Environmental Management

1 Basic Policy

→ P87 NIPPON PAPER GROUP Environmental Charter

2 Promotion Structure



- NIPPON PAPER GROUP's management risks related to the environment are identified, and countermeasures are implemented by the NIPPON PAPER GROUP Environment Committee. The committee is chaired by the General Manager of the Nippon Paper Industries' Technical & Engineering Division, who is the executive officer in charge of GHG emissions reduction and promotion of environmental management.
- The Committee consists of major Group companies in Japan that have production sites.
- Under the supervision of the Board of Directors, the Committee manages, evaluates, and deliberates on the achievement status of environmental targets based on the NIPPON PAPER GROUP Environmental Charter.

- Once a year, the operational status and deliberations of the Committee are reported to the Board of Directors through the Risk Management Committee.
- In FY2023, the Committee reported to the Board of Directors through the Risk Management Committee on environmental law violations and risks related to the transition to a carbon neutral society.

3 NIPPON PAPER GROUP Environmental Vision 2050, NIPPON PAPER GROUP Environmental Targets 2030

• The Group has set a vision for 2050 and the ideal state of the Group in 2050, and is working on the 2030 Environmental Targets formulated to achieve it.

 In the 2030 Environmental Targets, the Group will promote the reduction of greenhouse gas (GHG) emissions, the maximization of forest value, the expansion of recycling, and the reduction of environmental impact throughout the value chain in order to realize a sustainable society.

Basic Policy, etc.

• The Group aims to achieve a sustainable society where people and nature coexist by providing products that have a low environmental impact throughout their life cycle.



* Emissions related to production except for the Energy Business field

Environmental Management

NIPPON PAPER GROUP Environmental Vision 2050 (Sustainable Future Vision)

1. Carbon Neutrality

Reduce greenhouse gas emissions to virtually zero.

- Minimize greenhouse gas emissions through the efficient use of energy and the use of renewable energy sources.
- Minimize greenhouse gas emissions in the value chain through collaboration with stakeholders.
- Become carbon neutral by offsetting residual emissions through CO₂ absorption and fixation in forests and CO₂ removal technologies.

2. Creation and Circulation of Resources

Create sustainable forests that preserve biodiversity and procure and supply resources.

- Maintain and expand forests with multifaceted value and maximize forest value.
- Procure and supply a variety of woody biomass resources that can be used as raw materials for various products.

Promote the utilization of woody biomass resources to contribute to better living in a circulation-oriented society.

- Provide a variety of materials and products made from woody biomass resources.
- Promote resource circulation and product recycling as a social infrastructure.

3. Minimum Impact

Minimize the environmental impact of the Group's business activities.

Basic Policy, etc.

- Minimize the input and output of resources that impact the environment.
- Provide society with products and services that have a low environmental impact throughout their entire life cycle.



Environmental Management

Progress and Status of Initiatives in NIPPON PAPER GROUP Environmental Targets 2030 (FY2023)

1. Reduce greenhouse gas emissions

Reduce greenhouse gas emissions through fuel conversion and energy conservation measures.

Target	Progress and status of initiatives
 Reduce direct greenhouse gas emissions by 54% from FY2013 levels*¹. 	The Group reduced GHG emissions (Scope 1 and 2) by 37% compared with FY2013 levels (progress rate: 69%).
 Accelerate fuel conversion and increase the ratio of non-fossil energy use to at least 60%. 	The non-fossil energy ratio to energy used was 47% (progress rate: 78%).
 Improve total energy consumption per unit of production and distribution by 1% from the previous year. 	Compared with 2022, the total energy intensity of Nippon Paper Industries in its production processes increased by 5.3% in the Paper Business and decreased by 1.5% in the Paperboard Business, while increasing by 2% in logistics processes.
• Reduce greenhouse gas emissions from product transportation in the Paper and Paperboard Business in Japan by 23% relative to FY2020 levels through modal shift and other measures* ² .	Greenhouse gas emissions from product transportation in the Paper and Paperboard Business in Japan decreased by 16% relative to FY2020 levels.
 Collaborate with stakeholders to reduce indirect greenhouse gas emissions. 	The Group calculated Scope 3 emissions from major pulp and paper companies in Japan, identified categories where efficient reductions are possible, and began considering reduction measures.

*1 Emissions related to production except for the Energy Business field

*2 Applied to Nippon Paper Industries

2. Promote the creation and circulation of resources

Promote the protection and cultivation of forest resources and biodiversity-conscious forest management.

3. Reduce environmental impact

Reduce the environmental impact of manufacturing processes.

Basic Policy, etc.

d status of initiatives	Target	Progress and status of initiatives	Target	Progress and status of initiatives	
duced GHG emissions) by 37% compared with progress rate: 69%).	 Improve CO₂ fixation efficiency in overseas forest plantations by 30% compared to 2013 levels. 	AMCEL(Brazil) began the commercial planting of eucalyptus clones developed through DNA marker selective breeding technology (the first in the world* ¹)	• Reduce air pollutants by 15% and water pollutants by 15% compared to EV2018 levels	Reduction rate at production sites in Japan: SOx 33%, NOx 28%, dusi 18% COD/BOD 36% and SS 16%	
ssil energy ratio to	• Obtain and maintain favoat	The Company and overseas plantation subsidiaries		18%, COD/ BOD 30%, and 33 10%	
was 47% (progress	• Obtain and maintain forest certification for all company forests in Japan and overseas.	have obtained and maintained forest certification (FM) (FSC ^{**2} , PEFC, and SGEC) for all of the company-owned forests in Japan and overseas.	• Reduce the final disposal of industrial waste at production sites in Japan to 2% or less.	The final disposal of industrial waste at production sites in Japan was 1.8%	
sity of Nippon Paper in its production reased by 5.3% in the ss and decreased by Paperboard Business, ing by 2% in logistics	• Ensure the traceability and sustainability of all woody biomass resources used.	The Group has worked to confirm sustainability and enhance traceability by making use of forest certification systems, and through other efforts. The wood chips and pulp used for papermaking in FY2023 were all made from wood approved by FSC**3 or PEFC (including controlled wood and controlled sources)	 Provide society with products and services that have minimal environmental impact throughout their entire life cycle. 	By replacing mechanical pulp with chemical pulp, the Company has developed and launched the "N.Polaris43Mocha", a type of pape for the body of magazines, which reduces GHG emissions during production by approximately 20%	
gas emissions from nsportation in the perboard Business in	 Promote the use of domestic forest resources. 	The use of domestic wood at all Nippon Paper Industries mills reached 36.8% in		compared to conventional products	

FY2023 (based on actual purchases).

*1 According to research by the Company

2 FSC Logo License No. FSC* C023383 (AMCEL: Brazil)

3 FSC Logo License No. FSC* C001751 (Nippon Paper Industries)

Promote the circulation of resources.

Target	Progress and status of initiatives
 Work to build a recycling system that promotes resource circulation. 	The Group is working with our customers, including processing manufacturers, to establish a recycling scheme for hard-to-use paper products made from laminated paper, which has been a material that could not be recycled. In consultation with various local authorities, the Group has established our own collection routes for paper waste and have begun to achieve results in the recycling of used release paper, beverage paper cups, and other materials.
 Utilize 12,000 t/year of unused wastepaper which has been difficult to recycle, through the development of recovered paper utilization technology. 	The actual use of unused and hard- to-use wastepaper was 4,933 tonnes. (Breakdown: 4,411 tonnes of wastepaper for food and beverage containers, 522 tonnes of other hard-to-use wastepaper)



Responsibility to Customers

Human Rights, Employment and Labor Responsibility

Responsibility to Communities

Environmental Management

4 Strengthening Environmental Compliance

The Group is strengthening its environmental compliance from a preventive standpoint, using a two-pronged approach of establishing frameworks for preventing problems and ensuring that no problems are missed, and engaging in its business activities while giving priority to legal compliance.

Two-Pronged Approach

(1) Building Systems to Prevent Problems

- · Building a workplace that emphasizes the importance of the environment (environmental compliance training)
- Strengthening the system for identifying applicable laws and regulations
- Implementing measures from both the facility and technology perspectives

(2) Establishing a Framework that Ensures All Problems are Covered

- Enhancement of environmental audits
- Enhancement of environmental management system
- Engaging in environmental communication and active information disclosure

Environment-related* Fines and Penalties

Environment-related fines and penalties (FY2023) 0 Yen

* Decrees and regulations regarding the environment of water intake, wastewater, air, and waste

1. Building a Workplace that Emphasizes the Importance of the Environment (Environmental Compliance Training)

To promote the creation of workplaces that emphasize the importance of the environment, the Group is working on systematic environmental training for employees.

- Encourage employees to obtain gualifications related to pollution prevention and to participate in external training to acquire specialized knowledge.
- Photo contest "NIPPON PAPER GROUP Eco Photo Award" (Environment Month every June)
- Environmental e-Learning
- Dissemination on the in-house portal site of environmental education materials and environmental information from each mill and office (FY2023: Posted 5 environmental education materials)

Achievements in Environment-related Employee Education (FY2023)

Topic/Title	Target participants	Number of participants	Number of sessions (frequency)
e-Learning for Environmental Month:Let's Consider the Issue of Climate Change	All employees of the group in Japan	7,411 persons	1 (once a year)

2. Strengthening the System for Identifying Applicable Laws and Regulations

To respond appropriately to revisions to environment-related laws and regulations, the Group uses a law search system and other means to share information on revisions of laws and their trends and has established a system to ensure compliance with laws and regulations.

3. Implementing Measures from Both the Facility and Technology Perspectives

Basic Policy, etc.

- The Group extracts the risk of environmental accidents from two perspectives: the possibility of an accident and its impact on the environment, and introduces equipment and measurement equipment necessary for preventing accidents.
- Each Group company is engaged in continuous measures to prevent large-scale leaks of oil or chemical agents, including the installation of liquid containment barriers (oil fences, etc.) and measuring devices.

4. Enhancement of the Environmental Management System

- The Group conducts regular environmental audits based on the "Environmental Management Policy Concerning Pollution Prevention," which is the action guideline for environmental management efforts issued by the Ministry of the Environment and the Ministry of Economy, Trade and Industry.
- Audits are double-checked by an internal audit by each mill or office, and by an audit by the environmental department at head office.
- In addition to document audits (confirmation of management records for wastewater and other waste materials) and on-site audits (confirmation of facilities such as chemical tanks), the environmental department at head office accompanies internal audits by the Management Audit Office to strengthen audits of the environmental management of Group companies.
- The Group thoroughly manages its environmental impact, including factory wastewater and exhaust gases, on a daily basis through regular measurements by third parties and, at some of the mills, constant monitoring using measuring equipment and inspectors' measurements.

Environmental Management

- 5. Engaging in Environmental Communication and **Active Information Disclosure**
- The Group has also established the "NIPPON PAPER GROUP Risk Communication Guidelines" and is implementing initiatives based on the guidelines.
- Risk communication for local residents and local governments held at each mill/office (in principle, held at least once a year)
- · Preliminary briefing session on the environmental impact of construction and operation when introducing large equipment, etc.
- The Group tries to listen to the opinions of all, including accepting opinions and questions on its website, establishing complaints and inquiries desks at mills, and utilizing an environmental monitor system to request information from local residents.
- When a complaint is received, the Group moves swiftly to determine possible causes, and implement emergency and permanent solutions.
- The Group also explains to the person who lodged the complaint what happened and what was done to resolve the situation, so that they can be satisfied that the Group has responded appropriately.

Environment-related Complaints in Japan (FY2023)

Complaints	Noise/ Vibration	Odor	Dust and mist dispersal	Smoke	Other	Total
Number	2	2	3	0	0	7

5 Acquisition of Major Environmental Certifications and Awards

Acquisition of ISO 14001 Certification (as of March 31, 2024)

Company name	Mills/Operating division/Production subsidiaries
Nippon Paper Industries	Asahikawa Mill, Siraoi Mill, Akita Mill, Ishinomaki Mill, Iwanuma Mill* ¹ , Nakoso Mill, Ashikaga Mill, Soka Mill, Fuji Mill, Gotsu Mill, Otake Mill, Iwakuni Mill, Yatsushiro Mill, Higashimatsuyama Mill
Nippon Paper Crecia	Tokyo Mill, Kaisei Mill, Koyo Mill, Kyoto Mill
Crecia Kasuga	Shin-Fuji Mill
Nippon Paper Papylia	Harada Mill, Suita Mill, Kochi Mill
NP Trading	Headquarters, Sapporo Branch Office, Chubu Branch Office, Kansai Branch Office, Chugoku Branch Office, Kyushu Branch Office, Shizuoka Sales Office
Daishowa Uniboard	Daishowa Uniboard
N&E	Headquarters Mill
Nippon Paper Ishinomaki Technology	Headquarters (Excluding Power Section, Machinery Section I, and Construction Section I)*2
Opal	Opal Kiwi Packaging Auckland, Opal Kiwi Packaging Christchurch, Opal Kiwi Packaging Hastings, Opal Australian Paper Maryvale Mill
Jujo Thermal	Kauttua
Siam Nippon Industrial Paper	Siam Nippon Industrial Paper
Nippon Paper Liquid Package Product	Egawa Mill, Miki Mill, Ishioka Mill

*1 Certified for production of pulp and paper such as newsprint paper, second and lower grade paper

*2 Certified for the design and construction related to civil engineering, architecture, electrical equipment, mechanical equipment, steel structures, pipe work, and related incidental work (excluding construction work ordered by NIPPON PAPER GROUP)

Nippon Paper Industries has obtained ISO 14001 certification for 100% of its production sites.

The Status of Eco-Action 21 Acquisition (as of March 31, 2024)

Company name	Mills/Operating division/Production subsidiaries
Akita Jujo Chemicals	Headquarters Mill

External Awards for Environmental Conservation Activities (FY2023)

Company name/Organization	Award
NPO Ecolife Hamamatsu/Nippon Paper Industries	Environment Minister's Award in the Reduce, Reuse and Recycle Promotion Merit Awards
Coca-Cola (Japan) Company, Limited/Nippon Paper Industries	"The Forestry Agency Director's Award", Forests × Decarbonization Challenge 2023



1 Basic Policy

→P87 NIPPON PAPER GROUP Environmental Charter

2 Achieving Carbon Neutrality in 2050

- Based on one of the basic policies of the 2030VISION, "responding to drastic changes in social conditions, such as GHG reduction and other environmental issues," the Group is working on reducing greenhouse gas (GHG) and implementing green strategies to achieve carbon neutrality in 2050.
- The Group's GHG emissions reduction initiatives are based on three pillars: "fuel conversion," "energy conservation in production and logistics processes," and "CO2 absorption and fixation through optimal management of company-owned forests."
- In May 2023, the Group revised its original plan for the GHG emissions reduction target for FY2030 and decided to reduce GHG emissions (Scope 1 and 2) by 54% compared to FY2013*. The Group is also working toward obtaining certification of Science Based Targets (SBT) to realize transition to carbon neutrality that is consistent with the standards of the Paris Agreement. * Emissions related to production except for the Energy Business field
- To accelerate GHG emissions reduction, the Company introduced internal carbon pricing in FY2021. However, this operation has been temporarily suspended since FY2022, due to the soaring price of coal and other fuels.
- In the long term, the Group aims to achieve carbon neutrality by 2050 through a multifaceted approach that includes CO₂ absorption by forests, the introduction of carbon-free fuels and CCUS.
- In 2021, the Japan Paper Association, of which the Company is a member, established the "Countermeasures against Global Warming aiming at Net Zero GHG Emissions from the Paper Industry -Long-Term Version 2050" and is working to realize the creation of a carbon-neutral industry by 2050 through the proactive introduction of a range of measures aimed at reducing CO₂ emissions.

• The Company is actively working on various measures to realize the Vision advocated by the Japan Paper Association. In FY2023, the Company worked on the development of rules for calculating GHG emissions generated throughout the product lifecycle (carbon footprint), preparing a calculation system within the Company.



• In the GX League, where groups of companies work together with government and academia to realize green transformation, the Company participates in initiatives such as the formation of market rules and voluntary emissions trading (Green Transformation Emissions Trading Scheme, or GX-ETS*). The Company will continue to actively contribute to achieving carbon neutrality and driving economic and social change through the GX League.

* Reduction target: 54% for direct emissions in FY2030, and 5% for indirect emissions (participating unit: Nippon Paper Industries, base period: FY2013)



NIPPON PAPER GROUP's FY2030 Targets

Basic Policy, etc.

Reduce GHG emissions (Scope 1 and 2) by 54% compared with FY2013*

• Reduce fossil fuel use by maximizing the use of existing infrastructure

Pursuit of a green strategies

- Maximize forest value (30% improvement in CO₂ fixation efficiency at overseas plantations, compared to 2013)
- Respond to demands to eliminate and reduce plastic (increase products that replace plastic with paper)
- * Emissions related to production except for the Energy Business field

Carbon neutrality in 2050

GHG Emissions (Scope 1 and 2)



5 🗖 26 🕨

GHG Emissions (Scope3, FY2023)

	Category	Emissions (thousand t-CO ₂)	
1	Purchased goods and services	2,399	
2	Capital goods	114	
3	Fuel- and energy-related activities (not included in scope 1 or scope 2)	1,776	
4	Upstream transportation and distribution	666	
5	Waste generated in operations	108	
6	Business travel	2	
7	Employee commuting	8	
8	Upstream leased assets	Not applicable	
9	Downstream transportation and distribution	329	
10	Processing of sold products	346	
11	Use of sold products	0	
12	End-of-life treatment of sold products	385	
13	Downstream leased assets	Not applicable	
14	Franchises	Not applicable	
15	Investments	Not applicable	
Others (upstream)		Not applicable	
Others (downstream)		Not applicable	
Tota	al	6,133	

Coverage: Nippon Paper Industries, Nippon Paper Crecia, Nippon Paper Papylia, Opal, Nippon Dynawave Packaging

Target business: Paper and Paperboard Business, Dairy-Life Products Business*, Energy Business Category11: It is assumed that paper and paperboard products, which are our main products, do not use energy during product use

* Only Opal's figures are estimates based on FY2022 results

3 Fuel Conversion

- The Group uses black liquor (produced as a byproduct of the production of pulp) and construction waste materials as woody biomass fuels.
- The amount of woody biomass energy for the Group in FY2023 is equivalent to 3%* of Japan's total non-fossil energy supply (excluding nuclear and hydroelectric power).

* Estimated by the Company based on domestic primary energy supply data (finalized data for FY2022) published by the Agency for Natural Resources and Energy

- In addition to woody biomass fuel, the Company actively uses waste fuels such as used tires and RPF*. Its non-fossil energy utilization rate in FY2023 was 47%.
- * RPF: Refuse derived Paper and Plastics densified Fuel. This is a high-grade solid fuel made mainly from those paper and plastic industrial waste materials which are difficult to recycle. (From the website of Japan RPF Industry Association)

- In its Energy Business, the Company uses biomass fuel appropriately procured in Japan and overseas to expand its renewable energy supplies.
- In 2023, Nippon Paper Crecia, at its Kaisei Mill, introduced a solar-power generation facility under a Power Purchase Agreement (PPA) and from September 2024 it expanded the PPA model to the Tokyo Mill, Koyo Mill, and Kyoto Mill, expecting an annual reduction of approximately 2,183 t-CO₂.

CASE STUDY

Initiatives in the Energy Business

Together with Sojitz Corporation, the Company has established the Yufutsu Energy Center, a power generation company. In February 2023, the Company started operations at the Yufutsu Biomass Power Plant, one of Japan's most extensive power generation facilities that exclusively burn biomass. As fuel, the plant uses wood chips, palm kernel shells (PKS), and unused wood, such as forest residue leftovers from Hokkaido. In addition, Nippon Paper Ishinomaki Energy Center carried out renovation work to convert to high biomass cofiring (completed in December 2023) and increased the biomass ratio from 26% to 42%. This will help the center to contribute more to reducing GHG emissions.

Ratio of Fossil Energy Usage (calorie conversion)

Basic Policy, etc.



CASE STUDY

Use of Torrefaction Technology and Woody Biomass Fuels (Nippon Paper Industries)

The Company has established a torrefaction technology to manufacture new woody biomass fuel as an alternative to coal for thermal power stations. Torrefaction is a technology that carbonizes woody biomass at a relatively low temperature. This has been developed for the production of fuels which remain relatively high in calories, are easy to crush, and have developed a water resistance that makes them suitable for outdoor storage. The fuel produced by the torrefaction technology can be used in the existing thermal power generating equipment, and contributes to the reduction of GHG emissions.

In-house Production of Solid Fuel from Waste (Nippon Paper Industries)

At the Company's Otake Mill in Otake City, Hiroshima Prefecture, paper sludge*1 and wastepaper residues*2 generated in the production of containerboards are solidified within the mill and used as fuel. Since April 2019, the mill has also accepted and utilized plastic waste produced in Otake City. In-house production and use of waste fuel are beneficial not only by reducing coal consumption and contributing to regional shift to carbon neutrality, but also by extending the lifespan of final waste disposal sites.

*1 A sludge produced in the manufacture of paper. It contains mainly cellulose fibers and minerals drained during the paper dewatering/drying process. *2 Foreign matter produced when processing wastepaper



4 Energy Conservation in Production and Logistics Processes

- 1. Promotion of Energy Conservation in Production Process
- The Group is working hard to conserve energy in Japan and overseas by introducing high-efficiency equipment and reviewing its production processes.
- As for effective initiatives, the Group is expanding them to the mills of Group companies in Japan and overseas in an effort to increase their effectiveness.
- <Examples of energy saving in production process>
- Energy conservation achieved by integrating refiner equipment for beating pulp fibers (from 2 units to 1 unit)
- Reduction of steam achieved by optimizing the temperature setting for white water heating
- Utilization of a co-generation system (Use of steam with high temperature and pressure obtained in combustion at a boiler in power generation and production processes)

2. Promotion of Energy Conservation in Logistics Processes

From the perspectives of "improving loading efficiency" and "shortening transport distances," the Group is working on green logistics that will lead to a reduction in GHG emissions.

- <Promoting energy-saving in logistics processes>
- · Promoting a modal shift (Long-distance transportation by loading a large amount of goods at one time on railroads and coastal vessels)
- Promotion of joint transportation in cooperation with distributors

Comparison of Modal Shift Rates



Green Management Certifications*¹ (as of March 31, 2024)

Company name	Number of offices with Green Management certification* ²
NIPPON PAPER LOGISTICS	5
Nanko Logistics Support	1
НОИТОКИ	1
NP-UNYU-KANTO	3
NP-UNYU-FUJI	1
NP-UNYU-KANSAI	1
NP-UNYU-IWAKUNI	2

- *1 A system in which the Foundation for Promoting Personal Mobility and Ecological Transportation acts as a certification body and certifies and registers businesses that are making efforts above a certain level based on the Green Management Promotion Manual
- *2 Awarded the "Green Management Certification Permanent Award" for all business sites that have been certified and registered continuously for 10 years from the first year of registration.

Eco Rail Mark Certifications* (as of March 31, 2024)

Company name Certification type	
Nippon Paper Industries	Eco Rail Mark for companies
	Eco Rail Mark for products (paper, white paperboard)

* The certification, established by the Ministry of Land, Infrastructure, Transport and Tourism, applies to companies (and the products of companies) which use more than given percentage of rail freight transportation, which generates lower unit CO2 emissions.

CASE STUDY

Introduction of an AI-based Optimization System for Ship Allocation Plans for Woodchip Carriers (Nippon Paper Industries)

Basic Policy, etc.

In June 2023, for the first time in the paper industry, the Company introduced and began an optimization system for ship-allocation plans for woodchip carriers using an algorithm (hereinafter referred to as "AI") developed by ALGO ARTIS CORPORATION. The system automatically creates optimized ship-allocation plans in a short time by making a formula out of the various constraints, risks, and costs that need to be considered when putting together plans and also integrates the experience and expertise of the people who do that work into the AI. Using the system, the Company can promptly optimize basic transportation plans and revise plans according to day-to-day changes, reducing ocean freight costs and GHG emissions via improved chip carrier operation efficiency.

Started Cooperative Marine Transportation with Daio Paper Corporation (Nippon Paper Industries)

In FY2023, the Company started cooperative marine transportation with Daio Paper Corporation between the Tokyo metropolitan area and the Kansai area. Before the initiative, products from the Nakoso Mill were transported to the Kansai area by truck. Now, some of the products are transshipped at Chiba Chuo Port in Chiba Prefecture to a Rollon Roll-off (RoRo) ship operated by Daio Paper and transported by sea to the Port of Sakai-Senboku in Osaka Prefecture, strengthening the modal shift in product transportation. With this shift, the Company will contribute to creating a sustainable society by strengthening and stabilizing the transportation system for products bound for the Kansai region to address the "Logistics 2024 Problem" (of reduction of transport capacity expected to result from regulations set to take effect in Japan that year) in the logistics industry and by reducing GHG emissions.

5 28

Response to Climate Change

3. Absorption and Fixation of CO₂ through Appropriate Management of Company-owned Forests

- The Group is in compliance with the Clean Development Mechanism (CDM) of the Kyoto Protocol and considers that the forests absorb CO₂ while growing and the CO₂ is deemed emitted to the atmosphere when trees are harvested.
- The forests owned by the Group in Japan and overseas are harvested and replanted based on the business plan for the purpose of using resources.
- Part of the amount of CO₂ absorbed through proper forest management and continuous thinning has been certified as "J-Credits*" after inspection.
- * A system in which the government certifies as "credits", the amount of CO2 emissions reduced through the introduction of energy-saving equipment, the use of renewable energy, and the absorption of CO2 through appropriate forest management.
- The net amount of CO₂ absorbed by forests in company-owned forests in Japan and overseas (absorption amount minus logging amount) was about 1 million tonnes-CO2 from 2021 to 2023, and the total fixation amount was about 32 million tonnes-CO₂ as of the end of 2022.
- The Group estimates that the amount of sequestered CO2 in forests in environmental protection area established in plantation projects overseas is approximately 10 million tonnes-CO₂,

J-Credit Sales Performance

Company name	Credit name	FY2020	FY2021	FY2022	FY2023
Nippon Paper Industries	Fuji/Kitayama company-owned forest thinning promotion project	-	2 cases	2 cases	3 cases
Nippon Paper Lumber	Gunma/Sudagai company-owned forest thinning promotion project	1 case	2 cases	3 cases	3 cases

CASE STUDY

Acquisition of J-Credits (Nippon Paper Industries)

In September 2022, the Company newly acquired J-Credit certification for Kazaki Company-owned forest (Fuji City, Shizuoka Prefecture). The project marks the first case in Japan of obtaining J-Credit certification by utilizing aircraft and drones, which was made possible by a revision to the system in August 2021.



Information Disclosures Based on TCFD

In April 2021, NIPPON PAPER GROUP endorsed the Task Force on Climate-related Financial Disclosures (TCFD) to ensure appropriate disclosure of information on its response to climate change issues.

Governance

The Group has positioned the reduction of GHG emissions as a management issue and is working toward quantitative targets it set in 2008.

The Company's Board of Directors positions responding to climate change issues as vital for realizing the Group Mission. It receives reports on related activities from the Risk Management Committee (at least once a year) and from the executive officer in charge of GHG emissions reduction and promotion of environmental management (at least twice a year), and supervises the execution of these operations.

Risk Management

The assessment of and responses to climate change-related risks are integrated into the Group's risk management system →POB and managed by the Risk Management Committee. In order to carry out appropriate risk prediction, NIPPON PAPER GROUP Environmental Committee, established under the Risk Management Committee, collects and analyzes information in order to identify climaterelated risks and promote measures against them. In addition, the Group has set up the Climate Change Strategy Working Group that gathers related information and anticipates risks.

Indicators and Targets (FY2030)

In the 2030VISION, the Group set a goal to achieve a 45% reduction in GHG emissions (compared with FY2013). However, as the path to achieving the target has become clearer due to the implementation of various measures and as societal demand for reducing GHG emissions is accelerating, the Group decided to accelerate its efforts toward decarbonization and in May 2023 raised the reduction target to 54%*. * Emissions related to production except for the Energy Business field

Indicators	Targets						
FY	2030	2023 (Implementation results)	2050				
GHG Emissions Reduction Rate	54% Reduction (compared with FY2013)*	37% Reduction 5.29 million t-CO₂	Carbon neutrality				
Non-fossil energy use ratio	60% or more	47%	_				

* Emissions related to production except for the Energy Business field

- Amount of investment to address climate-related risk: ¥52.0 billion
- Internal carbon price: Introduced in FY2021 but temporarily suspended since FY2022 due to the rising prices of coal and other fuels

Strategy and Scenario Analysis

The Group has envisioned a future society amid a backdrop of growing awareness of ESG issues. Using two types of scenarios (1.5°C scenario and 4.0°C scenario), the Company conducted qualitative and quantitative assessments of the impact that climate change risks and opportunities in 2030 and 2050 will have on its financial plans, focusing mainly on its business, and reported the results to the Board of Directors.

Scenario Analysis Methods

(1) Establishing an Image of Society 1.5°C scenario (RCP 2.6)

All kinds of policies will be introduced to keep temperature rise below 1.5°C, and at the same time, society as a whole will take action to limit temperature rise. As a result, temperatures will rise slowly, and therefore, by 2030, there will be little change from the current situation in terms of severe disasters, temperature rises, and precipitation patterns. In markets, production and consumption activities giving priority to environment conservation such as an expansion in ethical consumption, will increase. 4°C scenario (RCP 8.5)

No policies will be introduced to control temperature rise. While some stakeholders will take actions to limit temperature rise from the perspective of promoting ESG management, regardless of whether policies are introduced or not and regardless of what society as a whole is doing, society generally will not take actions to limit temperature rise. As a result, temperatures will

rise more rapidly than in the 1.5°C scenario, and the frequency of severe disasters will increase, temperatures will rise, and precipitation patterns will be more changeable in 2030 than in the current situation.

Basic Policy, etc.

(2) Evaluation Items

Risk: likelihood of occurrence, timing of occurrence, timing of impact, financial impact

Opportunity: likelihood of occurrence, timing of occurrence, timing of impact, financial impact, market growth

Summary of Analysis Results

As the pulp and paper industry is energy-intensive, transitional factors such as the introduction of policies and changes in market needs pose significant risks. Based on the results of analysis, the Company has been focusing on reducing GHG emissions through fuel conversion and energy conservation measures, as well as green strategies. In particular, to address the increasing social demand to reduce GHG emissions and the trends of various policies, the Company brought forward the scenario presented in the 2030VISION and in May 2023 raised its GHG reduction target to 54% compared to FY2013*. The Company aims to ensure strategic resilience by promptly achieving the GHG reduction target.

At the same time, there are many opportunities for the Company to leverage its strengths to enter and grow in markets that are being created and expanded due to government policy introductions and changes in market needs. Moreover, in response to adaption to climate change, measures to establish multiple production bases will lead to sales expansion, and the development and sales of environmentally friendly and adaptable products that are needed by society will be a growth opportunity for the Company in markets where expansion is expected. * Emissions related to production except for the Energy Business field

5 < 30 ► ∩

Response to Climate Change

NIPPON PAPER GROUP Plan for Shift to Carbon Neutrality



Period	Short-term Mid-term	Long-term						
Target	54% reduction compared with FY2013 (Scope 1 and 2)*	Carbon neutrality in 2050						
	Continuation and reinforcement of energy-saving measures Improve the basic unit by 1% or more compared to the previous fiscal year							
	Conversion to non-fossil fuels Non-fossil energy ratio of 60% or more by FY2030							
Priority measures	Improved production efficiency Reorganization of production structure	,						
		Introduction of carbon- free fuels and CCUS						
	Maximizing forest absorption of CO ₂ Sustainable forest management and utilizing breeding/propagation technology							

* Emissions related to production except for the Energy Business field

[1.5°C scenario]

2030

Costs, such as a carbon levy, increase.

On the other hand, new business opportunities such as biofuels, environmentally friendly products, and innovative materials will emerge.



Response to Climate Change

[4°C scenario]

2030

Increased physical risk.

On the other hand, business opportunities for climate change and disaster-response products will expand.





Climate Change-Related Risks

Risks as of 2030

			Financial impact			
	Factors	Impact on the Group	1.5°C scenario	4°C scenario		
		Carbon prices and energy procurement costs will Increase.				
	Daliau intraduation	Capital investment costs for fuel conversion and energy conservation will increase.	High	Low		
Tran	Policy Introduction	Raw material procurement costs will increase.	High	Low		
sition fa		Increased acquisition cost of plantation project sites.	High	Low		
ictors		Increased procurement costs for certified wood chips.	Medium	Medium		
	Changes in market needs	Development costs and capital investment costs for reducing environmental impact will increase.	Medium	Low to Medium		
		Sales from non-renewable power generation projects will decrease.	High	Low		
	Increase in the number	Stoppage of raw material procurement, production, product transportation, etc., resulting in reduced production volume and delayed or halted deliveries of products.				
	of severe disasters (frequent typhoons	Procurement, manufacturing, and logistics costs will increase.	Medium to High	High		
Phys	and heavy rains)	Increase in turbidity of rivers, etc., from which water is taken, resulting in production stoppage and delay or stoppage of deliveries of products.				
cal facto		Losses in the company's plantation assets.				
Ors	Increase in	Raw materials will become difficult to procure and procurement costs will increase.				
	change in precipitation patterns	Costs for search for alternative materials and technology development will increase.	Medium	High		
		Sales volume decreases or sales price declines due to difficulty in maintaining quality.				

* Amount of impact: less than 10 billion ven (low), 10 billion ven or more but less than 50 billion yen (medium), 50 billion yen or more (high) Qualitative evaluations, except for those marked with "*"

Carbon prices are set based on the IEA's NZE (Net Zero Emissions) scenario

1. Transition Factors

1-1. Risks Mainly Due to the Introduction of Policy

<Hikes in carbon and fuel prices due to the introduction of carbon pricing policy> In the 1.5°C scenario, the introduction of policies such as carbon levies, emissions trading schemes, and the prohibition of coal-fired power generation is expected to be the main factor in raising carbon prices and fossil fuel prices, which will increase fuel procurement costs. As the pulp and paper industry is energy-intensive, there is a risk that introducing these policies could significantly impact its financial planning.

Under the 4°C scenario, carbon prices will not increase and fossil fuel prices are not expected to rise significantly because no policies will be introduced, but changes in supply and demand for fossil fuel will occur and fuel prices will fluctuate. This is already part of the Company's normal risk management and the risk of being affected is considered small.

In response to the risk of higher fossil fuel prices expected in the 1.5°C scenario in which all manner of policies are introduced, to reduce this risk the Company will accelerate the shift to non-fossil fuels by maximizing the biomass procurement network of Nippon Paper Lumber, which has one of the most extensive timber procurement records in Japan.

Regarding the rise in carbon prices due to the introduction of emissions trading schemes and carbon levies, the Company aims to accelerate the reduction of GHG emissions to reduce the risk of impact on its financial plans related to carbon price rises as soon as possible. To reduce GHG emissions, the Company continues to implement energy-saving measures at its paper and paperboard mills to reduce coal consumption, with an index of improvement of 1% or more in energy intensity each year. At the same time, the Company is also working on conversion to recycled fuels, such as biomass and waste fuels, and is maximizing the use of black liquor,* which is a carbon-neutral fuel.

By studying the reorganization of the production structure and GHG emissions reductions in an integrated manner, proceeding with the output reduction and shutdown of coal boilers, and transitioning to low-carbon consumption at an early stage, the Company will reduce, at an early stage, the risk of impact on financial plans related to carbon price hikes.

Although carbon prices are likely to increase in Japan in the future due to the introduction of emissions trading schemes and carbon levies, the Company will work to reduce risks by actively participating in the development of systems and rules and other activities in the GX League $\rightarrow P26$ so that such policies will be conducive to corporate growth.

* Black liquor is comprised mainly of a wood component, lignin, and created as a by-product during the course of pulp manufacturing.

Basic Policy, etc.

<Changes in energy composition>

In the 1.5°C scenario, there is a risk that the demand for biomass fuels will increase due to policies to promote the introduction of renewable energy, causing fuel prices to rise and procurement costs to increase. At the same time, under the current FIT system, there is a risk that the procurement cost of wood chips for paper production will also increase due to competition with biomass fuels.

This phenomenon is already apparent, but under the 4°C scenario, no further policy tightening will take place, and price fluctuations will remain within our normal risk management.

In response to the procurement risks associated with the increased demand for biomass fuel due to the introduction of various policies, the Company believes that it can procure biomass fuels stably and at a relatively attractive price by making maximum use of its Nippon Paper Lumber biomass procurement network, which has among the best wood procurement performance in Japan. With regard to wood chips for papermaking, the Company will reduce risks by securing raw materials and stabilizing purchase prices by strengthening relationships of trust based on our long track record with existing suppliers and developing and adopting inexpensive local resources. <Impact on raw material procurement>

Since the Company imports most of the raw materials necessary for its manufacturing from overseas, it may be affected by the policy trends of resource-supplying countries.

In the 1.5°C scenario, there may be a risk of increased raw material procurement costs due to higher carbon trading prices arising from stricter policies in resource-supplying countries and CO₂ emissions levies imposed on raw materials and transportation.

By diversifying its supply sources, the Company is working to mitigate risks from geopolitical factors, policies in resourcesupplying countries, and climate change.



Responsibility to Communities

Response to Climate Change

<Expansion of the carbon credit market>

In the 1.5°C scenario in which the world aims to become carbon neutrality (net zero CO_2), the market is expected to expand due to increased demand for carbon credits. Along with this, the demand for credits from forest absorption is also expected to be higher. As forest investment aimed at creating credits increases, there is a risk that the price of land suitable for plantation will rise, increasing the cost of acquiring land suitable for its plantation business. This trend is already being seen. On the other hand, under the 4°C scenario, some stakeholders may

obtain plantations in view of government policies, social trends, and the promotion of ESG management. However, risks to the plantation business from such activity are considered insignificant.

While expanding the plantation business requires large areas of land suitable for plantation, and rising land prices may pose a risk to the Company, the amount of fixed CO_2 can be increased to generate credits by harnessing the Company's strengths, including utilizing its unique technology for breeding and proliferating highly efficient CO_2 -fixing trees and promoting the plantation business in cooperation with third parties.

1-2. Risks Arising Primarily from Changes in Market Needs

<Rapid increase in demand for environmentally friendly products>

Under the 1.5°C scenario, demand for environmentally friendly products is expected to increase, and there is a risk that technology development costs, capital investment costs, etc. will increase in response to this demand while products and services with high environmental burden will no longer be selected in the market. In the future, the market is expected to favor products and services derived from renewable raw materials, due to expectations of being environment friendly. Therefore, the Company believes that by accurately identifying and forecasting customer needs and further promoting the "paperization" that it is already working on, the Company will be able to promote the replacement of materials with renewable biomass materials, reduce risks associated with changes in market needs, and at the same time seize this as an opportunity to expand its business. The Company will further accelerate reduction of GHG emitted over the course of product manufacturing. At the same time, by taking advantage of the fact that its production sites are dispersed throughout Japan, the Company will offer products that contribute to the reduction of GHG emissions throughout the supply chain by shortening the transportation distance to delivery destinations and reducing GHG

emissions during transportation through the use of multiple production sites. In addition, regarding changes in market needs, the 1.5°C scenario predicts that greater public awareness of the importance of proper forest management and use will result in even greater demand than now for certified paper made from sustainable forest resources, such as those verified by a forest certification system. Certified wood chips are a limited resource, and higher demand may result in the risk of increased procurement costs.

To reduce this risk, the Company will continue to maintain good relationships with certified wood suppliers, while at the same time working to expand certified resources by obtaining certification for new plantations and supporting its suppliers, thereby ensuring a stable and efficient supply of certified resources.

2. Physical Factors

2-1. Risks Caused by an Increase in Severe Disasters

<Damage to production sites and distribution networks>

Under the 4°C scenario, severe disasters such as typhoons and torrential rains are expected to become more frequent, and the probability of damage to production sites and distribution networks is expected to increase, so the risk of a decrease in production volume due to temporary production stoppages and delays or stoppages in deliveries will become greater. In addition, in the event that the power supply is interrupted due to damage to power lines or other essential services, there is a risk that production sites that do not have their own power generation facilities will be forced to temporarily suspend production.

Although the Company cannot control the occurrence of natural disasters, it is working to reduce risks by establishing elaborate systems to ensure business continuation, such as backup systems for production and inventory controls. The Company is also trying to reduce risks by promoting measures to adapt to climate change, such as bulking up equipment installation sites and installing in-house power generation equipment for use in times of disaster.

<Deterioration of water intake quality>

The Company's main business, pulp and paper, uses water in its manufacturing process. If the water quality (turbidity) of the rivers, etc. from which water is taken deteriorates due to typhoons or heavy rains, product quality cannot be maintained, and there is a risk that production will be suspended until the water quality improves. This event is already occurring,

but is expected to become more frequent under the 4°C scenario. Natural disasters are unavoidable, but the Company is taking measures to ensure that operations can continue as long as possible by strengthening its water intake purification facilities and methods, and at the same time, working to reduce risks by developing a detailed system for business continuity in case production is suspended.

Basic Policy, etc.

2-2. Risks Caused by Rising Temperatures and Changes in Precipitation Patterns

<Forest fire occurrence>

As temperature rises, under the 4°C scenario, forest fires are expected to occur more frequently around the world.

As the Company has developed a business model based on forest resources, fires in forests owned by wood chip suppliers or companyowned forests could result in a significant risk in terms of stable procurement of raw materials and procurement costs. Moreover, if a company-owned forest is destroyed by fire, there is a risk that its value will decrease, and the profitability of the Company's plantation business is likely to deteriorate.

In order to mitigate this risk, the Company is strengthening the fire prevention and extinguishing systems in its own forests and decentralizing its forests and suppliers to multiple countries and regions.

<Deterioration in plant growth>

The growth of plants is greatly affected by temperature and precipitation. Since the Company uses plant-derived raw materials such as wood chips, various types of pulp, starch, etc., there is a risk that procurement of raw materials will become difficult and procurement costs will rise in the 4°C scenario where plant growth is expected to decline due to rising temperatures and changes in precipitation patterns. In the event that the Company has difficulty in procuring raw materials, it would be hard to maintain the quality and function of its products, which may be a risk that its sales volume and price decrease. However, the Company is working to reduce these risks by diversifying its raw material supply sources and continuing to search for alternative materials.



Response to Climate Change

Opportunities for Business Expansion

Opportunities as of 2030

Factors			The Group's opportunities	The Group's strength	Market	growth
			The Group's opportunities	The Group's strength	1.5°C scenario	4°C scenario
			Demand for power generation facility locations will increase	Company-owned forests and land in Japan, etc. Procurement network for demostic wood materials		
		Renewable energy will be	Demand for biomass fuels will increase	Biomass fuel production technology	Expansion	Stable
			Waste-derived fuels, such as RPF (refuse derived paper and plastics densified fuel), waste tire-derived fuel, and other fuels, will be utilized more often	 Procurement network for non-fossil fuels Utilization of existing boilers 		
		Waste-derived fuels, such as RPF (n Next-generation vehicles are becoming increasingly popular Storage batteries will sp Demand for CNF will	Storage batteries will spread and demand for raw materials for storage batteries will increase	CMC Technology and Production Facilities	Significant	Expansion
		becoming increasingly popular	Demand for CNF will increase due to the need to reduce the weight of automobiles	CNF Technology and Production Facilities	expansion	Expansion
	Policy introduction (e.g., carbon levies, changes in	Carbon credit market will be activated	Demand for forest absorption credits will increase	Company-owned forests in Japan Elite tree seedling business Plantation projects overseas Forest management technology Breeding and propagation technology	Significant expansion	Stable
	energy mix)	Resources will become more difficult to obtain due to stricter policies in	Demand for domestic lumber will increase	Company-owned forests in Japan Procurement network for domestic wood materials Elite tree seedling busines Collaboration with Stakeholders	Expansion	Stable
Tran		resource-providing countries	Demand for wastepaper will increase	Wastepaper procurement network (including unused wastepaper) Collaboration with Stakeholders		
sition factors		Carbon recycling is advancing (utilization of carbon resources)	Increasing demand for carbon fixation and utilization by forests	Breeding technology for high-efficiency CO ₂ -fixation trees Company-owned forests in Japan Elite tree seedling business Plantation projects overseas	Expansion	Stable
			Growing demand for chemical raw materials using wood-derived $\rm CO_2$	 Biomass-derived CO₂ supply infrastructure (recovery boilers) Chemical CO₂ fixation and utilization technology 	Significant expansion	Stable
	Transition to a decentralized society	Increasing local production and local consumption of energy	Small scale fuel demand will increase	Procurement network for domestic wood materials Company-owned forests in Japan	Expansion	Stable
		Decentralization of product consumption	Increased opportunities to sell products with reduced CO ₂ emissions during distribution while handling shipments from each production site	Multiple production sites	Expansion	Stable
			Demand for biomass materials will increase as the need for paperization increases due to decarbonization	 Woody biomass materials development technologies (CNFs, paper-based packaging materials, liquid containers, functional corrugated cardboards, biocomposites, etc.) 	Significant	Expansion
			Demand for lignin products will increase	Technologies to extract and utilize lignin Technology for recycling unused wastepaper	expansion	
	Changes in market needs	Demand for environmentally friendly products will increase	Demand for paper made from sustainably sourced forest materials will increase	Track record of procuring certified forest materials Relationship of trust with excellent suppliers Sustainable forest management	Expansion	Expansion
			Demand for products that reduce GHG emissions from livestock farming will increase	Cellulose material utilization technology	Expansion	Stable
			Demand for halogen-free resins with low environmental burden will increase	- Increased demand for functional coating resin "AUROREN""	Expansion	Expansion
			Demand for sustainable aviation fuel will increase	Technology for producing bioethanol from wood resources Multiple kraft pulp manufacturing facilities	Expansion	Expansion
		A rise in demand for stable product supply	Growing demand for purchasing from suppliers with established flexible BCP systems	Multiple production sites	Expansion	Significant expansion
Ph			Demand for domestic wood materials will increase. Demand for elite tree seedlings will increase due to greater area for reforestation in Japan.	Company-owned forests in Japan Elite tree seedling business Wastenanar procurement network Procurement network for domestic wood materials		
ysica	Increase in the number of	Overseas raw material suppliers and distribution networks are damaged	Demand for wastepaper will increase	Forest management technology Breeding and propagation technology	Expansion	Significant
ıl fac	catastrophic disasters		Domestic demand for waste-derived fuels and biomass fuels will increase	Collaboration with Stakeholders Unused wastepaper recycling technology		
tors		Increasing need to strengthen buildings	Demand for concrete admixtures and other materials will increase	Admixture for concrete (fly ash) technology	Expansion	Expansion
		Demand for long-term food storage will increase	Increasing demand for aseptic paper cartons for long-term storage of contents	Total system supplier	Expansion	Expansion
	Increase in temperature and change in precipitation patterns	Decline in plant growth	Demand for environmental stress tolerant trees will increase	Breeding and propagation technology	Expansion	Expansion



Responsibility for the Sustainable Use of Forest Resources

Environmental Responsibility Responsibility to Customers Human Rights, Employment and Labor Responsibility

Responsibility to Communities

ESG Data Section

NIPPON PAPER GROUP ESG Databook 2024

Response to Climate Change

1. Transition Factors

1-1. Opportunities Associated with the Introduction of the Policy

<Increase in demand for renewable energy>

In the 1.5°C scenario, policies are expected to promote the introduction of renewable energy, which will increase the demand for locations to install solar, wind, and small hydroelectric power generation facilities, as well as the demand for biomass fuels. The Company owns its forests and land in Japan, and it has an opportunity to expand its business of supplying renewable energy in cooperation with power generation companies. Increasing demand for biomass fuels will provide an opportunity to expand the biomass fuel sales business by making maximum use of the procurement network of Nippon Paper Lumber, one of the largest wood collection and sales companies in Japan.

In the 1.5°C scenario, where a rapid increase in demand for renewable energy is expected, the Company believes that it has the tangible and intangible assets, such as biomass boilers and facilities and technologies that use black liquor, a carbon-free fuel, to meet this demand, and can quickly respond to this market expansion and capture business opportunities.

<Dissemination and expansion of next-generation vehicles> Since the transportation sector accounts for about 20% of Japan's CO₂ emissions, it is predicted that next generation vehicles such as electric vehicles will become more popular in the future.

In 2021, the New Industry Creation Hatchery Center (NICHe) at Tohoku University announced that it had discovered that CNF*¹s have a powerful energy storage effect, and that it had succeeded in developing the world's first dry, lightweight supercapacitor by using the Company's TEMPO-oxidized CNF to create an uneven surface with a controlled CNF surface shape. In addition to enabling high-voltage charging in a shorter period of time than conventional lithium-ion batteries, CNF-based energy storage is a technology that is expected to solve the problem of increasing energy storage capacity, which is currently an issue for electric vehicle batteries, and could make a significant contribution to the spread of electric vehicles, etc.

The global market for supercapacitors is projected to be worth US\$3.59 billion in 2023 and is predicted to grow at a compound annual growth rate (CAGR) of 16.5% from 2024 to 2030 to reach US\$10.58 billion by 2030*².

With the spread of next-generation vehicles , the need for lighter-weight

vehicles is expected to be even greater in the future. The market for fiberreinforced plastics, including automotive components, is predicted to be worth US\$232.9 billion in 2021 and to reach US\$316.3 billion by 2030*³. While glass (glass fiber) and carbon (polymer-reinforced carbon fiber) are the most widely used fibers for reinforcing materials at present, due to the spread of electric vehicles, etc., there is a rising need for lightweight materials to achieve even greater fuel efficiency. The relative gravity (weight per unit volume) of CNF is lower than that of other fibers, making it an extremely lightweight fiber. Furthermore, CNF is a carbon-neutral, plant-derived material with multifaceted value in environmental conservation, as it suffers less performance degradation due to material recycling than glass fiber-reinforced plastics does. The global market for CNF is estimated to be slightly under 6 billion yen in 2023. However, it is projected to expand to around 7.5 billion yen in 2025 as more businesses use it for composite reinforcement material, including in automotive components (from 85 tonnes in 2023 to 115 tonnes projected for 2025)*⁴.

The diffusion of next-generation vehicles is a highly feasible event in both scenarios, with or without the introduction of policies, but in the 1.5°C scenario, the diffusion will be rapid due to policy support. The Company believes that it has the technological superiority and technological development capability to respond to this rapid spread, and that it can promptly respond to the rapid market expansion and grow the Company's business.

*1 Cellulose Nano Fiber

- *2 QY Research (Japan) "Supercapacitor Global Market Share and Ranking, Overall Sales and Demand Forecast 2024–2030" (report dated January 1, 2024)
- *3 Market Research Community (U.K.) "Reinforced Plastics Market Size, Trends, Analysis, and Outlook to 2030 " (report dated September 30, 2023)

*4 Research Conducted on the Cellulose Nanofiber Global Market (2023) / News and Topics / Yano Research Institute Ltd. (yanoresearch.com)

<Expansion of the carbon credit market>

In the 1.5°C scenario where the world is aiming for carbon neutrality (net zero CO_2), the carbon credit market is expected to expand due to increased demand, and the demand for forest absorption credits is expected to increase accordingly.

The Company owns approximately 90,000 hectares of its forests in Japan and operates tree plantation projects in various overseas countries. In addition to forest management technology cultivated through the management of Company-owned forests in Japan and overseas plantation projects, the creation of carbon credits by utilizing the Company's unique breeding and

propagation technology that enables highly efficient CO_2 fixation is expected to enable the Company to enter the expanding market and capture business opportunities. Specifically, the Company will work toward registering projects that will create 200,000 tonnes of J-Credits in its own forests in Japan by FY2027. The Company is committed to making contribution to formulation of rules regarding how forest absorption credits should be shaped and utilized from a forest owner's perspective, through such initiatives as the GX League Basic Concept advocated by the Ministry of Economy, Trade and Industry.

Basic Policy, etc.

<Strengthen the policies of resource-providing countries>

Since a significant portion of its raw materials and fuel for manufacturing are imported from overseas, the Company could be impacted by policy trends in resource-supplying countries. In the 1.5°C scenario, there may be a risk of increased raw material procurement costs due to higher carbon trading prices arising from stricter policies in resource-supplying countries. On the other hand, the Company owns forests in Japan and utilizes such resources, and at the same time, it operates a seedling business that contributes to creation of new resources. The Company has also established diversified procurement networks in Japan for resources such as fuels and wastepaper. Accordingly, the Company is able to make a shift to utilization of domestic resources. In addition, the Company has already become one of the top-ranked companies in Japan in terms of the domestic timber utilization rate.

The Company is working with stakeholders to create a closed-loop recycling system for wastepaper and at the same time, it is leveraging its strengths to make efficient and stable use of diverse resources, such as utilizing technologies to make use of paper that is difficult to recycle, such as used paper containers for food and beverage applications.

In order to develop a used paper container recycling business, the Company introduced recycling facilities for food and beverage paper containers at the Fuji Mill and began its operation in the fall of 2022. The Company is also working with Hamamatsu City to recycle used paper containers and is building a scheme for sorting and collecting paper cups and paper cartons. By 2030, It aims to stably collect and use unused wastepaper (12,000 tonnes per year), such as used paper containers. Under the 1.5°C scenario, the Company expects the impact of the policies of resource-providing countries to occur within five years, but the Company believes it can maintain and expand its business by taking advantage of its access to domestic resources.



Responsibility to Customers Human Rights, Employment and Labor Responsibility

Responsibility to Communities

ESG Data Section

Response to Climate Change

<Increase in products that reduce greenhouse gas emissions> In the 1.5°C scenario, carbon recycling, which is the process of capturing and reusing CO₂ from the atmosphere, is expected to progress rapidly, along with the reduction of GHG emissions through the reduction of fossil fuel use. In the plantation business overseas, the Company uses wood materials as a woody biomass resource by continuing the cycle of planting, nurturing, harvesting (wood chip production), and then replanting, allowing forests to freshly absorb and fix CO₂ from the atmosphere every year. As an example, the annual production volume of wood chips by AMCEL (Brazil), the Group's plantation company, is equivalent to approximately 1.5 million tonnes of forest CO₂ absorption. By positioning its overseas plantation business as a carbon recycling business and promoting the use of its proprietary breeding and propagation technologies that enable highly efficient CO₂ fixation, the Company can improve its CO₂ absorption and fixation capacity and contribute to the recycling of carbon resources, not just in the Company's own forests. The Company aims to improve the CO₂ fixation efficiency in overseas tree plantation projects by 30% by FY2030, as compared with FY2013. The Company intends to secure future resources for the Company by contributing to improvement of productivity of forests across the globe and an increase in CO₂ fixation through provision of our breeding and propagation technologies and plantation technologies to other companies. The Company entered into a strategic partnership agreement concerning a plantation project in Indonesia with Marubeni Corporation in 2022, and commenced provision of technological support. In addition, the Company aims to secure about 0.1 million hectares of new plantation resources mainly in Asia. In Japan, the Company has developed tree breeding and proliferation technologies based on its knowledge accumulated overseas to promote a business that produces selective seedlings of Japanese cedar and cypress that are called elite trees. Elite trees have their excellent properties, with growth rates more than 1.5 times faster and pollen production less than half that of conventional varieties. The Japanese government also supports the spread of elite trees to expand the forestry industry and combat pollen allergies. The Company aims to establish a system to produce 10 million elite tree seedlings by 2030. By promoting the widespread use of elite tree seedlings, the Company will not only ensure a stable supply of domestic raw materials, but also contribute to promoting the carbon recycling in Japan, expanding GHG sinks, enhancing

resource security and self-sufficiency, supporting balanced land development through the return of economic benefits to local regions, and more. Since CO_2 derived from biomass obtained from sustainable forests is considered carbon neutral, carbon negativity (negative emissions) can be achieved by separating and recovering the CO_2 generated from the combustion of biomass fuels and storing it underground or recycling it. In the future, with the practical application of technologies for CO_2 separation, underground storage, and recycling, the Company can expect to achieve carbon negativity using CO_2 generated from biomass boilers and black liquor-fueled recovery boilers operating in Japan.

1-2. Opportunities Associated with Transition to a Decentralized Society Under the 1.5°C scenario, the transition from a metropolitan-intensive society to a decentralized society is expected to proceed. As a result, local production and local consumption of energy will increase, and small-scale demand for fuel will likely increase. This trend has already begun, but it is expected to accelerate under the 1.5°C scenario. In response, the Company will have the opportunity to expand its biomass fuel sales business by making full use of the biomass procurement network of Nippon Paper Lumber, which is one of the largest wood collection and sales networks in Japan. In addition, with the shift to a decentralized society, the places of consumption of products are also expected to become more dispersed.

In the 4°C scenario, regardless of the temperature rise, there will be a shift to decentralization, but at a slower rate than in the 1.5°C scenario, in part due to the impact of increased risk of infectious diseases. In both scenarios, the Company believes that it can maintain and expand its business by taking advantage of the fact that its mills are dispersed throughout Japan and by responding to the decentralization.

1-3. Opportunities Arising from Changes in Market Needs

<Increase in demand for biomass materials>

The Company has built a business model based on carbon neutral forest resources, which enables it to provide products that meet the needs of customers who prefer environmentally friendly products. The shift in packaging materials from plastic to paper has continued as one way to address the marine plastics problem. Under the 1.5°C scenario, this trend is expected to accelerate further in conjunction with the problem of climate change, leading

to increased demand for the use of biomass materials in a variety of products other than packaging materials.

Basic Policy, etc.

As part of the Company's strategy to meet the increasing demand for biomass materials, it is promoting "paperization" under the slogan, "Let paper do what it can do". In addition to developing and marketing "SHIELDPLUS[®]," a paper packaging material with unprecedentedly excellent barrier properties against oxygen and water vapor, the Company has developed other products for marketing, including "Waterproof Liner," a multifunctional containerboard that is a sustainable packaging material alternative to styrofoam boxes, "SPOPS[®]," a replaceable paper container, and "School POP[®]," a strawless drinking carton. Moreover, biomass composites, which are made of "KC FLOCK[®], powdered cellulose created by finely grinding pulp, and plastic, are under consideration for various applications as a material with low environmental burden, as the Company can reduce the use of plastic while improving the strength by using biomass composites. It believes that, by providing powdered cellulose suitable for composite material, it can respond to changing market needs and capture and expand business opportunities.

<Increased demand for products derived from sustainable forests> The Company confirms the legality and sustainability of all woody raw materials it procures and ensures traceability through its supplier questionnaires, site visits and audits. At the same time, all of its woody raw materials are FM (Forest Management) materials under the forest certification system and have been risk assessed and managed.

In addition to utilizing the forest certification system, the Company has adopted a due diligence system to confirm the legality and sustainability of its woody raw materials, and it has established a system that enables it to promptly respond to inquiries from customers regarding raw material procurement. Furthermore, in order to supply certified paper, for which demand has been increasing in recent years, the Company has been working to strengthen its procurement system to secure certified forest materials. This includes securing new plantation sites, mainly in Asian regions, and establishing NPL Resources Asia as a base for activities in the region to expand the procurement volume of certified wood chips.

The Company's sustainable procurement of forest resources is based on the trust it has built with its suppliers over many years, ensuring reliability through its due diligence system for procurement activities and the creation

⇒ 37 ► ∩

vironmental sponsibility

Responsibility to Customers Human Rights, Employment and Labor Responsibility

Responsibility to Communities

ESG Data Section

Response to Climate Change

of forest resources. In 2022, the Group updated its "Principles and Basic Policies Concerning Raw Materials Procurement" to enhance its content and established the "Wood Resources Procurement Guidelines" under that policy. The Company continues to strengthen its efforts to further improve the reliability of the wood-based raw materials used and will continue to meet customer requests.

With the aim of fully utilizing its wood resources, the Company produces pulp and various products, including industrial dispersants and additives for leadacid batteries made from lignin. The Company is committed to continuing to provide environmentally friendly products that use sustainable wood resources as raw materials.

<Increase in products that reduce greenhouse gas emissions> The amount of greenhouse gases generated during the conversion of cattle excrement into fertilizer accounts for about 30% of the total emissions from the agriculture, forestry, and fisheries sectors in Japan, and research is being conducted to reduce these emissions.

By utilizing its unique technology to extract from wood chips only cellulose fibers that are easily digestible by cattle, the Company has developed "Genki MoriMori™," a livestock feed high in fiber content and nutritional value. The product is now in full-scale production and sales. Feeding cows with easily digestible feed is expected to lower the water content of excrement and reduce GHG emissions generated when compost is made. Reducing GHG emissions generated by the livestock industry has become a global issue. In the 1.5°C scenario, efforts to address the problem may accelerate and create greater market demand for feed with this reduction effect. The Company believes that it can capture this business opportunity by utilizing the technologies it has accumulated in the pulp and paper business.

<Increased demand for sustainable aviation fuel (SAF)>

The Company is currently reviewing the possibility of starting bioethanol production in 2027 using wood resources procured in Japan, with an annual production capacity of tens of thousands of kiloliters. Considering the utilization of domestic wood and its contribution to a carbon neutral society, the bioethanol to be manufactured is assumed to be mainly used as raw material for domestic SAF*¹. At the same time, the Company will also consider carbon recycling initiatives that contribute to a carbon neutral society, such as

 $\rm CCU^{*2}$ that uses $\rm CO_2$ from carbon neutral origins generated as a secondary product in bioethanol production and the effective use of residues from the fermentation process.

Leveraging the paper and pulp manufacturing technologies it has cultivated over the years, the Company plans to promptly establish mass-manufacturing technology and a full-fledged supply system for "wood-derived bioethanol" in units of 10,000 kiloliters. With this, the Company will accelerate its entry into the biochemicals market and contribute to building a carbon neutral society as a comprehensive biomass company shaping the future with trees.

*1 SAF: Sustainable Aviation Fuel. This sustainable aviation fuel significantly reduces CO₂ emissions in its lifecycle, from production and collection to manufacturing and combustion, compared to conventional fuels, and can be utilized as is with existing infrastructure.
*2 CCU: Carbon dioxide Capture and Utilization. This refers to the separation and recovery of CO₂ and

its effective use as a resource in crop production and chemical product manufacturing,

2. Physical Factors

2-1. Opportunities Due to the Increase in the Number of Severe Disasters <Increase in demand for stable supply of products>

Severe weather disasters, such as typhoons and torrential rains, are expected to cause damage to production sites and distribution networks, further intensifying the demand from customers to maintain a stable supply of products.

In response, the Company is working to formulate a detailed system for business continuity. It is developing a system that will allow it to manufacture products at multiple plants. Since severe disasters are expected to become more frequent in the 4°C scenario, the Company believes that it can take advantage of the fact that its factories are dispersed throughout Japan to accelerate the transition to a more flexible production structure and further strengthen its system for business continuity.

Also, in the event that its overseas raw material suppliers are damaged and opportunities for domestic timber, wastepaper and domestic non-fossil fuel use expand significantly, the Company can take advantage of its strong timber, wastepaper and fuel procurement network as well as its efforts to secure wastepaper raw materials in collaboration with its customers. Furthermore, it believes that it can also maintain and expand its business by utilizing its unused wastepaper recycling technology and making extensive use of domestic resources.

<Increase in demand for long-term storage food containers>

Basic Policy, etc.

The market for containers for long-term storage is expected to grow, as local governments and households are becoming increasingly concerned about the importance of storing emergency food supplies to prepare for severe disasters that are expected to occur not only in a 4°C scenario but also in a 1.5°C scenario.

In addition to "FUJIPAK[®]", which enables room-temperature distribution and long-term storage of beverages and tofu, the Company sells a "non-aluminum FUJIPAK", which allows room-temperature distribution without using aluminum foil. This product has drawn attention as an environmentally friendly container that improves recyclability and reduces GHG emissions. The Company has also developed "NSATOM[®]" as a new container that can hold a wider variety of contents and has a long-term storage function. As paper containers capable of long-term storage are believed to help eliminate plastic and reduce food waste, the Company will continue to develop new containers that meet market needs and strengthen its system of stable supply.

2-2. Rising Temperatures and Changing Precipitation Patterns

<Increasing demand for environmental stress tolerant plants> Plants cannot move on their own, which means that environmental changes like higher temperatures can stress them and hinder their growth. So, efforts have been made for many years to breed plants that can withstand high temperatures, salt damage, and dry conditions.

Under the 4°C scenario, the demand for environmental stress tolerant plants may increase because the appropriate areas for plant growth are expected to change and decrease due to climate change.

The Company has been developing tree breeding and propagation technologies for many years and has developed a number of proprietary technologies for these.

Because tree breeding takes time, it will be difficult to expand the business rapidly in 2030, but the Company will work to expand its business quickly after 2030, when the value of forests will further increase toward carbon neutrality.

5 < 38 ► ∩

Responsibility to Customers

5 < 39 ► Λ

Promotion of Resource Circulation

1 Basic Policy

NIPPON PAPER GROUP Environmental Charter

2 Initiatives for Using Wastepaper

NIPPON PAPER GROUP considers wastepaper as important raw material and is working on the recycling of unused wastepaper.

Trend of Wastepaper Utilization Rate (in Japan*)



* From FY2021, Crecia Kasuga is also included in the scope

CASE STUDY

Launch of Recycling Facilities for Food and Beverage Paper Containers (Nippon Paper Industries)

In October 2022, the Company's Fuji Mill began operating facilities dedicated to producing recycled pulp from wastepaper of food and beverage paper containers. Using wastepaper derived from food and beverage paper containers that have been sorted very accurately makes it possible to produce high-quality recycled pulp that has a high degree of brightness. By leveraging the characteristics of recycled pulp produced at these facilities and promoting their recycling into various paper products with high added value, the Company will popularize the recycling of used paper containers and build a new resource circulation business.

Won the Environment Minister's Award for Business of Voluntary Collection and Recycling of Paper Containers in Collaboration with Hamamatsu Residents (Nippon Paper Industries)

The Company has recycled food and beverage paper containers, such as yogurt cups and paper cups, with the support of Hamamatsu City since April 2021. This recycling project, being carried out together with Hamamatsu Green Wave Co., Ltd. (replaced by JFE Environment Technology Co., Ltd. in February 2024) and NPO Ecolife Hamamatsu, gathers used paper containers in collection boxes installed at places such as "Ecohama", a facility in Hamamatsu City that raises environmental awareness, and utilizes them at one of the Company's mills as raw material for paper. It contributes to raising general consumers' awareness of recycling, reducing the volume of incinerated rubbish, and fixing CO₂ through long-term circular use of wood resources. This project won the Environment Minister's Award [PP25] in the FY2023 Reduce, Reuse and Recycle Promotion Merit Awards (hosted by the 3Rs Promotion Council.)

Paper Cup Recycling through Three-Company Collaboration with JAL and TOKAN KOGYO (Nippon Paper Industries)

Since December 2022, the Company has continued to collaborate with Japan Airlines Co., Ltd. (JAL) to recycle paper cups and other items. JAL Group properly sorts and collects the paper cups used in some domestic in-flight services, while NIPPON PAPER GROUP is building a unique route for their transportation, accumulation, and packing. This recycling project was initially limited to materials such as containerboards. However, further efforts through three-company collaboration that includes paper cup manufacturer TOKAN KOGYO CO., LTD. realized horizontal recycling to recycle paper cups back into paper cups^{*1} in June 2024 for the first time in Japan^{*2}.

*1 Recycled paper containing used paper cups is used as part of the raw material. *2 According to research by the Company

Upcycling Project of Used Paper Containers Centering on "choito[®]" (NP Trading, Nippon Paper Industries)

In February 2024, the Group launched "choito®", a brand of fabric products partially made of paper yarn from used food and beverage paper containers. This project recycles collected used paper containers into high-quality recycled pulp at the Company's Fuji Mill and produces fabric products, such as towels and aprons, using paper yarn created from the pulp. It promotes collaboration with many operators and will help expand the recycling of used paper containers, which conventionally tend to be disposed of.

Promotion of Resource Circulation

CASE STUDY

Initiatives to Recycle Release Paper (Nippon Paper Industries)

The Company produces base paper for release paper used for stickers and labels and promotes initiatives to recycle release paper, which is conventionally disposed of, from the perspective of extended producer responsibility. Currently, used release paper is collected and recycled into materials such as containerboards and notebook covers. The Company also participates in activities conducted by J-ECOL (Japan-Earth Conscious Labeling*) to spread the recycle release paper. To reduce plastic consumption and make it easier to recycle release paper, the Company is proposing base paper for release paper (paper coated on one side) that does not need a layer of PE laminate.

* This association was founded in May 2023 to promote the resource circulation of used release paper. It consists of companies and organizations related to the use, production, and recycling of stickers and labels.

Circular Use of Wastepaper in Collaboration with Local Governments (Nippon Paper Industries)

The Company's Yatsushiro Mill, in collaboration with Yatsushiro City, has built a system to recycle wastepaper generated in Yatsushiro City. Various types of wastepaper (newspapers, magazines, miscellaneous recycable paper, cardboard, paper packs, paper containers, and packaging) collected by Yatsushiro City are accepted by the Yatsushiro Mill and other plants of the Group, recycled using facilities and technologies such as wastepaper pulp production facilities, and used as raw materials for making paper.



"Closed Loop" Initiatives (Nippon Paper Industries)

The Company has established a "closed loop" scheme in which it directly purchases wastepaper from its customers in order to make long-term, stable use of collected waste newspaper and catalog paper as a raw material. In April 2023, the Company signed a new contract with DINOS CORPORATION regarding the sale and recycling of wastepaper, for the purpose of domestic circulation of resources by building a "closed loop" of catalog wastepaper, and started operations.

Collection and Recycling of Paper Cups (Nippon Paper Industries)

Since 2019, the Company has been collecting used paper cups at its head office and recycling them as raw materials for containerboards at its Ashikaga Mill. In FY2023, the Company collected 170,000 paper cups.

Paper Carton Recycling "PakUpcycle®" (Nippon Paper Industries)

Basic Policy, etc.

The Company has conducted various initiatives with a catch phrase of "PakUpcycle[®]," coined by the Company by combining "Pak" (beverage paper pack) and "Upcycle" (to reuse unnecessary items through processing to add value as a product).

<Paper-Pak Carton Collection and Recycling>

The Company has installed Paper-Pak collection boxes at Group company sites and is working to increase employee awareness of paper packs recycling. In addition, the Company has positioned the collection of paper packs as an activity that enables society as a whole to make effective use of resources, and is working with collection companies to strengthen the efforts to promote recycling at various facilities and schools. In 2017, the Company commenced collection activities using a proprietary method, primarily in Nerima City, Tokyo. The collected paper packs are used as raw material for household paper products. (Results for FY2023: 3.8 tonnes)

<Recycling of Beverage Paper Packs with Aluminum>

The Company is working jointly with RIPRO Corporation, Japan, and Hagihara Industries Inc. to develop uses for a mixture of polyethylene and aluminum (hereinafter "PolyAI") in order to material recycle* the mixture that is processed as waste during the recycling process of beverage paper packs that use aluminum. Boundary stakes made from PolyAI are used by several forest owner's cooperatives.

* Recycling method in which waste is recycled as raw material for a new product

<Recycling of Milk Paper Packs from School Lunches>

In 2023, <u>School POP</u>^{*} **Sets** was adopted by CHUOMILK, which supplies milk for school lunches in areas surrounding Toyohashi City. In response, Toyohashi City began recycling school lunch milk paper packs to reduce waste and recycle resources, and to promote environmental education at schools it also holds activities such as visiting lectures. Employees of the Company participated in this visiting lecture to help with instruction and with a paper-making workshop.

5 40 1

Reduction of Environmental Burden

1 Basic Policy

→P87 NIPPON PAPER GROUP Environmental Charter

Effective Management of Water Resources 2

- NIPPON PAPER GROUP uses water necessary for production activities from tap water, industrial water, groundwater, and rivers.
- For the sustainable use of water resources, the Group is working to reduce water consumption and the amount of water pollutants in its wastewater.
- In FY2023, the Group did not receive any information from the government or local residents that the Group's mills and business offices were impacting the environment due to their water intake.
- The Group conducts assessments in order to identify water risks for each major production site in Japan and overseas, such as the frequency of risks to water supply and flooding, and to formulate appropriate countermeasures.
- This fiscal year, in order to grasp the water issues in the regions where major production sites and sales offices are located, water risks were evaluated \rightarrow P48 using the WWF Water Risk Filter*. The results show that water risks are low at present.

* WWF Water Risk Filter: A tool for evaluating water risks that is offered by the World Wide Fund for Nature (WWF)

1. Reducing the Amount of Water Used

- The Group actively reuses water in production processes to reduce the amount of water used.
- The reuse of water in the production process leads to energy saving of equipment by reducing the amount of inflow water.

CASE STUDY

White Water Recycling

At the Group's paper mills, they collect water containing fine pulp fibers generated in the wet part called white water. The collected white water is separated into pulp fibers and reused water by the treatment equipment, the pulp fibers are returned to the preparation facility, and the reused water is returned to the wet part for recycling, in an effort to reduce water consumption.

White Water Circulation Flow Diagram



CASE STUDY

Recycling of Water Using Jet Nozzles (Nippon Paper Industries)

Basic Policy, etc.

As the amount of recycled water in the manufacturing process increases, hydrogen sulfide is generated due to fouling within the system caused by closed processes and the rotting of accumulated fine pulp. In order to save water and achieve improved operational efficiency by controlling the production of unpleasant smells, submersible jet nozzles that utilize the eductor* effect have been installed in the Company's mills in Japan. The powerful liquid flow cleans the system by removing dirt and deposits from the bottom of the pit, thereby promoting the circular use of water.

* Sucking up the liquid inside the pit and discharging it with supplied water using pressure difference

2. Reducing Water Pollutants

- The Group is working toward reducing water pollutants by 15% compared to FY2018 by FY2030.
- The Group purifies wastewater using activated sludge treatment equipment and other equipment to reduce the amount of organic substances in the wastewater to below the standard values stipulated by laws and regulations and agreed upon with local governments before discharging it into public waters.
- Wastewater from some of the mills and business offices is thoroughly controlled through constant monitoring using measuring equipment and daily water quality inspections by inspectors.

5 41

Responsibility to

Communities

Beduction of Environmental Burden

3. Initiatives in Collaboration with Other Companies

The Group is working with other companies to implement initiatives for the sustainable use of water resources.

CASE STUDY

Participation in the JOKI Programme (Jujo Thermal)

Jujo Thermal (Finland) participates in the JOKI programme, which aims to strengthen the protection of water resources in operating areas and improve water quality.

3 Waste Reduction

1. Waste Recycling

The Group is advancing initiatives such as revising production processes and making effective use of boiler ash as civil engineering material in order to reduce the amount of industrial waste sent to landfill and other forms of final disposal.

Waste Generated and Final Waste Disposal (in Japan*)



* From FY2021, Crecia Kasuga is also included in the scope

CASE STUDY

Circular Use of Quicklime (Nippon Paper Industries)

At its papermaking mills, the Group uses quicklime to recover chemicals used in the pulp manufacturing processes and to manufacture fillers that impart functionality to paper. Quicklime waste is generated in this process. The Group has so far disposed of this material as an industrial waste. However, the Company' Ishinomaki and Iwanuma mills have started collaborating with a supplier that can recycle quicklime waste. Under this collaboration, the Ishinomaki and Iwanuma mills are working to reuse quicklime waste as a resource.

Processing Coal Fly Ash from a Boiler into a Construction Material (Nippon Paper Industries)

The Ishinomaki Mill operates a coal boiler to privately generate electricity on site. In the process, combustion ash is generated in its coal boiler. The Company processes the combustion ash through heat modification, and sells the material as CfFA® (Carbon-free Fly Ash) concrete admixture. Mixing CfFA® into concrete has the effect of making it more durable and longer lasting. CfFA® has so far been adopted in earthquake recovery construction (bridges and seawalls, etc.) in the Tohoku region of Japan.

Effective use of local waste (Nippon Paper Industries)

At the Company's Nakoso Mill, waste generated in neighboring areas is actively used as fuel. This waste includes shiitake mushroom beds and rubber chips from artificial turf. The use of waste as fuel allows the Nakoso Mill to reduce its use of fossil fuels. The local production and consumption of fuel has not only contributed to reducing GHG emissions from the Nakoso Mill, but it has also helped to reduce waste generated in local areas. In 2022, the Company won the 7th Fukushima Industrial Award's Special Award sponsored by the Fukushima-Minpo Co., Ltd.

Recycling of Paper Pallets

The Group is contributing to the effective use of renewable resources by collecting and reusing pallets through the Pallet Recycle Co., Ltd.

2. Response to the Plastic Resource Circulation Act

Basic Policy, etc.

The Group is working on the control of generation and discharging of waste plastic and its recycling pursuant to the "Plastic Resource Circulation Act," established in April 2022.

- <Control of generation and discharging>
- •Through the Japan Paper Association, the Group encourages wastepaper suppliers to reduce plastic contamination in wastepaper.
- The Group chooses high-strength and long-life plastic products for use in production.

<Recycling>

- •The Group prioritizes the outsourcing of work to processing companies that can recycle resources.
- •Waste plastic that is difficult to recycle is used by the Group internally as fuel. $\rightarrow P27$

<Others>

•The Group develops and provides products that can help reduce the amount of plastic used in society as a whole.

4 Controlling Chemical Substances

- The Group examines the chemical substances it uses in its production processes in accordance with its Chemical Substance Management Guidelines. The Group implements risk management by monitoring how much of these substances is used and how much is released into the environment. The Group also takes corrective actions as necessary.
- At risk communication →P25 held at its mills and business offices, the Group discloses to local stakeholders the amounts of released and transferred chemical substances subject to the PRTR system.

5 42

Basic Policy, etc.

Reduction of Environmental Burden

Amounts of Substances Subject to the PRTR System Released and Transferred*1 (FY2023)

Chemical Substance	Amount released	Amount transferred	Total released and transferred
Water-soluble compounds of zinc	300.0	0.0	300.0
Acrylamide	8.3	0.0	8.3
Acrylic acid and its water-soluble salts	13.2	0.0	13.2
Acrylonitrile	1.1	0.0	1.1
EPN	1,500.0	0.0	1,500.0
Ethylbenzene	0.3	0.0	0.3
Ethylene glycol monoethyl ether	210.0	4,700.0	4,910.0
Epichlorohydrin	1.7	0.0	1.7
Xylene	150.9	0.0	150.9
Glutaraldehyde	23.9	1.7	25.6
Chloroform	40,974.0	23,801.0	64,775.0
Tetrachloromethane	0.0	19,374.0	19,374.0
Cyclohexylamine	750.0	0.0	750.0
Methylene chloride	9,300.0	170.0	9,470.0
N,N-Dimethylacetamide	216.8	194.3	411.1
N,N-Dimethylformamide	33.0	370.0	403.0
Mercury and its compounds	10.8	0.0	10.8
Dioxins*2	1,775.5	6,666.9	8,442.4
O,O-Dimethyl O-(3-methyl-4-nitrophenyl) phosphorothioate	7.0	0.0	7.0
Water-soluble copper salts (except for complex salts)	2.3	0.0	2.3
Toluene	22,410.5	58,382.0	80,792.5
Naphthalene	0.4	0.0	0.4
Carbon disulfide	5,001.0	0.0	5,001.0
Arsenic and its inorganic compounds	0.4	0.0	0.4
Hydrogen fluoride and its water-soluble salts	9,010.8	0.0	9,010.8

Chemical Substance	Amount released	Amount transferred	Total released and transferred
Hexane	1.0	0.0	1.0
Benzene	0.17	0.0	0.17
Boron compounds	25,653.3	0.0	25,653.3
Polychlorinated biphenyls	0.0	7,687.9	7,687.9
Poly(oxyethylene) alkyl ether	1,218.2	0.0	1,218.2
Formaldehyde	570.5	94.2	664.7
Manganese and its compounds	804.2	0.0	804.2
Methacrylic acid	2.0	0.0	2.0
Methyl methacrylate	24.0	0.0	24.0
Methylnaphthalene	982.9	0.0	982.9
Methyl benzimidazol-2-ylcarbamate	5,040.5	0.0	5,040.5
Polycondensation products of adipic acid / 2-(chloromethyl)oxirane	6,916.5	2,450.0	9,366.5
Alkan-1-amine, (Z)-octadec-9-en-1-amine, -octadeca-9,12-dien-1-amine	723.0	0.0	723.0
Mixture of polyaddition products of oxirane to alkan-1-amine, polyaddition products of oxirane to (Z)-octadec-9-en-1-amine and polyaddition products of oxirane to -octadeca-9,12-dien-1-amine	18,538.0	2,070.0	20,608.0
Alpha-Alkyl-omega-hydroxypoly, alpha-alkenyl-omega-hydroxypoly, and the mixture thereof	1,158.0	0.0	1,158.0
Alpha-Alkyl-omega-hydroxypoly	2,065.0	0.0	2,065.0
Salt of alkyl(benzyl)(dimethyl)ammonium (limited to those the alkyl group is C=12-16)	2,599.0	0.0	2,599.0
Ethylene glycol monobutyl ether	33.0	540.0	573.0
Ethylenediaminetetraacetic acid and its potassium and sodium salts	68,038.4	3,830.0	71,868.4
Chloric acid and its potassium and sodium salt	1,909,302.4	0.0	1,909,302.4
Cyclohexane	1,266.6	9,147.0	10,413.6
Salt of N,N,N-trimethyldodecan-1-aminium	1,926.0	0.0	1,926.0
Trimethylbenzene	101.5	0.0	101.5



Reduction of Environmental Burden

Amounts of Substances Subject to the PRTR System Released and Transferred*1 (FY2023)

Chemical Substance	Amount released	Amount transferred	Total released and transferred
Nitrilotriacetic acid and its sodium salt	32,616.0	0.0	32,616.0
1-Hydroxyethane-1,1-diyl diphosphonic acid	98,898.0	2,717.0	101,615.0
Hexahydro-1,3,5-tris-1,3,5-triazine	16,924.0	0.0	16,924.0
Methyl isobutyl ketone	180.0	5,100.0	5,280.0
2-(2-Methoxyethoxy)ethanol	4,186.5	0.0	4,186.5
Total* ³ Unit : kg	2,289,695.1	140,629.1	2,430,324.2

*1 A summary of the volumes Group companies reported in accordance with the PRTR system.

*2 Dioxins unit : mg-TEQ

*3 Dioxins are not included in total data.

5 Prevention of Soil and Air Pollution

- The raw materials and chemicals used by the Group's mills and business offices contain almost no heavy metals, trichloroethylene, or other soil contaminants.
- The Group is working toward reducing air pollutants by 15% compared to FY2018 by FY2030.
- The Group has introduced NOx removal equipment, desulfurization equipment, and a dust collector to reduce atmospheric pollutants, such as sulfur oxides (SOx) and nitrogen oxides (NOx) generated in fuel combustion, to below the standard values stipulated by laws and regulations and agreed upon with local governments before discharging them.

6 Preventing Noise and Vibration

The Group is engaged in efforts <u>utilizing IoT technologies to prevent the occurrence of noise and</u> vibrations. →P54

7 Centralizing Environment-Related Data

The Group has introduced an environment-related data collection and aggregation system for all the Group companies. Environment-related data, such as water quality, air, waste, and chemical substances, is centralized to share and use environmental information within the Group.



⇒ 45 ►

Preservation of Biodiversity

1 Basic Policy

- □ → P87 NIPPON PAPER GROUP Environmental Charter
- Description of Biodiversity Description and the Preservation of Biodiversity

2 Preserving Biodiversity in the Value Chain

- The Group strives to reduce its impact on biodiversity throughout the entire value chain, from procurement of raw materials and fuel to paper and other manufacturing processes, , wastewater treatment, and GHG emissions control.
- The Group sustainably procures wood resources, which are the raw materials for the Group's products, from properly managed forests.

3 Preserving Biodiversity in Forest Management

1. Initiatives to Preserve Biodiversity in Forest Management

- The Group manages sustainable forests in the company-owned forests in Japan and overseas.
- The Group conducts biodiversity surveys based on its "Basic Policy on the Preservation of Biodiversity" in the companyowned forests in Japan and overseas.
- In existing businesses, the Group confirms topographical information that should be considered, such as waterfront forests, and conducts fixed-point surveys of forest ecosystems.
- Based on the results of biodiversity surveys, in areas that require special attention, the Group has established environmental forests, protected areas, and protected forests where logging is not performed.
- In managed forests where lumber is produced, the Group appropriately manages the forests by considering the location and timing of logging and implementing operations that consider local biodiversity.

2. Third-Party Confirmation

- By utilizing the forest certification system, the Group can have third-party confirmation that its forest management is being implemented, considering biodiversity.
- Nippon Paper Industries and overseas plantation company have obtained forest certification for all company-owned forests in Japan and overseas.

Initiatives to Preservation of Biodiversity in Forest Management



 $^{\ast 1}$ Forest areas that are operated for the sustainable production of timber

*2 Forest areas that are not cultivated or logged for the production of timber

*3 Forest areas where logging and other operations are restricted to preserve biodiversity

Preservation of Biodiversity

CASE STUDY

Certified as a site of "Nationally Certified Sustainably Managed Natural Sites" by the Ministry of the Environment (Nippon Paper Industries)

The Company has participated in the "30by30 Alliance for Biodiversity," run by the Ministry of the Environment, since the alliance was founded in FY2022. It aims to achieve "30by30," an international commitment to preserve at least 30% of land and sea as natural environmental areas by 2030. After cooperating with the trial and verification of the screening process in FY2022, the Hooh company-owned forest (1,359 ha in Yamanashi Prefecture) was certified as a site of "Nationally Certified Sustainably Managed Natural Sites*" by the Ministry of the Environment when the certification system began in October 2023. In the future, the Company will consider expanding the target area.

* In this project, to achieve "30by30," the Ministry of the Environment certifies areas where biodiversity is preserved through private initiatives.

Preserving Blakiston's Fish Owl* Habitat While Pursuing Timber Production Business Collaborating with the Wild Bird Society of Japan (Nippon Paper Industries)

The Company carries out initiatives together with the Wild Bird Society of Japan to run a timber production business while protecting the habitat of Blakiston's fish owl.

* Blakiston's fish owl was identified as a national protected species in 1971, and placed on the Red List of critically endangered species by Japan's Ministry of the Environment

Collaborating with the Wild Bird Society of Japan

Year	Activities
2010	Entered into an agreement on the protection of wild birds with which forestland owned by the Company in Eastern Hokkaido was identified as a sanctuary.
2015	Set a new standard for the compatibility of business activities with the preservation of Blakiston's fish owl habitat in company-owned forests in Eastern Hokkaido. Won Biodiversity Action Award of the Ministry of the Environment.
2020	Installation of artificial nest boxes to support Blakiston's fish owl breeding
2021	Won "Hokkaido Biodiversity Conservation Awards" of the Hokkaido Government.
2023	Introducing the initiatives at the "NIPPON PAPER GROUP" sustainability <u>lecture</u> →Po2
2024	Revised the standard set in 2015 in line with the actual behavior of Blakiston's fish owl.

Conducting Biodiversity Surveys on Overseas Company-owned Land (AMCEL)

AMCEL (Brazil) has about 170,000 hectares as protected areas of approximately 300,000 hectares of company-owned land. The protected areas are a habitat for many wildlife species and they also include forests with high conservation value where rare and endangered species live. AMCEL conducts biodiversity surveys on the company-owned land.

Biodiversity Preservation Initiatives of AMCEL

Activities	Description
Regular water inspections	Installation of equipment for monitoring the quality and level of water in the plantation area, and performance of regular water inspections
Wild animal and plant habitat research in company-owned land	AMCEL conducts habitat research and monitoring of wild animals and fish in plantation areas in a joint effort with ecologists.
Monitoring of vegetation in protected areas	AMCEL conducts continuous monitoring research of vegetation in protected areas

Supporting the Activities of the "Association for the Protection of Shirane-aoi*"

To protect the Shirane-aoi, the "Association for the Protection of Shirane-aoi (Japanese wood poppy)" was established in 2000 by Gunma Prefectural Oze High School and Katashina Village, Tone District, Gunma Prefecture. Nippon Paper Development, which manages the Sugenuma company-owned forest, has provided operational support since the association's establishment and has opened a portion of the company-owned forest to the public. Since 2002, Group employees have participated in these activities as volunteers.

* Plants of the Ranunculaceae (buttercup) family designated as an endangered species in Gunma Prefecture

Eradicating Invasive Plant Species from Iriomote Island ~Cooperation with the Iriomote Island Ecotourism Association~ (Nippon Paper Industries)

Basic Policy, etc.

Based on the agreement concluded in 2017 with the Okinawa Forest Office of the Kyushu Forestry Department of the Forestry Agency, in about 9 hectares of national forest on Iriomote Island, the Company has eradicated Bay Biscayne creeping oxeye*, an alien species that has invaded Iriomote Island, and investigated the invasion status of exotic plants in collaboration with the NPO Iriomote Island Ecotourism Association. In March 2022, the agreement was updated to continue the activities for another 5 years.

* A plant in the Asteraceae family which originated from the Americas, but was introduced throughout Okinawa for greenifying slopes and embankments, etc. It has strong propagating capabilities, and there are concerns over its impact on local ecosystems.

Mutual Cooperation in Forest Management with **Coca-Cola Bottlers Japan**

The Company, the Group's MARUNUMA KOUGEN RESORT and Coca-Cola Bottlers Japan Inc. (hereinafter CCBJ) cooperate for the conservation and protection of forest and water resources. They are collaborating on initiatives to keep "Healthy forest" that nurtures "rich water." Part of the Sugenuma company-owned forest in Katashina Village, Gunma Prefecture (1,747 ha), is located in the water source area of CCBJ's Saitama Mill and Iwatsuki Mill. To maintain its water source retention capability, the Group promotes forest conservation and maintenance activities.

Management Responsibility

Basic Policy, etc.

Preservation of Biodiversity

Information Disclosures Based on TNFD

1. Basic Stance on Natural Capital

Under its philosophy of "carrying out its corporate activities in recognition of the importance of biodiversity", NIPPON PAPER GROUP provides society with biomass products that contribute to its sustainability by utilizing forest resources.

The Group's business activities heavily rely on natural gifts such as water resources, wood resources, and soil health, all of which are supported by biodiversity.

Therefore, the Group recognized the protection of biodiversity as a critical management issue when it established its "Basic Policy on the Preservation of Biodiversity" in 2016.

In compliance with this basic policy, the Group conducts business activities to promote nature-positive initiatives and achieve a society in harmony with nature, by achieving both "conservation and restoration of biodiversity" and "sustainable business growth."

2. Disclosure Items

The Group is actively working to disclose information based on the information disclosure framework of TNFD (Taskforce on Nature-related Financial Disclosures).

The Group is conducting a primary assessment of naturerelated risks using the LEAP approach* according to the TNFD Final Recommendations v.1.0 published in September 2023. This fiscal year, the Group discloses L (Locate your interface with nature) and E (Evaluate your dependencies and impacts on nature) regarding direct operation (manufacturing) and upstream supply chain (procurement).

* This is a process proposed by the TNFD to systematically assess nature-related risks and opportunities based on scientific evidence. It proceeds in the order of the following four steps: L (Locate your interface with nature), E (Evaluate your dependencies and impacts on nature), A (Assess your nature-related risks and opportunities), and P (Prepare to respond to nature-related risks and opportunities and to report to stakeholders on your material nature-related issues).

(1) Governance Structure

The Group is promoting the protection, development, and utilization of forest resources while taking into consideration biodiversity. The Board of Directors pursues business activities that are in harmony with the sustainable use of ecosystem services by recognizing the protection of biodiversity as a critical management issue. It receives reports on the progress of initiatives related to biodiversity, risk analysis results, and other key data points from the executive officer in charge of GHG emissions reduction and promotion of environmental management (at least twice a year) and the Risk Management Committee (at least once a year), and supervises the execution of these operations.

(2) Strategy

In FY2023, dependencies on ecosystem services and impacts on natural capital were analyzed using ENCORE*¹ regarding direct operation (manufacturing of paper products) and the upstream supply chain (production of coal, forest and wood products).

Water risks at major production sites and sales offices were also analyzed using the WWF Water Risk Filter*².

Going forward, the Group will expand the scope of analysis, manage risk impacts, and set performance indicators and goals.

*2 WWF Water Risk Filter: A tool for evaluating water risks that is offered by the World Wide Fund for Nature (WWF)

^{*1} ENCORE (Exploring Natural Capital Opportunities, Risks and Exposure) is an analysis tool that enables users to understand the impact of corporate activities on nature and the degree of their dependencies.

Preservation of Biodiversity

(3) Results of Analysis Using ENCORE

Dependencies on Ecosystem Services

		Dependencies												
	Supply services ^{*1}					Control services ^{*2}								
	Ground- water	Surface water	Fiber and other materials	Animal- derived energy	Soil	Water quality	Flood prevention	Erosion prevention	Contaminant filtration	Epidemic preparedness	Pest control	Pollination	Preservation of the water cycle	Climate control
Manufacturing of paper products	Very High	Very High	Medium	_	-	_	_	-	-	_	_	-	Medium	Very Low
Upstream supply chain (forest and wood products)	Very High	Very High	Very High	_	High	High	Very High	Very High	-	High	High	High	Medium	Very High
Upstream supply chain (coal)	High	High	_	_	_	_	_	Medium	_	_	_	_	High	High

*1 Supply services provide the necessities of life, such as water, food, wood, clothing, and pharmaceuticals.

*2 Control services purify the air and water and control the climate.

Impact on Natural Capital

	Impact											
	Change due to use of land, freshwater, or seawater (land transformation)		Use and supplementation of resources		Climate change	Pollution and removal of pollution		n	Invasion and removal of invasive species			
	Use of terrestrial ecosystem	Use of freshwater ecosystem	Use of seawater ecosystem	Use of water	Use of other resources	Greenhouse gas emissions	Air pollutants other than greenhouse gas	Water pollutants	Soil pollutants	Solid waste	Nuisance	_
Manufacturing of paper products	_	_	_	Very High	_	_	Medium	High	High	_	_	_
Upstream supply chain (forest and wood products)	Very High	_	_	-	_	High	_	High	High	_	_	_
Upstream supply chain (coal)	Very High	High	_	Very High	_	High	High	High	High	High	High	_

(4) Results of Analysis Using the WWF Water Risk Filter

Basic Policy, etc.

About Water Risk Evaluation

Since the Group's ENCORE analysis showed that the dependencies on and impacts from water are high, the Group analyzed water risks (physical risks, regulation risks, and reputational risks in river basins) at major production sites and sales offices in Japan and overseas. An analysis using the WWF Water Risk Filter at 45 sites in Japan and 19 sites overseas resulted in low risk for all sites in Japan, and medium risk for 14 sites and low risk for 5 sites overseas. Going forward, the Group will further evaluate water risks to enhance resilience to risks, including drought and water-related disasters.

I			Average of physical risks, regulation risks, and reputational risks	Number of sites analyzed
Ja	pan	Japan	Low risk	45
		Asia	Medium risk	5
		Southeast Asia	Medium risk	8
0		Oceania	Low risk	2
0	verseas	North America	Low risk	2
		South America	Medium risk	1
		Europe	Low risk	1
		Total		64



Other Environment-related Data

1 Environmental Accounting (Domestic)

• Calculation standards are based on the Environmental Accounting Guidelines 2005

• Scope of organizations covered

 Consolidated: Nippon Paper Industries; Nippon Paper Crecia; Crecia Kasuga; Nippon Paper Papylia; GAC; Nippon Paper Sacks; Nippon Paper Ishinomaki Energy Center; Yufutsu Energy Center; N&E; Daishowa Uniboard; Nippon Paper Development

• Non-consolidated: Mishimakako; Osakakako; Kochikako; Nippon Paper Liquid Package Product; Akita Jujo Chemicals

Affiliated company: Fukuda Paper MFG

Environmental Conservation Costs (FY2023)

(Millions of Yen)

Categories	Main contents	Investment	Cost
(1) Business area costs	_		
1. Pollution prevention costs	Measures against air pollution, water pollution, noise and vibration	3,742	14,936
2. Global environmental conservation costs	Company-owned forest in Japan nursery care, overseas plantation business, energy-saving investment	4,483	431
3. Resources circulation costs	Efficient use of resources, cost of waste management	586	8,765
(2) Upstream/downstream cost	Expenses related to collection, recycling, and disposal of pallets and packing materials	_	3,223
(3) Administration cost	Costs for employee training, maintaining ISO 14001, analysis of air and water quality, and management of various conferences	_	319
(4) R&D cost	Product development that contributes to environmental conservation, such as promoting the use of wastepaper, and reduction of environmental impact at the manufacturing stage	_	3,280
(5) Social activity costs	Social contribution activities, group support, corporate action report	_	5
(6) Environmental remediation costs	Pollution Health Compensation Levy	_	413
Total		8,811	31,372

Environmental conservation impacts (FY2023)

Categories	Environmental impact indicators			YoY change
Effects related to resources introduced to business activities	Plantation projects overseas	Overseas plantation areas	72kha	No change
	Energy-saving measures	Fuel reduction (Heavy oil equivalent)	41,563kl	UP 848kl
Effects related to environmental impact and waste from business activities	Greenhouse gas emissions	4.35Mt	Down 0.52Mt	
	Air pollutant emissions	NOx emissions (NO equivalent)	6,298t	UP 446t
		SOx emissions (SO2 equivalent)	2,393t	UP 362t
		Soot and dust emissions	941t	UP 71t
	Effluent		729Mt	Down 12Mt
	Water contaminant emissions	COD/BOD emissions	33,470t	Down 2,418t
		SS emissions	16,680t	Down 1,510t
	Final waste disposal	9.2kt	UP 1.2kt	
Effects related to goods and services produced from business activities	Product recycling	Wastepaper utilization rate (paper)	31%	UP 1.3%
		Wastepaper utilization rate (paperboard)	88%	Down 0.2%
	Shipping material recycling	Pallet recovery rate	43%	UP 3%

Environmental Benefits of Environmental Conservation (FY2023) (Millions of Yen)

Effect	Amount
Income from company-owned forests in Japan	529
Reduced expenses from energy saved	3,599
Reduced disposal expenses through the effective use of waste	3,347
Gain on sales from the recycled waste	508
Reduced expenses through the recycling of shipping material	1,545
Total	9,528

Other Environment-related Data

2 Balance of Materials

Balance of Materials for All Businesses (Principal Materials) (3 years)

		Unit	FY2021*1	FY2022*1	FY2023*1	
Input						
	Purchased electricity	GWh	2,425	1,931	1,681	
	Oil	Thousand kl	434	178	157	
	Coal	Thousand t	2,287	1,192	1,156	
Energy Input	Gas	Thousand t	302	399	372	
	Other fossil fuels	Thousand t	27	19	17	
	Non-fossil fuels*2	Thousand t	5,919	5,268	5,103	
	(Of which Black liquor)	Thousand t	4,307	3,995	3,496	
Chemical substances subject to the PRTR system*3	Amount handled	t	11,094	10,840	29,700	
	Total amount of water intake (water consumption)	Million t	953	899	863	
	River water	Million t	615	660	639	
	Industrial water	Million t	291	190	177	
Water intake	Well wate	Million t	46	48	46	
(water consumption)	Public water supply	Million t	1	2	2	
	Rainwater	Million t	0	0	0	
	Seawater, sea, ocean	Million t	0	0	0	
	External waste water	Million t	0	0	0	
Raw Material	Wood chips	Thousand BDt	4,699	4,735	4,321	
	Logs	Thousand BDt	857	707	636	
	Pulp	Thousand Adt	492	575	521	
	Wastepaper (Pulp)	Thousand Adt	2,802	2,831	2,698	
	Base Paper	Thousand Adt	122	136	163	
	Others	Thousand Adt	384	77	76	

*1 Covered: FY2021 https://www.nipponpapergroup.com/english/csr/npg_esgdb2022_e_contents.pdf FY2022 https://www.nipponpapergroup.com/english/csr/npg_esgdb2023_e_contents.pdf

FY2023 https://www.nipponpapergroup.com/english/csr/npg_esgdb2024_e_contents.pdf

*2 Biomass fuels (including black liquor) and waste fuels

*3 Japan only. Dioxins are not included in total data.

*4 Coverage: Nippon Paper Indastries, Nippon Paper Crecia, Nippon Paper Papylia

*5 Only in Japan, Aggregated by specially controlled industrial waste

*6 Nippon Paper Lumber, Daishowa Uniboard

		Unit	FY2021*1	FY2022*1	FY2023*1	
Output						
	GHG emissions (Scope 1 and 2)	Million t-CO ₂	6.79	5.95	5.29	
	(Scope 1)	Million t-CO ₂	5.83	4.86	4.40	
	(Scope 2)	Million t-CO ₂	0.96	1.09	0.90	
	Emissions by type of greenhouse gas (Scope 1)					
	CO ₂	Million t-CO ₂	5.38	4.43	4.14	
Gas Emissions	CH4	Million t-CO ₂	0.03	0.03	0.09	
	NO ₂	Million t-CO ₂	0.43	0.40	0.17	
	SOx emissions	Thousand t	3.02	3.41	2.84	
	NOx emissions	Thousand t	8.99	8.15	8.16	
	Soot and dust	Thousand t	1.23	1.11	1.03	
Chemical substances subject	Amount released	t	143	131	2,290	
to the PRTR system*3	Amount transferred	t	106	89	141	
VOCs (volatile organic compounds)*4	Emissions	t	51	97	93	
	Waste water total	Million t	890	859	828	
	Public water	Million t	877	849	818	
	Sewerage	Million t	13	10	9	
	COD/BOD	Thousand t	50	48	43	
Waste Water	BOD	Thousand t	43	9	8	
	COD	Thousand t	7	39	35	
	SS	Thousand t	25	25	22	
	Nitrogen	Thousand t	1.3	1.2	1.2	
	Phosphorous	Thousand t	0.2	0.2	0.2	
	Total Waste Generated	Thousand BDt	848	743	735	
14/	Final disposal subtotal	Thousand BDt	102	102	92	
Waste	Recycled subtotal	Thousand BDt	746	585	643	
	Hazardous waste generation*5	BDt	1,610	4,484	11,236	
Products manufactured	Paper, Household Paper	Million t	3.64	3.31	2.86	
	Paperboard	Million t	1.90	1.85	1.74	
	Pulp	Thousand t	156	180	199	
	Paper container	Thousand t	95	83	83	
	Chemical products	Thousand t	62	90	99	
	Building materials+others*6	Thousand t	197	214	207	
Electricity	Electricity	GWh	2,199	2,241	2.603	

[Units] GWh = Gigawatt hours, BDt = Bone-dry tonnes, ADt = Air-dry tonnes Note: t indicates Tonnes(also called Metric Tons)

Basic Policy, etc.

⇒ ≤ 50 ► ∩

[Units] GWh = Gigawatt hours, BDt = Bone-dry tonnes, ADt = Air-dry tonnes Note: t indicates Tonnes(also called Metric Tons)

Other Environment-related Data

FY2023*1 FY2021*1 FY2022*1 Input Purchased electricity GWh 985 765 618 Oil Thousand kl 137 173 151 Coal Thousand t 1,521 1,166 1,127 Energy Input Gas Thousand t 140 137 126 Other fossil fuels Thousand t 27 19 17 Non-fossil fuels*2 Thousand t 3,823 3,804 3,535 (Of which Black liquor) Thousand t 2,803 2,737 2,481 Chemical substances subject to the PRTR system*3 Amount handled 482 490 17,246 t 709 Water intake Amount of water intake Million t 756 662 (water consumption) 158 158 163 Water intensity t/product-t Thousand BDt Wood chips 3,453 3,745 3,383 Thousand BDt 20 14 8 Logs Pulp Thousand Adt 393 480 439 Raw Material Wastepaper (Pulp) Thousand Adt 2,693 2,324 2,134 Base Paper 0.4 98 99 Thousand Adt Others Thousand Adt 0.3 16 15

Balance of Materials in the Pulp and Paper Businesses in Japan (Principal Materials) (3 years)

*1 Coverage : FY2021 Nippon Paper Industries, Nippon Paper Crecia, Nippon Paper Papylia, Crecia Kasuga, Fukuda Paper MFG

FY2022 Nippon Paper Industries, Nippon Paper Crecia, Nippon Paper Papylia, Crecia Kasuga, Fukuda Paper MFG

FY2023 Nippon Paper Industries, Nippon Paper Crecia, Nippon Paper Papylia, Crecia Kasuga, Fukuda Paper MFG *2 Biomass fuels (including black liquor) and waste fuels

*3 Dioxins are not included in total data. Excludes chemical business

		Unit	FY2021*1	FY2022*1	FY2023*1
Output					
	GHG emissions (Scope 1 and 2)	Million t-CO ₂	5.51	4.80	4.29
	(Scope 1)	Million t-CO ₂	5.04	4.24	3.83
	(Scope 2)	Million t-CO ₂	0.47	0.56	0.46
	GHG emissions intensity during production	t-CO ₂ / product-t	1.15	1.07	1.05
	Emissions by type of greenhouse gas (Scope 1)				
Gas Emissions	CO2	Million t-CO ₂	—	3.81	3.57
	CH4	Million t-CO ₂	—	0.03	0.09
	NO2	Million t-CO ₂	_	0.40	0.17
	SOx emissions	Thousand t	2.1	2.3	1.8
	NOx emissions	Thousand t	6.5	5.8	5.3
	Soot and dust	Thousand t	0.9	0.9	0.9
Chemical substances subject	Amount released	t	97	90	2,223
to the PRTR system*3	Amount transferred	t	15	90	19
VOCs (volatile organic compounds)	Emissions	t	51	60	50
	Waste water total	Million t	729	671	636
	Public water	Million t	_	669	634
	Sewerage	Million t	_	2	2
Waste Water	COD/BOD	Thousand t	38	28	26
	SS	Thousand t	18	15	13
	Nitrogen	Thousand t	1.3	1.1	1.0
	Phosphorous	Thousand t	0.2	0.1	0.1
Waste	Total Waste Generated	Thousand BDt	582	494	468
	Final disposal subtotal	Thousand BDt	12	8	8
	Recycled subtotal	Thousand BDt	570	484	460
	Paper, Household Paper	Million t	3.1	2.8	2.5
Products manufactured	Paperboard	Million t	1.6	1.5	1.5
	Pulp	Thousand t	17	158	122

