5. Emissions performance	Year on year change in emissions (Scope 1 and 2)	ISAE3000	Third Part Assurance report(Third Party Verification) p1 Integrated report(Integrated Report)2022 p116-119、p126-129 1, 2

[1]Third Party Verification.pdf

[2]Integrated Report2022.pdf

C11. Carbon pricing

C11.1

(C11.1) Are any of your operations or activities regulated by a carbon pricing system (i.e. ETS, Cap & Trade or Carbon Tax)?

Yes

C11.1a

(C11.1a) Select the carbon pricing regulation(s) which impacts your operations.

EU ETS

C11.1b

(C11.1b) Complete the following table for each of the emissions trading schemes you are regulated by.

EU ETS

% of Scope 1 emissions covered by the ETS

7

% of Scope 2 emissions covered by the ETS

0

Period start date

April 1, 2022

Period end date

March 31, 2023

Allowances allocated

4,626

Allowances purchased

0

Verified Scope 1 emissions in metric tons CO2e

63.47

Verified Scope 2 emissions in metric tons CO2e

854.136

Details of ownership

Facilities we own and operate

Comment

”Allowances allocated” are redeemed at the register.
% of Nippon Gases Europe Scope 1 and Scope2 are covered by

C11.1d

(C11.1d) What is your strategy for complying with the systems you are regulated by or anticipate being regulated by?

In the broadest sense, carbon pricing (Yen/t-CO2) applies to energy prices, energy taxed, FITs, emissions permits, and carbon taxes. As for our business, our main

products involve the manufacturing of N2, O2, and Ar; a process requiring mass amounts of electricity. If carbon
pricing was limited to carbon taxes, the financial effect on our company would be fairly limited due to Japan's low carbon tax rate. However, as future laws and regulations surrounding climate change strengthen, the tax rate and scope of the tax is expected to expand. Specifically in Japan, there are many companies that have an intense consumption of energy, meaning they are likely to be significantly impacted by the above changes. That is why, in line with the 2DS scenario in which regulations are continually tightened, we analysed Japanese businesses centred around energy (industrial use gases) and identified potential business and financial risks.

Additionally, as a countermeasure to broader carbon pricing, NSHD is actively using the levy reduction and exemption system. Under this system, electricity intensive businesses can apply for a reduction or exemption of the levy from the viewpoint of maintaining and strengthening their international competitiveness. NSHD has been utilizing this system since its establishment in 2012. The levy for certified business sites is reduced or exempted by 80% or 40%, depending on the improvement of the business's basic per unit of sales. NSHD has applied for exemption for 18 companies in Japan and has received billions of yen in exemptions.

C11.2

(C11.2) Has your organization cancelled any project-based carbon credits within the reporting year?

No

C11.3

(C11.3) Does your organization use an internal price on carbon?

Yes

C11.3a

(C11.3a) Provide details of how your organization uses an internal price on carbon.

Type of internal carbon price

Shadow price

How the price is determined

Alignment with the price of a carbon tax

Alignment with the price of a carbon tax

Change internal behaviour

Scope(s) covered

Scope 1
Scope 2

Pricing approach used – spatial variance

Differentiated

Pricing approach used – temporal variance

Evolutionary

Indicate how you expect the price to change over time

The internal carbon price is subject to change based on periodic checks of the external environment.

Actual price(s) used – minimum (currency as specified in C0.4 per metric ton CO2e)

4,500

Actual price(s) used – maximum (currency as specified in C0.4 per metric ton CO2e)

4,500

Business decision-making processes this internal carbon price is applied to

Risk management

Opportunity management

Mandatory enforcement of this internal carbon price within these business decision-making processes

Yes, for some decision-making processes, please specify

In our domestic Japanese business divisions, we proactively identify the following issues regarding the entire group: how much more CO2 is emitted from new capital expenditures, if there are any reduction contributions as a result of new capital expenditures, or the scope of the potential finances.

We base changes to our internal carbon price on periodic checks of external trends.

Explain how this internal carbon price has contributed to the implementation of your organization's climate commitments and/or climate transition plan

The introduction of shadow pricing is outside the scope of investment calculations, but it is always included in planned investment projects and is used as one of the indicators when making investment decisions. The manufacture of separated gas, our core business, consumes a large amount of electricity. Attempting to reduce this electricity consumption is an important measure for the continuation of this business. The introduction of ICP has also raised the environmental awareness of each business unit and group company, and we are promoting the replacement of equipment with high-efficiency equipment.

C12. Engagement

C12.1

(C12.1) Do you engage with your value chain on climate-related issues?

Yes, our suppliers
Yes, our customers/clients
Yes, other partners in the value chain

C12.1a

(C12.1a) Provide details of your climate-related supplier engagement strategy.

Type of engagement

Engagement & incentivization (changing supplier behaviour)

Details of engagement

Run an engagement campaign to educate suppliers about climate change

% of suppliers by number

10

% total procurement spend (direct and indirect)

16

% of supplier-related Scope 3 emissions as reported in C6.5

8

Rationale for the coverage of your engagement

[Rationale for choosing this supplier engagement]
Supplier management is becoming more important every year in the semiconductor industry, and efforts to address climate change are active. NSHD's Japanese business is 27% electronics, and NSHD's "Procurement Policy" and "Procurement Guidelines" require suppliers to "consider the environment" in order to "adapt to and mitigate climate change". NSHD's materiality requires suppliers to "establish and operate environmentally conscious management systems" for "climate change adaptation and mitigation. The scope of collaboration is as follows.
[Scope of Collaboration]
NSHD's Taiyo Nippon Sanso Corporation ("TNSC"), which operates in Japan, has defined the semiconductor industry as the scope of collaboration.

Impact of engagement, including measures of success

[Indicators of Success]
The threshold for success is the completion (in a single year) of 9 company interviews for major suppliers with the lowest scoring checklist.

[Company-specific explanation of the impact of climate change engagement strategy with customers]
NSHD's Taiyo Nippon Sanso Corporation ("TNSC"), which operates in Japan, distributes a "Matters we would like you to share with your suppliers" guidebook to its major suppliers in the semiconductor industry. This is a group-specific initiative, with plans set and progress managed every year, and is regarded as an activity for

"sustainable supply chains" in the future. In FYE2023, we aim to complete interviews (in a single year) with suppliers scoring in the bottom half of the checklist and engage with suppliers through two-way communication, not just distribution.

Comment

C12.1b

(C12.1b) Give details of your climate-related engagement strategy with your customers.

Type of engagement & Details of engagement

Collaboration & innovation

Run a campaign to encourage innovation to reduce climate change impacts

% of customers by number

19

% of customer - related Scope 3 emissions as reported in C6.5

0

Please explain the rationale for selecting this group of customers and scope of engagement

[Rationale for choosing this customer engagement]

The steel industry has traditionally been an energy-intensive market and a CO2 emitting industry, accounting for 9% of total CO2 emissions into the atmosphere. Therefore, technological innovation is needed to achieve carbon neutrality in the steel industry. We are cooperating with our customers in the steel industry to innovate technologies for the realization of a low-carbon society.

[Scope of Collaboration]

The scope of collaboration is with customers in the steel industry of Nippon Gases Euro-Holding (NGE), an NSHD company operating in Europe. The steel industry accounts for 19% of NGE's sales.

Impact of engagement, including measures of success

[Indicators of Success.]

Providing more hydrogen burners to NGE's customers in the steel industry than the previous year is considered a measure of success.

[Company-specific description of impact of climate change engagement strategy with customers]

NSHD provides industrial gases in Japan, Europe, and the United States. In this engagement, NSHD's European company, NGE and NGE's customer Sarralle, a steel industry company based in Spain, have been working together since 2021 to manufacture, supply, and integrate technology for hydrogen burners for the steel

industry. Burners using green hydrogen do not emit GHGs during combustion, thus significantly reducing the environmental impact compared to current burners that use natural gas. The steel industry makes up 19% of NGE's sales in addition to contributing 9% of the worlds GHG emissions so by undertaking this project we believe can contribute towards a low carbon society. NGE will provide the burner technology for this engagement and Sarralle will implement the technology at the end-user level. NGE is providing the burner technology for this engagement, while Sarralle is handling the end-user implementation. As a result, NGE is now able to offer hydrogen burners to more and more customers each year. Going forward, NGE and Sarralle intend to further promote the use of hydrogen burners in the steel industry.

C12.1d

(C12.1d) Give details of your climate-related engagement strategy with other partners in the value chain.

Our Group collaborates with various research institutes and companies to develop technologies that will enable a multilateral carbon neutral reality. Taiyo Nippon Sanso, a member of our group, participated in the energy carrier "Ammonia Hydrogen Station Basic Technology" of the Strategic Innovation Program (SIP), a national project led by the Cabinet Office from FYE2014 to FYE2019, and conducted joint research with Tokyo Institute of Technology, the National Institute of Advanced Industrial Science and Technology, Hiroshima University, Toyota Industries, and Showa Denko K.K. Additionally, the company developed a highly efficient technology for recovering high-purity hydrogen for fuel cell vehicles from ammonia decomposition gas in the "Ammonia Hydrogen Station Basic Technology" project commissioned by the SIP's "Energy Carrier" program. The company has also developed a highly efficient technology for recovering high-purity hydrogen for fuel cell vehicles from ammonia cracking gas. Furthermore, the company has been selected as a contractor for the "Development of Fuel Ammonia Utilization and Production Technology / Development of Fuel Ammonia Combustion Technology in Industrial Furnaces,". This is a project commissioned by the New Energy and Industrial Technology Development Organization (NEDO), and the company will work for five years from FYE2022 to FYE2026 with AGC Inc, the National Institute of Advanced Industrial Science and Technology (AIST), and Tohoku University to develop ammonia combustion technology in industrial furnaces, where fuel ammonia utilization technology has not yet been established.

C12.2

(C12.2) Do your suppliers have to meet climate-related requirements as part of your organization’s purchasing process?

No, but we plan to introduce climate-related requirements within the next two years

C12.3

(C12.3) Does your organization engage in activities that could either directly or indirectly influence policy, law, or regulation that may impact the climate?

Row 1

External engagement activities that could directly or indirectly influence policy, law, or regulation that may impact the climate

Yes, our membership of/engagement with trade associations could influence policy, law, or regulation that may impact the climate

Does your organization have a public commitment or position statement to conduct your engagement activities in line with the goals of the Paris Agreement?

Yes

Attach commitment or position statement(s)

JCIA's Stance as a Chemical Industry Toward Carbon Neutrality (C12.3)

Japan Chemical Industry Association. Chemical Industry's Stance on Carbon Neutrality (C12.3).pdf

Describe the process(es) your organization has in place to ensure that your external engagement activities are consistent with your climate commitments and/or climate transition plan

The Japanese government's FYE2050 carbon neutrality declaration is an ambitious goal, but we believe it is the ideal way to move toward a sustainable society. We believe that this policy is also very important for the Japanese chemical industry to remain internationally competitive. To achieve this goal, the chemical industry will accelerate its efforts to further advance its processes and expand its contribution to reduction and will make maximum efforts to reduce GHG emissions from energy and raw materials through the development and social implementation of technologies such as CCU, artificial photosynthesis, and chemical recycling toward a resource-recycling society. Based on the above policy, NSHD will also incorporate climate change-related initiatives into our Medium-term Management Plan.

C12.3b

(C12.3b) Provide details of the trade associations your organization is a member of, or engages with, which are likely to take a position on any policy, law or regulation that may impact the climate.

Trade association

Japan Chemical Industry Association

Is your organization's position on climate change policy consistent with theirs?

Consistent

Has your organization attempted to influence their position in the reporting year?

Yes, we publicly promoted their current position

Describe how your organization's position is consistent with or differs from the trade association's position, and any actions taken to influence their position

The Japan Chemical Industry Association (JCIA) promotes various climate change mitigation activities for its member companies.
1. Voluntary action plan on environment - member companies are trying to improve energy consumption intensity to reduce CO
2. Greenhouse gas (GHG) emissions reduction - JCIA is promoting and educating the public about the cLCA (Carbon Life Cycle Analysis) method, which looks at the entire life cycle and ascertains the GHG emission reduction contribution of a product.

JCIA activities are managed by several working teams of the Technical Committee, composed of participants from key member companies.
NSHD representatives participate in the majority of these working teams and strongly support JCIA activities, including proposals to the Japanese government such as the introduction of an emissions trading system and global development projects to promote emission reduction products (global value chains).

Funding figure your organization provided to this trade association in the reporting year (currency as selected in C0.4)

8,625,900

Describe the aim of your organization's funding

Membership dues, Supporting grants

Have you evaluated whether your organization's engagement with this trade association is aligned with the goals of the Paris Agreement?

Yes, we have evaluated, and it is aligned

C12.4

(C12.4) Have you published information about your organization's response to climate change and GHG emissions performance for this reporting year in places other than in your CDP response? If so, please attach the publication(s).

Publication

In mainstream reports

Status

Complete

Attach the document

Securities Report FYE2023.pdf

Page/Section reference

p19-p25/ （Approach to Sustainability and Initiatives）

Content elements

Governance
Strategy
Risks & opportunities
Emissions figures
Emission targets

Comment

C12.5

(C12.5) Indicate the collaborative frameworks, initiatives and/or commitments related to environmental issues for which you are a signatory/member.

	Environmental collaborative framework, initiative and/or commitment	Describe your organization's role within each framework, initiative and/or commitment
Row 1	Task Force on Climate-related Financial Disclosures (TCFD) UN Global Compact	[TCFD] NSHD has announced its endorsement of the TCFD effective November 2019.Through our endorsement of the TCFD, NSHD will further accelerate its existing efforts to reduce its environmental impact, promote energy conservation activities, and expand the range of products that contribute to reducing GHG emissions, while also gradually expanding information disclosure. [The United Nations Global Compact] NSHD has signed the United Nations Global Compact (UNGC) and was registered as a participating company as of January 18, 2022. We are also a member of the Global Compact Network Japan, which consists of Japanese and other companies that have signed the UNGC. In addition, Nippon Gases Euro-Holding S.L.U., an NSHD company, has also signed the UNGC and is registered as a participating company.

C15. Biodiversity

C15.1

(C15.1) Is there board-level oversight and/or executive management-level responsibility for biodiversity-related issues within your organization?

	Board-level oversight and/or executive management-level responsibility for biodiversity-related issues	Description of oversight and objectives relating to biodiversity
Row 1	Yes, both board-level oversight and executive management-level responsibility	NSHD has established the Nippon Sanso Holdings Group Environmental Policy by resolution of the Board of Directors, which includes "preservation of biodiversity" and states, "we will technically contribute to the resource-recycling society and to the development of sustainable society by harmonizing with environment and endeavouring to reduce environmental impact in our business activities under the direction of top management."

C15.2

(C15.2) Has your organization made a public commitment and/or endorsed any initiatives related to biodiversity?

	Indicate whether your organization made a public commitment or endorsed any initiatives related to biodiversity	Biodiversity-related public commitments
Row 1	Yes, we have made public commitments only	Other, please specify We promote business activities conducive to preservation of biodiversity and endeavour to avoid any negative impact on biodiversity.

C15.3

(C15.3) Does your organization assess the impacts and dependencies of its value chain on biodiversity?

Impacts on biodiversity

Indicate whether your organization undertakes this type of assessment

No and we don’t plan to within the next two years

Dependencies on biodiversity

Indicate whether your organization undertakes this type of assessment

No and we don't plan to within the next two years

C15.4

(C15.4) Does your organization have activities located in or near to biodiversity-sensitive areas in the reporting year?

No

C15.5

(C15.5) What actions has your organization taken in the reporting year to progress your biodiversity-related commitments?

	Have you taken any actions in the reporting period to progress your biodiversity-related commitments?	Type of action taken to progress biodiversity- related commitments
Row 1	Yes, we are taking actions to progress our biodiversity-related commitments	

C15.6

(C15.6) Does your organization use biodiversity indicators to monitor performance across its activities?

	Does your organization use indicators to monitor biodiversity performance?	Indicators used to monitor biodiversity performance
Row 1	No	

C15.7

(C15.7) Have you published information about your organization's response to biodiversity-related issues for this reporting year in places other than in your CDP response? If so, please attach the publication(s).

Report type	Content elements	Attach the document and indicate where in the document the relevant biodiversity information is located
No publications		

C16. Signoff

C-FI

(C-FI) Use this field to provide any additional information or context that you feel is relevant to your organization's response. Please note that this field is optional and is not scored.

C16.1

(C16.1) Provide details for the person that has signed off (approved) your CDP climate change response.

	Job title	Corresponding job category
Row 1	President CEO	Chief Executive Officer (CEO)