

# Policy and Management

## Basic Stance

The Nippon Paper Group provides society with a wide range of products and services through the effective use of wood, a renewable resource. At the same time, its manufacturing processes use a great deal of energy and water. Bearing this in mind, the Nippon Paper Group has formulated the Nippon Paper Group Environmental Charter. The Group practices environmental management that contributes to the formation of a circulation-oriented society by working from a long-term perspective to reduce environmental impact, promote resource recycling, conserve biodiversity, and respond to climate change. Under the 2030VISION, the Group has identified these priorities as materiality for realizing the Group Mission and will contribute to building a sustainable society through its business activities.

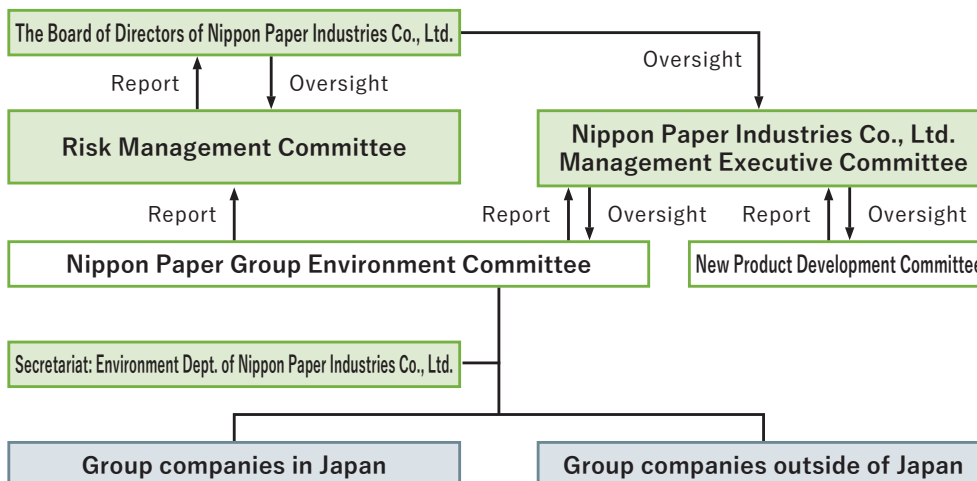
→ **The Nippon Paper Group Environmental Charter**

<https://www.nipponpapergroup.com/english/csr/policies/>

## Environmental Management Promotion Structure

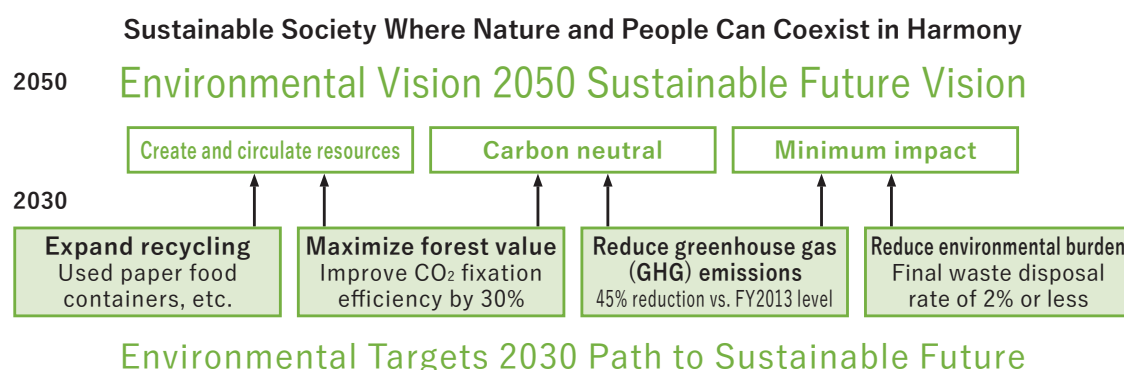
The Nippon Paper Group Environmental Committee, chaired by the general manager of the Technical Division, who is also the director in charge of environmental matters at Nippon Paper Industries, identifies management risks related to the Group’s environmental activities and promotes countermeasures. Additionally, the committee manages and assesses the proper implementation of the Environmental Action Plan in accordance with the Nippon Paper Group Environmental Charter and reports to the Board of Directors through the Risk Management Committee.

With the aim of creating corporate value through environmental management, the Group regularly convenes the New Product Development Committee, and promotes the development of products derived from wood resources in line with growing environmental awareness. The Executive Committee deliberates and decides on environmental management policies and measures based on this information, and incorporates them into business strategies to address environmental risks and capture business opportunities, thereby enhancing the resilience of the Company’s growth strategies.



## Aiming for a Sustainable Society Where Nature and People Can Coexist in Harmony

In order to be more effective in dealing with environmental issues such as climate change, which are highly uncertain and require long-term responses and countermeasures, it is necessary to have a vision and goals based on a medium- to long-term perspective. The Group has formulated targets and plans for 2030 by backcasting from the ideal state of the Group in 2050, and the entire Group is working together to achieve them.



## Nippon Paper Group Environmental Vision 2050 (Sustainable Future Vision)

### — Carbon-neutral

**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 CO<sub>2</sub> absorption and fixation in forests and CO<sub>2</sub> removal technologies.

### — Creation and circulation of resources

**Create sustainable forests that conserve 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.

### — Minimum impact

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

- ▶ 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.

## Nippon Paper Group Environmental Targets 2030: Path to Sustainable Future

### — Reduce greenhouse gas emissions

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

- ▶ Reduce direct greenhouse gas emissions by 45% from FY2013 levels.
- ▶ Accelerate fuel conversion and increase the ratio of non-fossil energy use to at least 60%.
- ▶ Improve total energy consumption per unit of production and distribution by 1% from the previous year.
- ▶ Reduce greenhouse gas emissions from domestic product transportation in the paper and paperboard business by 23% relative to fiscal 2020 levels through modal shift and other measures.
- ▶ Collaborate with stakeholders to reduce indirect greenhouse gas emissions.

### — Promote the creation and circulating of resources

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

- ▶ Improve CO<sub>2</sub> fixation efficiency in overseas forest plantations by 30% compared to 2013 levels.
- ▶ Obtain and maintain forest certification for all company forests in Japan and overseas.
- ▶ Ensure the traceability and sustainability of all woody biomass resources used.
- ▶ Promote the use of domestic forest resources.

#### **Promote the circulation of resources.**

- ▶ Work to build a recycling system that promotes resource circulation
- ▶ Utilize 12,000 t/year of unused recovered paper, which has been difficult to recycle, through the development of recovered paper utilization technology.

### — Reduce environmental impact

#### **Reduce the environmental impact of manufacturing processes.**

- ▶ Reduce air pollutants by 15% and water pollutants by 15% compared to FY2018.
- ▶ Reduce the final disposal of industrial waste at domestic production sites to 2% or less.
- ▶ Provide society with products and services that have minimal environmental impact throughout their entire life cycle.

## Achievements of Environmental Action Plan (Green Action Plan 2020)

- The Group has established an environmental action plan—the Green Action Plan—in accordance with the six basic policies expressed in its Environmental Charter. Since the establishment of this action plan in 2006, the Group set quantitative and qualitative management targets every five years relating to response to climate change and all manner of other environmental issues and carried out specific initiatives to achieve those targets.
- Based on this, Group companies have each established their own environmental action plans to reflect their own individual business characteristics. Their efforts to fulfill these plans are improving our effectiveness towards achieving the targets of the Green Action Plan.

### The Nippon Paper Group Environmental Action Plan (Green Action Plan 2020: from 2016 to 2020) FY2020 Achievement

Green Action Plan 2020		Main Initiatives and Final Results
1. Anti global warming action	Reduce greenhouse gas emissions by 10% compared to FY2013. 2013.*1	By systematic investment in energy saving equipment and promotion of fuel conversion, greenhouse gas emissions were reduced by 21% compared to FY2013.
	Reduce logistics generated CO <sub>2</sub> emissions.	<ul style="list-style-type: none"> <li>Continued efforts to reduce CO<sub>2</sub> emissions by shortening transportation distances and promoting modal shifts for efficient transportation.</li> <li>The Eco Rail Mark certification, established by the Ministry of Land, Infrastructure, Transport and Tourism, to recognize companies and products that engage in rail freight transportation with low CO<sub>2</sub> emissions per unit, has been obtained by Nippon Paper Industries for both the company and its products.</li> </ul>
2. Protection and development of forest Resources	Advance domestic company owned forest operations and the overseas afforestation project (Tree Farm Initiative) to ensure the sustainable nurturing of forest resources.	As of the end of 2020, we had planted 78,000 hectares of trees in our overseas afforestation business.
	Maintain forest certifications in all proprietary forests, both domestically and internationally.	The company continues to maintain forest certification (FSC®*2, SGE, PEFC,) for all its forests in Japan and overseas.
	The wood chips and pulp used for papermaking in FY2020 were all made from wood approved by FSC®*2 or PEFC (including controlled wood and controlled sources)	The wood chips and pulp used for papermaking in FY2020 were all made from wood approved by FSC®*2 or PEFC (including controlled wood and controlled sources)
	Enhance traceability and facilitate the procurement of sustainable forest resources.	Utilized the forest certification system to enhance traceability and in FY2020, 100% of the risk assessments for imported woodchips were cleared under both PEFC and FSC rules.
3. Recycling of Resources	Promote greater use of wastepaper by achieving advances in wastepaper utilization technologies.	<ul style="list-style-type: none"> <li>As a result of our efforts to use unused recovered paper, the utilization rate of recovered paper for paper and paperboard reached 34% and 89%, respectively.</li> <li>The Company started a new recycling project with the support of Hamamatsu City, to collect used paper containers which had previously been incinerated as general garbage.</li> <li>The Company have begun efforts to expand the recycling of discarded beverage paper packs with aluminum.</li> </ul>
	Increase the waste recycling rate to at least 98%.*1	In addition to reducing waste generation, we achieved a 98% recycling rate through the recycling of boiler ash.
4. Observance of environment related laws and reduction of environmental load	Use the environmental management system to strengthen environmental management and reduce environmental impact.	At sites that have a high environmental load, environmental management systems such as ISO 14001 were introduced in an effort to comply with laws and regulations and reduce the environmental load.
	Properly manage chemical substances in accordance with the Nippon Paper Group Chemical Substance Management Guidelines.	For each site, chemical substances are managed appropriately according to type and amount together with the information from safety data sheets.
5. Development of eco Friendly technologies and products	Enhance the more sophisticated use of wood materials.	<ul style="list-style-type: none"> <li>Commercial production is being carried out at the TEMPO oxidized CNF mass production machine at the Ishinomaki mill and the CM-CNF mass production machine at the Gotsu mill, and its adoption is increasing mainly for food and cosmetic applications. In addition, at the Fuji Plant / CNF Reinforced Resin Demonstration, sample work is being conducted for various users.</li> <li>CNF was adopted by the NEDO project "Development of cellulose nanofiber-related technologies that contribute to a carbon cycle society" (2 projects) and started research and development.</li> <li>For promotion of practical use of MinerpaR that has some characteristic such as deodorant, antibacterial, flame retardant, radiation blocking, etc., the Company implemented sample work for application development. The product from demonstration production equipment at Fuji mill has been adopted as cat sand (cat litter).</li> <li>Using a proprietary technology that removes only cellulose fibers that are easy for cows to digest from wood chips, the Company has developed "highly digestible cellulose" with excellent fiber content and nutritional value, and has started sample work for expanding sales.</li> <li>The NEDO project "Development of Bio-Asphalt Mixture Using Kraft Lignin from Pulp Digesting Process" was adopted, and the application development of craft lignin was started in this project.</li> <li>The Company has developed a resin composite material (Trefide Biocomposite TM) that contains a high amount of woody biomass and can reduce the amount of plastic used by 50%.</li> </ul>
	Develop equipment technology for facilitating a departure from reliance on fossil energy.	Development of new fuel production technology using biomass has started.
	Reduce the environmental load through the provision of ecofriendly products and services.	<ul style="list-style-type: none"> <li>Started selling "School POP®", a school lunch strawless paper pack.</li> <li>The world's first aseptic filling system for paper containers (NSATOM®), which can handle new beverages with solids, long fibers, and high viscosity and can be stored at room temperature instead of resin containers, has been completed and orders have started.</li> <li>Started production and sales of long toilet rolls that lead to reduction of CO<sub>2</sub> emissions and packaging materials.</li> <li>A new paper material to replace plastics, "Shield Plus", is a paper packaging material with excellent barrier properties against oxygen and water-vapor produced in combination with biodegradable resin.</li> <li>The new high-barrier product "Shield Plus® Premier" has been adopted as food wrapping paper. In addition, Shield Plus II, which is adapted to gravure printing and has an improved barrier bending tolerance, was launched.</li> <li>"Lamina®", a heat-sealing paper that does not require a laminating process and can be packaged with just paper, has been developed and has started providing samples.</li> <li>As a sustainable packaging material to replace Styrofoam, the multifunctional corrugated cardboard base paper "Waterproof Liner" was developed.</li> </ul>
6. Environmental Communication	Disclose environment related information to stakeholders and accelerate environmental communication through dialogue and other means.	Through Integrated reports and risk communication held by each business site, dialogue with local communities and other communities was activated to share risk information.
	Proactively participate in and support environment conservation activities.	Actively participated in environmental preservation activities such as community cleanup etc. and made efforts to contribute to the conservation of the local environment.
7. Biodiversity Commitments	Advance companywide biodiversity initiatives in accordance with the Nippon Paper Group Basic Policies on Protection of Biodiversity.	<ul style="list-style-type: none"> <li>For more than 10 years, the company has been working to preserve the habitat of the endangered Blakiston's fish owl in company-owned forests in Hokkaido under an agreement with the Wild Bird Society of Japan. While balancing with the company's forestry business, in 2020, the two companies jointly installed artificial nest boxes to support breeding.</li> <li>Since 2017, the Group have been working with a local NPO (Ecotourism Association) on Iriomote Island to exterminate the invasive plant American Hamaguruma.</li> </ul>

\*1 For manufacturing sites in Japan.

\*2 FSC® Logo License No. FSC® C120260 (Volterra: Chile), FSC® C012171 (Forestco: South Africa), FSC® C023383 (AMCEL:Brazil)

### — Introducing environmental management systems

- In order to promote environmental management, the Group is introducing various environmental management systems, including ISO14001 and Eco-Action 21.
- Nippon Paper Industries has obtained ISO 14001 certification for 100% of its production locations (as of March 31, 2021).

#### Acquisition of ISO 14001 Certification (as of March 31, 2021)

Company Name	Mills/Operating Division/Production Subsidiaries
Nippon Paper Industries	Kushiro Mill, Asahikawa Mill, Siraoi Mill, Akita Mill, Ishinomaki Mill, Iwanuma Mill, Nakoso Mill, Kanto Mill, Fuji Mill, Gotsu Mill, Otake Mill, Iwakuni Mill, Yatsushiro Mill, Higashimatsuyama Mill
Nippon Paper Liquid Package Product	Egawa Mill, Ishioka Mill, Miki 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	Headquarters/Miyagi Mill
N&E	Headquarters Mill
Nippon Paper Ishinomaki Technology	Headquarters
Opal	Acquired at 4 sites
Jujo Thermal	Kaattua

#### The status of Eco-Action 21 acquisition (as of March 31, 2021)

Company Name	Mills/Operating Division/Production Subsidiaries
Akita Jujo Chemicals	Head Office Plant

## Strengthening Environmental Compliance

### — Two-Pronged Approach to Environmental compliance

The Nippon Paper 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 with a priority on legal compliance.

#### Two-Pronged Approach

- |   |   |
|---|---|
| <p>1. Building Systems to Prevent Problems</p> <ul style="list-style-type: none"> <li>• Building a workplace that emphasizes the importance of the environment (environmental compliance training)</li> <li>• Strengthening the system for identifying applicable laws and regulations</li> <li>• Implementing measures from both the facility and technology perspectives</li> </ul> | <p>2. Establishing a Framework that Ensures All Problems are Covered</p> <ul style="list-style-type: none"> <li>• Enhancement of environmental audits</li> <li>• Enhancement of environmental management system</li> <li>• Engaging in environmental communication and active information disclosure</li> </ul> |
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### Environment-related \* fines and penalties

Environment-related fines and penalties (FY2020)	0 Yen
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\* Decrees and regulations regarding the environment of water intake, wastewater, air, and waste

### — Systems to Ensure that the Laws and Regulations to be Complied with are Identified

To respond accurately to wide-ranging and relatively frequent changes in environmental legislation, the Group has developed a framework which uses a legal and regulatory search system to search for and share information on revised laws and relevant trends, and ensure a reliable approach to legal compliance.

### — Introducing Equipment and Measurement Devices to Prevent Environmental Accidents

- 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.

### — Environmental Audits Emphasizing Legal Compliance and Risk Control

Based on the “Environmental Management for Pollution Prevention,” an action guideline for environmental management issued by the Ministry of the Environment (MOE) and the Ministry of Economy, Trade and Industry (METI), the Group conducts double-checking of compliance with laws and regulations through internal audits by each business site and environmental audits by the Head Office’s environmental department.

- ▶ Document audit (confirmation of management records such as drainage)
- ▶ On-site audit (confirm equipment such as chemical tanks)
- ▶ Mutual audit between group companies

## Environmental Communication

The Group has also established the Nippon Paper Group Risk Communication Guidelines and is implementing the following initiatives.

- ▶ Environmental risk communication for local residents and local governments.
- ▶ Preliminary briefing session on the environmental impact of construction and operation when introducing large equipment, etc.

### — Responses to Opinions and Complaints

- In addition to receiving opinions and inquiries via its website, the Nippon Paper Group has established a complaint and inquiry contact at each of its mills. We have also adopted environmental monitoring systems and take other steps to encourage input from local residents.
- When a complaint is received, we move swiftly to determine possible causes, and implement emergency and permanent solutions. We also explain to the person who lodged the complaint what happened and what we did to resolve the situation, so that they can be satisfied that we have responded appropriately.

#### Environment -Related Complaints(FY 2020)

Complaints	Noise/Vibration	Odor	Dust and mist dispersal	Smoke	Other	Total
Number	10	3	2	0	0	15

### — Environmental Education and Training for Employees

The Group conducts the following as environmental education for employees.

- ▶ Environmental education for employees
- ▶ Encourage participation in pollution control-related qualifications and external training to gain specialized knowledge
- ▶ Awareness-raising activities to raise employees' awareness of environmental conservation (every June, Environmental Month holds a photo contest "Nippon Paper Industries Group Eco-Photo Contest" and environmental e-learning)

#### Educational achievements (FY2020)

Program Name	Number of participants
What we can do for the future "Let's think about recycling"	Over 7,100 employees

# Alleviation of Environmental Burden and Promotion of Resource Circulation

## Basic Stance

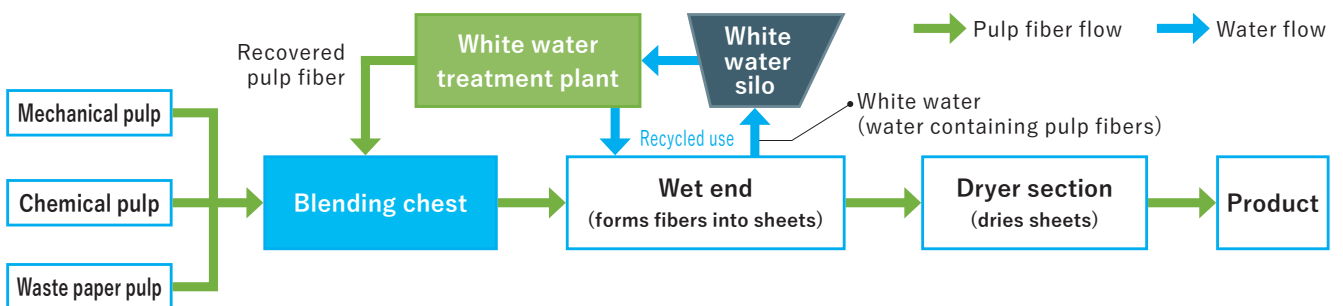
Environmental burden can never be fully eliminated in activities to provide products and services to society. However, companies have a responsibility to society to reduce their environmental burden as much as possible. The Nippon Paper Group identifies this priority as an important management issue for realizing the Group Mission. The Group has worked for many years to minimize its environmental burden by curtailing the generation of waste and other emissions, while promoting the circular use of resources. Under the 2030VISION, the Nippon Paper Group has clearly articulated a business model designed to expand and reinforce the three circulations, which take advantage of the characteristics of woody resources. The purpose of this business model is both to achieve business growth and also to contribute to realizing a circulating society. The Group will step up recycling, which is one of the three circulations, by harnessing its broad range of strengths, including recycling technology. This way, the Group will reduce its environmental burden and contribute to realizing a circulating society

## Alleviation of Environmental Burden

### — Effective Use of Water Resources

- The Nippon Paper Group’s papermaking process efficiently and effectively uses water resources, which are a form of natural capital. It does this by recovering “white water,” which contains very fine pulp fibers from the wet end of the papermaking process, removing the fibers through a treatment process, and then sending the removed fibers to the pulp blending chest and returning the water to the wet end of the manufacturing process.
- At present, we have received no information from local government authorities or residents to indicate that the mills operated by Nippon Paper Group companies are having an environmental impact as a result of their water intake, and water risks in Japan are low.

### Water Recycling System





## — Controlling Chemical Substances

- The Nippon Paper Group examines the chemical substances it uses in its production processes in accordance with its Chemical Substance Management Guidelines. We do this in exercising risk management that monitors how much of these substances we use and how much we release into the environment.
- We disclose information on our management, release, and transfer of PRTR\*-controlled substances to local stakeholders through environmental risk communications at each of our mills and other production sites.

### Amounts of Substances Subject to the PRTR Law Released and Transferred\*<sup>1</sup> (FY2020)

Cabinet Order No.	Chemical Substance	Amount Released	Amount Transferred	Total released and transferred
1	Water-soluble zinc compounds	730	0	730
2	Acrylamide	12	0	12
4	Acrylic acid and water-soluble salt	11	0	11
9	Acrylonitrile	1	0	1
53	ethylbenzene	0.5	0	0.5
57	Ethylene glycol monoethyl ether	300	4,500	4,800
63	1,1'-ethylene-2,2'-bipyridinium dibromide; diquat dibromide	0.3	0	0.3
80	Xylene	1,289	0	1,289
127	Chloroform	39,144	33,342	72,486
149	Tetrachloromethane	0	29,267	29,267
154	Cyclohexylamine	630	0	630
176	Dichlorofluoroethane	2	0	2
227	1,1'-dimethyl-4,4'-bipyridinium dichloride; paraquat; paraquatdichloride	0.2	0	0.2
232	N,N-dimethylmethanamide	46	220	266
243	Dioxins* <sup>2</sup>	180	3,228	3,408
251	0,0-dimethyl 0-3-methyl-4-nitrophenyl phosphorothioate;fenitrothion; MEP	1	0	1
272	Water-soluble copper salts (except complex salts)	124	0	124
296	1,2,4-trimethylbenzene	1,675	0	1,675
297	1,3,5-trimethylbenzene	3.4	0	3.4
300	Toluene	24,993	20,693	45,686
302	naphthalene	0.4	0	0.4
305	lead compounds	0.4	0	0.4
374	Hydrogen fluoride and its water-soluble salts	48,033	0	48,033
392	n-hexane	1	0	1
400	benzene	0.1	0	0.1
405	Boron compounds	16,620	0	16,620
406	polychlorinated biphenyls; PCBs	0	5,700	5,700
407	poly(oxyethylene)alkyl ether(alkyl C=12-15)	7	0	7
411	Formaldehyde	4,701	0	4,701
412	manganese and its compounds	10,950	0	10,950
415	Methacrylic acid	2	0	2
418	2-(dimethylamino) ethyl methacrylate	28	0	28
420	Methyl methacrylate	24	0	24
438	Methylnaphthalene	685	0	685
Total* <sup>3</sup>	(Excluding dioxins) Unit : kg	150,015	93,722	243,737

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

\*2 Dioxins unit : mg-TEQ

\*3 Dioxins are not included in total data.

— Preventing Soil Pollution

- The raw materials and chemicals used by Nippon Paper Group mills contain almost no heavy metals, trichloroethylene or other soil contaminants.
- FY2020 was another year in which there were no instances of contaminated soil generated at the Group companies.

— Preventing Noise and Vibration

The Nippon Paper group is engaged in efforts utilizing IoT technologies to prevent the occurrence of noise and vibrations.

**CASE STUDY** Development and Introduction of “e-musen junkai®” (e-wireless patrol) system

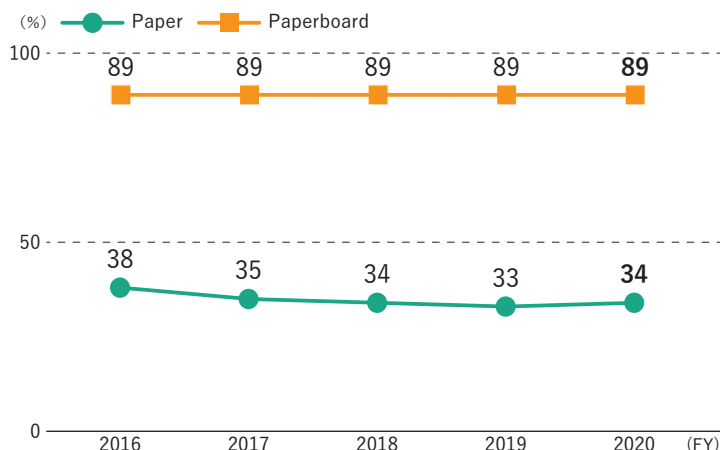
Pulp and paper mills use large machines incorporating numerous motors and other rotating parts that generate noise and vibration. Nippon Paper Industries and NIPPON PAPER UNITEC have developed—and are now operating—the “e-musen junkai®” (e-wireless patrol) system, which uses wireless sensors to constantly monitor equipment for signs of abnormalities. This system uses IoT technology to accumulate temperature and vibration acceleration data on machinery and equipment in operation. Analyzing trends in this data enables us to discover abnormalities early on. By discovering abnormalities at an early stage, this system helps to prevent the occurrence of equipment problems and avoid vibration, noise, and other causes of complaints. In addition to introducing this system at all NPI mills, the Company has also commenced sales to external clients, including customers in Thailand as of FY2019 and will sell to Indonesia, Vietnam.

Promotion of Resource Circulation

— Initiatives for Using Wastepaper

To further expand the use of wastepaper, the Group continues working to develop technologies that will enable the use of types of wastepaper which are currently difficult to recycle.

Trend of used paper utilization rate in Japan

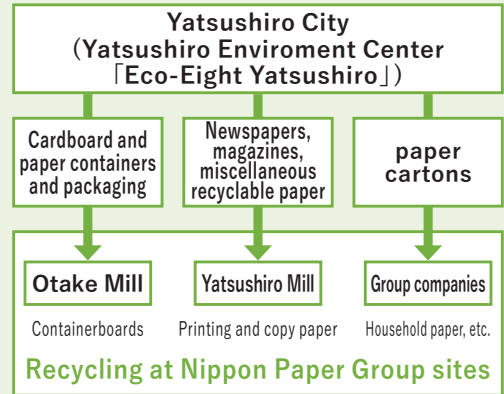


**CASE STUDY** Circular Use of Wastepaper

**Circular Use of Wastepaper Together with Local Governments**

Nippon Paper Industries' Yatsushiro Mill, in partnership with the city of Yatsushiro, has built a comprehensive wastepaper recycling system for the wastepaper generated in Yatsushiro.

A wide variety of used paper (newspapers, magazines, corrugated cardboard, paper cartons, paper containers and packaging) collected by Yatsushiro City is accepted by the Yatsushiro Mill and other plants of the Group, recycled using facilities and technologies such as recovered paper pulp production facilities, and used as raw materials for making paper.



**Collaborative business for recycling used food paper containers**

The Company received the support of Hamamatsu City and started yearlong tests and verification of a new recycling project from April 2021. This project, being carried out together with Hamamatsu Green Wave Co., Ltd. and NPO Ecolife Hamamatsu, uses a collection box installed at Ecohama, a facility in Hamamatsu City to raise environmental awareness, where used paper food containers are collected and brought to one of the Company's mills to be utilized as raw material for paper. By raising recycling awareness among ordinary consumers and using the Company's technologies to recycle old paper, this project utilizes the recyclability inherent in paper and reuses it as a resource. This will reduce the volume of incinerated rubbish and contribute to fixed carbon by prolonging use of woody resources.

**Closed Loop Initiatives**

In order to make long-term, stable use of collected waste newspaper as a recycled resource and raw material for newsprint, Nippon Paper Industries has constructed a closed loop scheme in which it purchases wastepaper directly from newspaper companies, which are its customers.

**Collection and Recycling of Paper Cups**

Nippon Paper Industries collects paper cups used at its head office and recycles them into material for containerboard at its Kanto Mill (Ashikaga). Since this initiative was launched in September 2020, we have collected a total of around 225,000 cups (as of July 31, 2021).

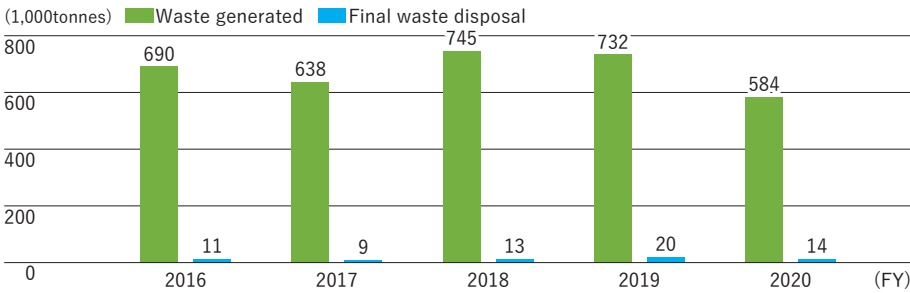
**Paper-Pak Carton Collection and Recycling**

The company is gradually installing Paper-Pak collection boxes at Group company sites and is working to increase employee awareness of Paper-Pak recycling. In addition, the company has positioned the collection of paper cartons 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 June 2017, the Company commenced collection activities using a proprietary method, primarily in Nerima City, Tokyo. In FY2020, four tonnes of Paper-Paks were collected and used as raw material for household paper products.

## — Recycling Industrial Waste

- In its environmental action plan—the Green Action Plan 2020, the Nippon Paper Group had set the objective of achieving a waste recycling rate of at least 98% and we have advanced 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.
- In the environmental target 2030 (Path to Sustainable Future), we will set the goal of reducing the environmental load as “final waste disposal rate of 2% or less” and work on the recycling of industrial waste.

### Waste generated and final waste disposal (in Japan)



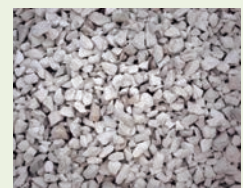
#### CASE STUDY Recycling Industrial Waste

##### Circular Use of Quicklime (Nippon Paper Industries Ishinomaki and Iwanuma Mills)

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, Nippon Paper Industries' Ishinomaki and Iwanuma mills have started collaborating with a supplier that can recycle quicklime waste. Under this collaboration, the Ishinomaki and Iwanuma mills have commenced initiatives to reuse quicklime waste as a resource.



Quicklime waste



Quicklime

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

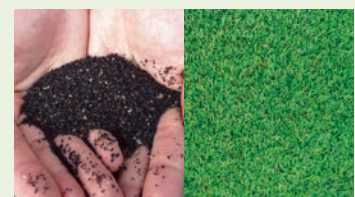
The Ishinomaki Mill operates a coal boiler to privately generate electricity on site. In the process, combustion ash is generated in its coal boiler. Nippon Paper Industries processes the combustion ash through heat modification, and sells the material as CfFA® (Carbon-free Fly Ash) concrete admixture. 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.



CfFA® was used in bridge beams, arches and vertical supports at the JR Kesenuma Line Sakuragawa Bridge on the JR Kesenuma Line (Minamisanriku Town, Motoyoshi District, Miyagi Prefecture)

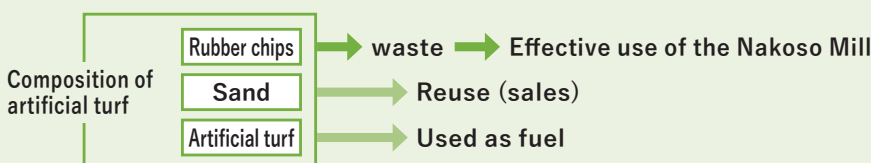
##### Local Production and Consumption of Energy (Nippon Paper Industries Nakoso Mill)

At Nippon Paper Industries' 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.



Rubber chips

Artificial turf



## Addressing Climate Change

### Aiming for Carbon Neutrality in 2050

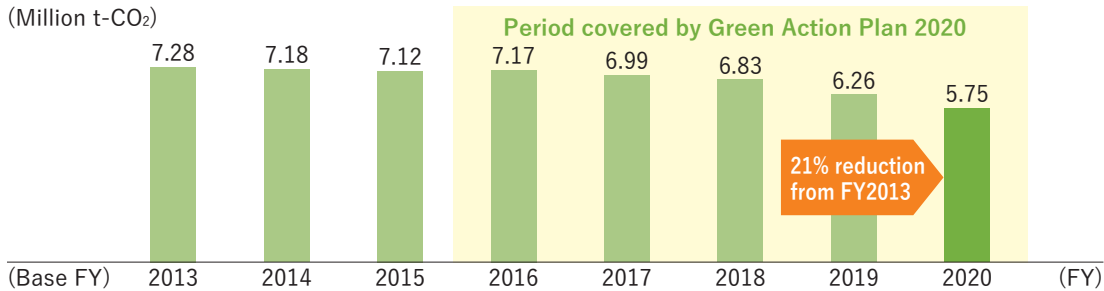
The Nippon Paper Group sees addressing climate change as one of its material issues for realizing the Group Mission. Under the 2030VISION, in its basic policy, the Company states “reduce CO<sub>2</sub> emissions and respond to drastic changes in social conditions, including environmental issues, etc.,” and it will work to reduce GHG (greenhouse gas) emissions and implement green strategies to achieve carbon neutrality by 2050.

### Initiatives to Reduce GHG Emissions

- The Group is working to reduce greenhouse gas emissions at each stage of our value chain through three key initiatives: shifting to alternative fuels (fuel conversion), promoting energy saving in production and logistics processes (energy saving) and absorbing and fixing CO<sub>2</sub> through the appropriate management of company-owned forests (carbon sequestration).
- To review the Group energy mix with an eye toward 2030, the Group began introducing internal carbon pricing in July 2021 in order to accelerate the reduction of GHG emissions.

### Changes in GHG emissions\*1 (in Japan\*2)

(Million t-CO<sub>2</sub>)



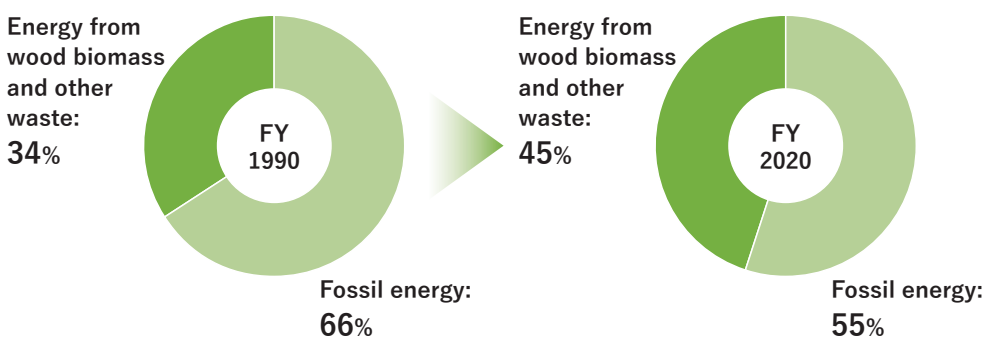
\* 1 Sum total of Scope 1 and Scope 2 figures

\* 2 Companies subject to the Act on the Rational Use of Energy at consolidated and non-consolidated subsidiaries in Japan

### Fuel Conversion

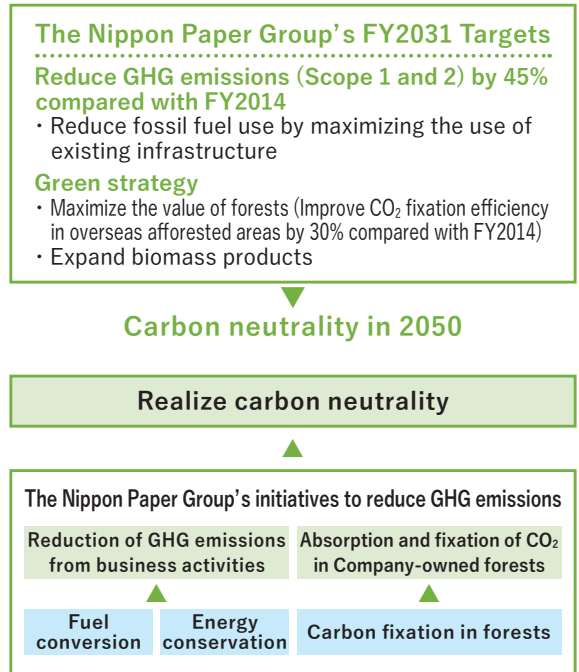
- The Group uses black liquor (produced as a byproduct of the production of pulp) and construction waste materials as wood biomass fuels. At the same time, it appropriately procures wood biomass through its domestic and overseas wood biomass collection network for utilization as a renewable source of energy.
- So far, too, the Group has installed two types of boilers—high efficiency boilers, and boilers capable of burning construction waste and other biomass fuels, used tires, RPF\* and other waste fuels. In FY2020, the domestic Group’s fossil energy usage ratio (calorie conversion) for its overall use of fuels fell to 55%.

### Fossil energy usage ratio (calorie conversion) of all fuels used by the Nippon Paper Group (Japan)



\*RPF : Refuse derived paper and plastics densified fuel

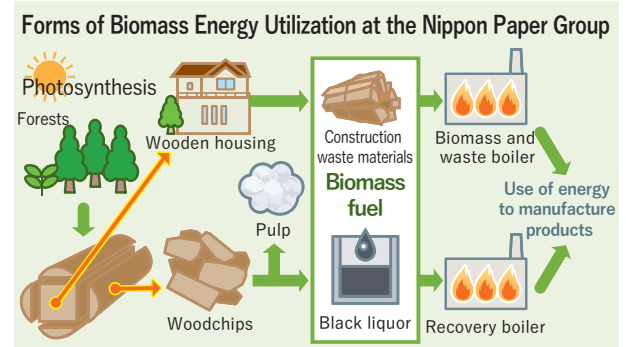
This is a high-grade solid fuel made mainly from those paper and plastic industrial waste materials which are difficult to recycle.



### — Use of Wood Biomass Energy

- The Group is working to increase its use of black liquor and other woody biomass fuels.
- The amount of woody biomass energy used by the group in FY 2020 was equivalent to around 3.3%\* of all non-fossil energy supplied in Japan (excluding nuclear and hydroelectric power). \*

\* Estimated by Nippon Paper Industries Co., Ltd. based on domestic primary energy supply data (finalized data for FY2019) published by the Agency for Natural Resources and Energy



**CASE STUDY**

### Use of Torrefaction Technology and Wood Biomass Fuels

Nippon Paper Industries Co., Ltd. has established a torrefaction technology which is useful in manufacturing 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 Company has established a torrefaction technology that contributes to the production of new woody biomass fuel to serve as an alternative to coal for thermal power generation.

**CASE STUDY**

### In-house Production of Solid Fuel from Waste

Nippon Paper Industries' Otake Mill converts the paper sludge\*<sup>1</sup> and wastepaper residues\*<sup>2</sup> produced in the manufacture of linerboard and corrugated medium (for containerboard) into solid form on site, and uses it as a form of energy to drive the mill itself. In FY2020, the mill produced 5,800 BD t\*<sup>3</sup> of fuel. Self-production of fuel from waste leads to reductions in coal usage, and also contributes to reducing the amount of waste sent for final disposal through the recycling of waste.

\* 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.  
 \* 3 As of April 2019, the mill has also begun accepting waste plastic refuse from the city of Otake as a raw material.

### — Promoting energy-saving in manufacturing processes

- The Group has been working continuously to implement energy saving at its paper mills in Japan for many years. We endeavor to increase the effectiveness of these efforts by seeking to share examples of effective initiatives with other mills.
- In recent years, energy-saving knowledge obtained through efforts at mills in Japan has also been applied at the paper mills of overseas Group companies in countries such as Australia and Thailand.

**CASE STUDY**

### Overseas Deployment of Energy-saving Examples in the Dryer Part

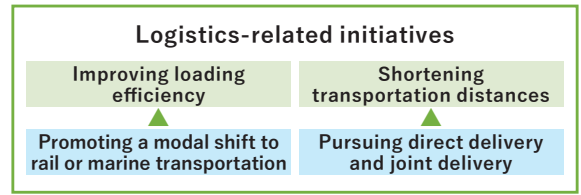
The Company's Asahikawa Mill has achieved energy-saving benefits by working to reduce the amount of steam used in the dryer sections of its paper machines, which dry sheets of pulp and finish them into paper. This is to use chemicals to create a water-repellent film inside the hollow equipment to repel water condensation and increase the efficiency of heat transfer. Based on this example, Siam Nippon Industrial Paper (Thailand) has adopted the same method, and is working to verify the energy-saving benefits of this approach.

— Promoting energy-saving in logistics processes

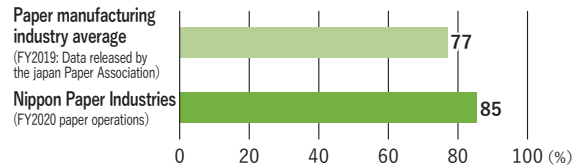
The Group is working to implement green logistics that will lead to reductions in greenhouse gas emissions, from the two perspectives of improving loading efficiency and shortening transportation distances.

- ▶ Promoting a modal shift (Long-distance transportation by loading a large amount of goods at one time on railroads and coastal vessels)
- ▶ Pursuing direct delivery and joint delivery (Direct delivery without going through the warehouse in cooperation with the distributor)

Achieving the Creation of a Low Carbon Society



Comparison of modal shift rates



CASE STUDY Obtaining Green Management Certifications\*1

Within the Group, 16 business locations of 8 Group companies have obtained Green Management Certification\*2. The Group is actively implementing ecological driving, vehicle inspection and maintenance, reduction of vehicle disposal and waste generation, proper waste handling and recycling, and other practices consistent with green management.

\*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 Of those locations that have obtained certification, 15 locations at 8 companies have obtained Green Management Certification Long-Time Commendation, which is awarded to business locations that have been certified and registered for 10 years continuously since the date of their initial registration (in the first year).

Green Management Certification logo  
 (Left: trucking business, right: warehouse business)

**Green Management Certifications**※  
 (As of July 30, 2021)

Company
NIPPON PAPER LOGISTICS, Kyokushin Transport, Nanko Logistics Support, Hotoku, NP Unyu Kanto, NP Unyu Fuji, NP Unyu Kansai, and NP Unyu Iwakuni

※ Consolidated and non-consolidated subsidiaries in Japan

CASE STUDY

Nippon Paper Industries obtained two Eco Rail Mark certifications which is a certification scheme established by Japan's Ministry of Land, Infrastructure, Transport and Tourism in 2021. One of the certifications is in the "Companies" category, and applies to the Company itself as a company, while the other is in the "Products" category, and applies to the company's paper products (newsprint, printing and writing paper, business communication paper, industrial paper, etc.). The certification applies to companies (and the products of companies) which make heavy use of rail freight transportation, which generates lower unit CO<sub>2</sub> emissions.



Eco Rail Mark for Companies certification      Eco Rail Mark for Products certification

The Company has continued to work on building a logistics system with a lower environmental impact.

CASE STUDY Efforts for double-coupled trucks

NIPPON PAPER LOGISTICS is participating in the creation of advanced logistics technology and new systems by investing in NEXT Logistics Japan Co., Ltd. (NLJ) in 2021 in order to optimize the working hours of truck drivers during transportation and reduce the environmental burden. Currently, as part of this, it has started the operation of NLJ's double-connected trucks and the efforts to change drivers at intermediate points during long-distance transportation (relay transportation).

A double-coupled truck is a full-trailer with a total connected length extended from the conventional 21m to a maximum of 25m, and has the transportation capacity of about two large trucks. CO<sub>2</sub> emissions per weight of the trucks (vehicles over 21m) are reduced by about 30% compared to ordinary heavy-duty trucks (12m vehicles) (according to NLJ actual values).



double-coupled truck

— Absorbing and Sequestering CO<sub>2</sub> through Proper Management of Company-Owned Forests

The Group manages forests at home and abroad, consisting of about 90 thousand hectares in Japan and about 80 thousand hectares overseas. Based on the concept of sustainable forest management, the Group appropriately manages these forests and maintains the CO<sub>2</sub> absorption and sequestration capabilities of the trees. Forests owned by the Group continuously fix approximately 31 million tonnes of CO<sub>2</sub>.

CASE STUDY

Quantifying CO<sub>2</sub> Absorbed by Appropriately Managed Company-owned Forests as Credits and Contributing to Offsetting Initiatives

The Nippon Paper Group engages in appropriate management of its company owned forests with the aim of achieving sustainable forest management. The greenhouse gas absorption effects of its partial tree thinning projects have been certified with J-Credits\* as one of multifaceted values. The supply of these credits as forest-derived credits is contributing to attempts at carbon offsetting in local communities.

\* A system in which the government certifies the amount of reduction and absorption of greenhouse gases such as CO<sub>2</sub> as “credits”



A forest where tree thinning projects have been certified under the credit scheme (Sudagai company forest, owned by Nippon Paper Lumber)



## Response to TCFD (Task Force on Climate-related Financial Disclosure)

The Group endorsed the TCFD in April 2021 with the aim of disclosing appropriate information on its response to climate change issues.

### — Governance

The Group has positioned the reduction of GHG emissions as a management issue and has been working on it by setting quantitative targets since 2008.

The Company regards addressing climate change issues as an important issue in realizing its corporate group philosophy. In addition to the Risk Management Committee, the Nippon Paper Group Environmental Committee reports on and oversees the Company's efforts. From FY2021, the director in charge of environmental issues will report to the Board of Directors on issues once a quarter.

### — Risk Management

The assessment of and response to climate-related risks is integrated into the Group's risk management system and is managed by the Risk Management Committee (see P.9). In order to appropriately foresee risks, the Nippon Paper Group Environmental Committee, established under the Risk Management Committee, collects and analyzes information, identifies climate-related risks and promotes countermeasures. The Group has also set up a Climate Change Strategy Working Group to gather information and forecast risks.

### — Indicators and targets

The Group will continue to analyze 1.5°C scenarios, expand indicators and targets, and strengthen risk management.

Indicator: Carbon pricing information

Target : FY2030 GHG emissions (Scope 1+2) 45% reduction (compared to FY2013)  
Non-fossil energy use ratio of 60% or more

### — Strategy and scenario analysis

As a scenario analysis for the year 2020, the Company drew up a vision of society against the backdrop of growing awareness of ESG issues. Using two different scenarios, it conducted an analysis and qualitative assessment of 2030 projections, focusing on our business, and reported the results to the Board of Directors.

## 1. Scenario analysis methods

### 1-1. Establishing an image of society

#### 2°C scenario

All kinds of policies will be introduced to keep the temperature rise below 2°C, and at the same time, society as a whole will take action to limit the 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 increases, and precipitation patterns.

#### 4°C scenario

No policies will be introduced to control temperature rise. While some stakeholders will take actions to limit temperature increase 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 increase. As a result, temperatures will rise more rapidly than in the 2°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.

### 1-2. 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

## 2. Summary of Analysis Results

Since the pulp and paper industry is an energy-intensive industry, the introduction of policies and changes in market needs are major risks, as well as physical factors such as an increase in the number of catastrophic disasters. In response to this, the Group is currently working to ensure strategic resilience through multifaceted measures such as a 45% reduction in greenhouse gas emissions (compared to FY2013) and multiple production sites.

On the other hand, 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 the introduction of policies and changes in market needs. As for adaptation to climate change, measures to shift to multiple production sites will lead to increased sales, while the development and sale of environmentally friendly and adaptive products needed by society will also provide opportunities for growth in a market that is expected to expand.

## 2-1. Climate change-related risks

Factors		Impact on the Company	Risk Assessment	
			2°C scenario	4°C scenario
Transition Factors	Policy introduction (e.g., carbon tax, change in energy mix)	• Energy procurement costs for fuel and raw materials will increase.	High	Low
		• Capital investment costs for fuel conversion and energy conservation measures will increase.		
		• Raw material procurement costs will increase.		
		• Increased acquisition cost of plantation project sites		
	Changes in market needs	• Increased procurement costs for certified wood chips	Medium	Medium
		• 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	
Physical Factor	Increase in the number of severe disasters (frequent typhoons and heavy rains)	• Stoppage of raw material procurement, production, product transportation, etc., resulting in reduced production volume and delayed or halted deliveries	Medium to High	High
		• Procurement, manufacturing, and logistics costs will increase.		
		• Increase in turbidity of rivers, etc., from which water is taken, resulting in production stoppage, decrease in production volume, and delay or stoppage of deliveries		
	Increase in temperature and change in precipitation patterns	• Losses in the company's plantation assets	Medium	High
		• Raw materials will become difficult to procure and procurement costs will increase.		
		• Search for alternative materials and increase technology development costs		
		• Sales volume decreases or sales price declines due to difficulty in maintaining quality.		

## 2-1-1. Transition factors

## ① Risks mainly due to the introduction of policy

## &lt; Introduction of carbon pricing, etc. &gt;

Under the 2°C scenario, fossil fuel prices are expected to rise and fuel procurement costs will increase, mainly due to the introduction of policies such as carbon taxes, emissions trading schemes, and bans on the use of coal-fired power generation, while investment costs for fuel switching and energy conservation measures to curb greenhouse gas emissions will also increase.

Since the pulp and paper industry is an energy-intensive industry, it is at risk of being significantly affected by the introduction of these policies.

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

In response to the risk of rising fossil fuel prices due to the introduction of the policy, the Group will make maximum use of the Group's Nippon Paper Lumber biomass procurement network, which is one of the largest timber procurement companies in Japan and accelerate the shift to non-fossil fuels in order to achieve the target of a 45% reduction in greenhouse gas emissions (compared to FY 2013) set in the Nippon Paper Group 2030VISION. The Company will accelerate the conversion to non-fossil fuels. At the same time, by strengthening energy conservation measures through the introduction of internal carbon pricing and other measures, the Company will work to reduce risks by promoting efforts to realize the effects of greenhouse gas reductions as early as possible.

**< Changes in energy composition >**

In the 2°C scenario, there is a risk that the demand for biomass fuels will increase due to policies to promote the introduction of renewable energies, 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 risk of increased demand for biomass fuel due to the introduction of the policy, the Company believes that it can procure biomass fuel in a stable and low-cost manner by making maximum use of the biomass procurement network of Nippon Paper Lumber, one of the largest wood procurement companies in Japan. With regard to wood chips for papermaking, the Company will reduce risk 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 our manufacturing from overseas, it may be affected by the policy trends of resource-supplying countries. Under the 2°C scenario, carbon prices are expected to be raised in resource-supplying countries to strengthen their policies, which will also increase the prices of raw materials purchased by the Company, and there is a risk that raw material procurement costs will increase.

The Company collects information on policies in resource-supplying countries and strives to predict the occurrence of risks, while at the same time trying to reduce risks by diversifying supply sources.

**< Expansion of the carbon credit market >**

In the 2°C scenario where the world is aiming for carbon neutrality (net zero CO<sub>2</sub>), the market is expected to expand due to increased demand for carbon credits. As a result, the demand for credits from forest absorption is expected to increase, and there is a risk that an increase in the number of afforestation projects for the purpose of creating credits will lead to an increase in the price of land suitable for afforestation and an increase in the cost of land acquisition for the Company's afforestation business.

On the other hand, under the 4°C scenario, some stakeholders may secure afforested land from the perspective of promoting ESG management, regardless of whether policies are introduced or not, and regardless of the movements of society as a whole, but the risk of such actions on the Company's afforestation business is considered to be small.

The plantation business requires a large area of suitable land for plantation, so rising land prices may pose a risk to the Company. However, the Company can reduce this risk by utilizing its strengths, such as its proprietary technology for breeding and propagating highly efficient CO<sub>2</sub>-fixing trees and operating plantation businesses in cooperation with third parties.

**② Risks arising primarily from changes in market needs.****< Rapid increase in demand for environmentally friendly products >**

Under the 2°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. In response, the Company is working to mitigate risks by strengthening efforts to reduce its environmental impact.

The Company will further accelerate the reduction of greenhouse gas emissions through fuel conversion and energy conservation measures. By taking advantage of the fact that its production bases are dispersed throughout Japan, the Company will contribute to the reduction of greenhouse gas emissions throughout the supply chain by shortening the transportation distance to delivery destinations and reducing greenhouse gas emissions during transportation through the use of multiple production bases as well.

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 we are already working on, the Company will be able to promote the replacement of materials with renewable biomass materials, reduce the risks associated with changes in market needs, and at the same time use this as an opportunity to expand its business.

In addition, under the 2°C scenario, the demand for certified paper based on the forest certification system, which indicates that the paper is made from forest resources that have been properly managed, will increase due to the heightened awareness of the whole society about the proper management and use of forests, which will increase the procurement cost of certified wood chips, which are a limited resource. There is a risk that the procurement cost of certified wood chips, a limited resource, will increase. In order to reduce this risk, the Company will maintain and continue good relationships with certified timber suppliers, and at the same time, it will secure certified timber in a stable and efficient manner by acquiring certification in new plantation areas and by supporting suppliers in expanding certified resources.

## 2-1-2. Physical factors

### ① Risk due to the increase in the number of severe disasters

#### <Damage to production bases 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 bases 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 lifelines, 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 occurrence of natural disasters is beyond the Company's control, it is taking advantage of the fact that its factories are dispersed throughout Japan to accelerate the transition to a system that allows production at multiple factories, thereby strengthening its system for business continuity and risk reduction. 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 today but is expected to become more frequent under the 4°C scenario.

Although the Company cannot control the occurrence of natural disasters, it 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 risk by developing a detailed system for business continuity in case production is suspended.

### ② Risk due to rising temperatures and changing precipitation patterns

#### <Forest fire occurrence>

As temperature rises, the probability of forest fires increases, and under the 4°C scenario, forest fires are expected to occur more frequently around the world. Since the Company's business model is based on forest resources, fires in the forests of its wood chip suppliers or in its own forests could pose a major risk in terms of stable procurement of raw materials and procurement costs. In addition, in the event that the Company's own forests are damaged by fire, there is a risk that the value of the Company's own forests will decline, and the Company's plantation business will suffer damage. In order to reduce this risk, the Company is strengthening its fire prevention and extinguishing systems in its own forests, and at the same time, it is trying to reduce this risk by dispersing our own forests and suppliers in multiple countries and regions.

#### <Decrease in plant productivity>

The growth of plants is greatly affected by temperature and rainfall. 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 a 4°C scenario where plant growth is expected to decline due to rising temperatures and changes in rainfall patterns. In the event that the Company is unable to procure raw materials, it will be difficult to maintain the quality and function of its products, and there is a risk of a decrease in sales volume or sales price. However, the Company is working to reduce this risk by diversifying our raw material supply sources and continuing to search for alternative materials.

2-2. Opportunities for business expansion

Factors		Transition Opportunities	The Company's Strength	Market Growth		
				2°C Scenario	4°C Scenario	
Transition Factors	Introduction of policies (e.g. carbon tax, changes in energy mix)	• Renewable energy is being introduced.	• Demand for power generation facility locations will increase. • Demand for biomass fuels will increase.	• Domestic company-owned forests and sites, etc. • Fuel procurement network • Biomass fuel production technology	Expansion	Stable
		• Next-generation vehicles are becoming increasingly popular.	• Storage batteries will spread and demand for raw materials for storage batteries will increase. • Demand for CNF will increase due to the need to reduce the weight of automobiles.	• CMC Technology and Production Facilities • CNF Technology	Significant Expansion	Expansion
		• Carbon credit market will be activated.	• Demand for forest absorption credits will increase.	• Company Owned Domestic Forestry • Forest Management Technology • Breeding and propagation technology	Significant Expansion	Stable
		• Resources will become more difficult to obtain due to stricter policies in resource-providing countries.	• Demand for domestically produced lumber will increase. • Demand for recycled paper will increase.	• Domestic Company-owned Forests and Seedling Businesses • Recycled paper procurement network • Collaboration with Stakeholders • Unused recovered paper recycling technology	Expansion	Stable
		• Carbon recycling is advancing (utilization of carbon resources)	• Increasing demand for carbon fixation and utilization by forests	• Breeding Technology for High CO <sub>2</sub> Fixation Efficiency Trees • Company-owned forests in Japan	Expansion	Stable
			• Demand for chemical raw materials using carbon-neutral CO <sub>2</sub> will increase	• Biomass-derived CO <sub>2</sub> supply infrastructure (recovery boilers) • Chemical CO <sub>2</sub> fixation and utilization technology	Significant Expansion	Stable
	Transition to a decentralized society	• Increasing local production and local consumption of energy	• Small fuel demand will increase.	• Fuel procurement network	Expansion	Stable
		• Decentralization of product consumption	• Increased opportunities to sell products with reduced CO <sub>2</sub> emissions during distribution while handling shipments from each production site.	• Multiple production sites	Expansion	Stable
	Changes in market needs	• Demand for environmentally friendly products will increase.	• Demand for biomass materials will increase as the need to paperizing due to decarbonization.	Woody Biomass Material Development Technology • Technology for recycling unused waste paper	Significant Expansion	Expansion
			• Demand for paper made from sustainably sourced forest materials will increase.	• Track record of procuring certified forest materials • Relationship of trust with excellent suppliers	Expansion	Expansion
• Demand for products that reduce greenhouse gas emissions from livestock farming will increase.			• Cellulose material utilization technology	Expansion	Stable	
Physical Factors in Climate Change	Increase in the number of catastrophic disasters	• Increasing demand for stable supply of products	• Increased need to purchase from suppliers with established flexible systems for business continuity	• Multiple production sites	Expansion	Significant Expansion
		• Overseas raw material suppliers and distribution networks are damaged.	• Demand for domestically produced lumber will increase • Demand for recycled paper will increase.	• Domestic Company-owned Forests and Seedling Businesses • Recycled paper procurement network • Collaboration with Stakeholders • Unused recovered paper recycling technology	Expansion	Significant Expansion
		• 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.	• Demand for long-term storage aseptic paper pak will increase.	• Total System Supplier	Expansion	Expansion
	Increase in temperature and change in precipitation patterns	• Decreases the amount of plant growth	• Demand for environmental stress tolerant trees will increase.	• Breeding and propagation technology	Expansion	Expansion

## 2-2-1. Transition factors

### ① Opportunities associated with the introduction of the policy

#### <Increase in demand for renewable energy>

In the 2°C scenario, policies are expected to promote the introduction of renewable energies, 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 can use these as an opportunity to expand its business of supplying renewable energy in cooperation with power generation companies. In response to the increasing demand for biomass fuels, this will also 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 2°C scenario, where a rapid increase in demand for renewable energy is expected, the Company believe that it has the tangible and intangibles assets to meet this demand and can quickly respond to this market expansion so as to capture business opportunities.

#### <Dissemination and expansion of next-generation vehicles>

Since the transportation sector accounts for about 20% of Japan's CO<sub>2</sub> emissions, it is predicted that next-generation vehicles such as electric vehicles will become more popular in the future.

In March 2021, the New Industry Creation Hatchery Center (NICHe) at Tohoku University announced that it had discovered that CNFs 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<sup>\*1</sup> to create an uneven surface with a controlled CNF surface shape. The Company is pleased to announce that it has succeeded in developing the world's first dry, lightweight supercapacitor. 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 supercapacitors market was valued at approximately USD 365 million in 2019 and is expected to grow at a significant rate of over 12% per annum from 2020 to 2027.<sup>\*2</sup>

With the spread of next-generation vehicles, the need to reduce vehicle weight is expected to increase further. The size of the fiber-reinforced plastics market, including automotive components, was \$228.4 billion in 2019 and is expected to reach \$295.6 billion by 2027.<sup>\*2</sup> Currently, glass (glass fiber) and carbon (polymer-reinforced carbon fiber) are the most commonly used fibers for reinforcing materials, but with the spread of electric vehicles and other vehicles, there is a growing need for lightweight materials to further improve fuel efficiency. The specific gravity (weight per unit volume) of CNF is lower than that of other fibers, making it a highly effective lightweight fiber. In addition, CNF is a carbon-neutral, plant-derived material with multifaceted value in environmental conservation, as it has less performance degradation due to material recycling than glass fiber reinforced resin. The global market scale of CNF is about 0.6 billion dollars in 2020, but it is expected to expand to about 250 million dollars by 2030, as it is gradually adopted as a composite reinforcing material for automotive components.<sup>\*3</sup>

The diffusion of next-generation vehicles is a highly feasible event in both scenarios, with or without the introduction of policies, but in the 2°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 Report Ocean

\*3 Yano Research Institute

#### <Expansion of the carbon credit market>

In the 2°C scenario, where the world is aiming for carbon neutrality (net zero CO<sub>2</sub>), the demand for carbon credits will increase and the market will expand, and the demand for forest absorption credits is expected to increase accordingly.

The Company owns approximately 90,000 hectares of its forests in Japan. In addition to forest management technology cultivated through the management of Company-owned forests in Japan and overseas afforestation projects, the creation of carbon credits by utilizing the Company's unique breeding and propagation technology that enables highly efficient CO<sub>2</sub> fixation is expected to enable the Company to enter the expanding market and capture business opportunities.

#### <Strengthen the policies of resource-providing countries>

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 2°C scenario, there is a risk that raw material procurement costs will increase if resource-providing countries tighten their policies and raise carbon prices. On the other hand, the Company owns forests in Japan and operates a mountain seedling business. It is also working with stakeholders to create a closed-loop recycling system for recovered paper, 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.

Under the 2°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.

### < Promotion of carbon recycling >

In the 2°C scenario, carbon recycling, which is the process of capturing and reusing CO<sub>2</sub> from the atmosphere, is expected to progress rapidly, along with the reduction of greenhouse gases through the reduction of fossil fuel use.

In the Company's overseas afforestation business, by continuing the cycle of afforestation, cultivation, logging (wood chip production), and reforestation, the Company's forests absorb and fix atmospheric CO<sub>2</sub> into the forest every year and use it as a woody biomass resource. 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 CO<sub>2</sub> absorption. By positioning its overseas afforestation business as a carbon recycling business and promoting the use of its proprietary breeding and propagation technologies that enable highly efficient CO<sub>2</sub> fixation, the Company can improve its CO<sub>2</sub> absorption and fixation capacity and contributes to the recycling of carbon resources, not only in the Company's own forests.

In addition, since CO<sub>2</sub> derived from biomass obtained from sustainable forests is considered carbon neutral, carbon negativity (negative emissions) can be achieved by separating and recovering the CO<sub>2</sub> 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<sub>2</sub> separation, underground storage, and recycling, the Company can expect to achieve carbon negativity using CO<sub>2</sub> generated from biomass boilers and black liquor-fueled recovery boilers operating in Japan.

### < Transition to a decentralized society >

Under the 2°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 2°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 increase, there will be a shift to decentralization, but at a slower rate than in the 2°C scenario, mainly 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 factories are dispersed throughout Japan and by responding to the decentralization.

## ② 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. Currently, there is a growing movement to switch from plastic to paper packaging as a means of solving the problem of ocean plastic. In the 2°C scenario, this trend will be further accelerated in combination with climate change issues, and the demand for the use of biomass materials in various products other than packaging materials will increase.

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 also developed and started marketing "waterproof liner", a multifunctional base paper for corrugated board that is a sustainable alternative to Styrofoam boxes. In addition to this, the Company believes that by providing society with a variety of biomass materials, such as resin composite materials with a high content of woody biomass, it can respond to changing market needs and capture and expand business opportunities.

### < 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.

Using the Company's proprietary technology to extract only cellulose fiber, which is easily digestible by cattle, from wood chips, it is developing livestock feed with superior fiber content and nutritional value. Feeding highly digestible feed to cows is expected to reduce the amount of water in their excrement and reduce the greenhouse gases produced when making fertilizer.

Reducing greenhouse gas emissions from the livestock industry is a global challenge, and a 2°C scenario could accelerate efforts to achieve this goal and expand the market for feedstuffs with the potential to reduce emissions. 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 products derived from sustainable forests >

The Company confirms the legality and sustainability of all wood 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 wooden raw materials, and it has established a system that enables it to promptly respond to inquiries from customers regarding raw material procurement. In addition, in order to supply certified forest paper, for which demand has been increasing in recent years, the Company will establish a system to secure certified forest materials in cooperation with suppliers.

The Company's sustainable procurement of forest resources is based on trusting relationships with its suppliers that it has built over the years, and it ensures certainty through its due diligence system and forest resource creation, which it believes will lead to future business expansion in terms of the reliability of the wood raw materials the Company uses.

## 2-2-2. Business opportunities due to changes in physical factors

### < Increase in demand for stable supply of products >

Severe weather disasters, such as typhoons and torrential rains, are expected to cause damage to production bases 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 system 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 and recovered paper use expand significantly, the Company can take advantage of its strong timber and recovered paper procurement network as well as its efforts to secure recovered paper raw materials in collaboration with its customers. Furthermore, it believes that it can also maintain and expand its business by utilizing its unused recovered paper recycling technology and making extensive use of domestic resources.

### < Increasing need for strengthening of buildings >

The Company sells "CfFA<sup>®</sup>", an admixture for concrete made from coal ash, a byproduct of in-house power generation, by modifying it with its unique technology. "CfFA<sup>®</sup>" is also used in earthquake reconstruction projects, as it can be used to make concrete more durable and longer lasting.

In the 4°C scenario, severe disasters caused by typhoons and torrential rains will become more frequent, and this market is expected to grow as the strength of buildings needs to be improved. On the other hand, even in the 2°C scenario where severe disasters do not occur frequently, demand is expected to increase for earthquake countermeasures, etc. The Company believes that it can maintain and expand its business by utilizing its unique technologies.

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

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 2°C scenario.

The Company sells FUJIPAK, which enable room-temperature distribution and long-term storage of beverages and tofu. In addition, the "non-aluminum FUJIPAK," which does not use aluminum foil and can be distributed at room temperature, is attracting attention as an environmentally friendly container because it improves recyclability and reduces greenhouse gas emissions.

The Company has developed a new container, NSATOM<sup>®</sup>, which enables it to fill a wider variety of contents in addition to its long-term storage function. Since paper containers that can be stored for a long time are expected to contribute to de-PE and food loss prevention, it will continue to develop new containers that meet the needs of the market and strengthen the Company's stable supply system.

### < Increasing demand for environmental stress tolerant plants >

Since plants cannot move on their own, environmental changes such as rising temperatures can cause stress and result in poor growth, development of plants that can tolerate high temperatures, salt damage, and drought has long been underway.

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.

# Preserving Biodiversity

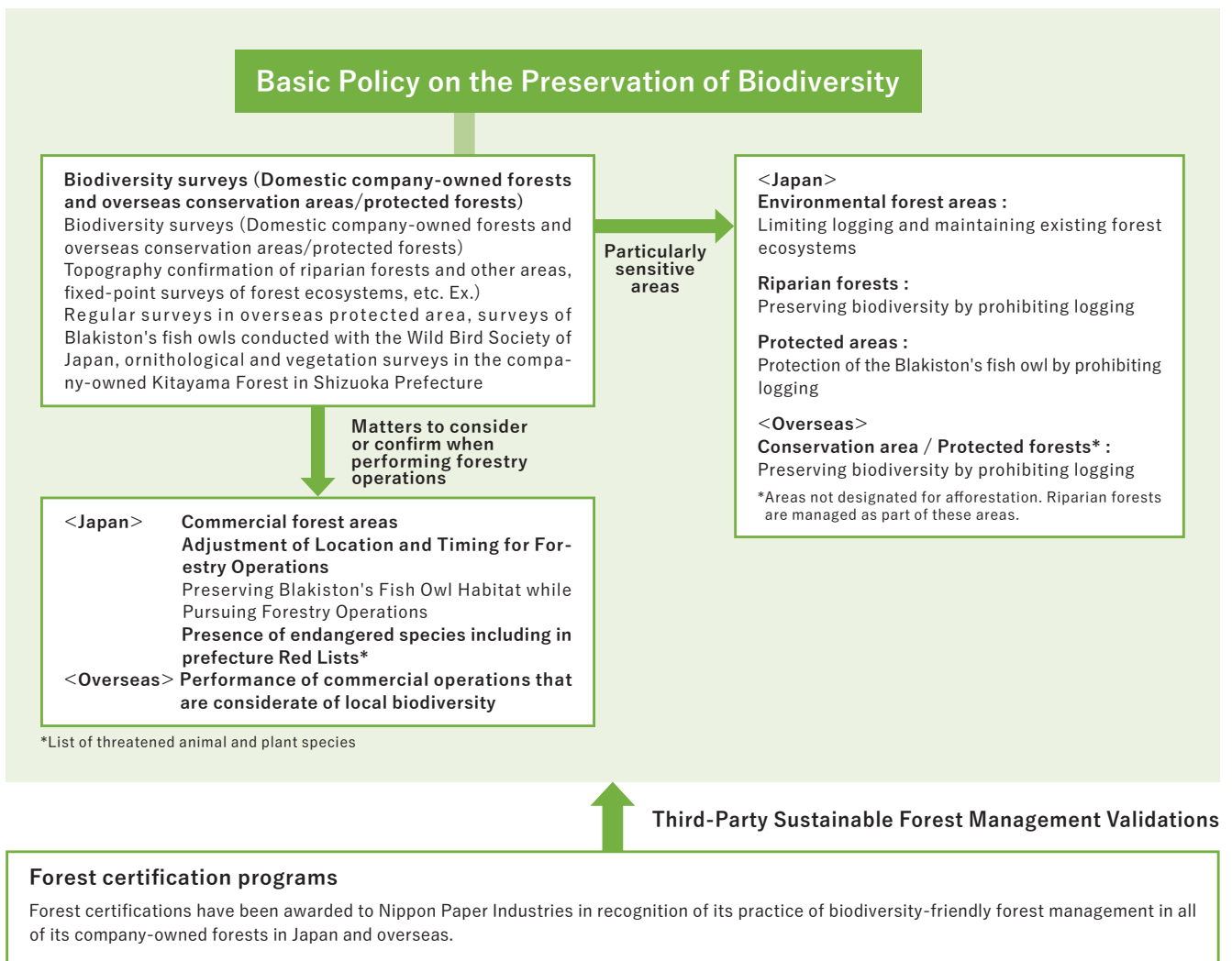
## Basic Stance

The business foundation of the Nippon Paper Group is forest resources, and it is highly dependent on the forests that nurture biodiversity and at the same time has various impacts. “Conservation of biodiversity” is considered to be the fundamental function of forests. In addition, forests have environmental conservation functions such as soil conservation and water source recharge, and in order for them to be fully utilized, it is necessary to use the blessings of forests in a sustainable manner. Therefore, the Group set the Nippon Paper Group’s Environmental Charter which states that the Group will engage in corporate activities that recognize the importance of biodiversity and also established the “Basic Policies on the Preservation of Biodiversity” in 2016. The Group is working to preserve biodiversity through its main business activities, as well as activities utilizing its resources and technologies.

### →Basic Policy on the Preservation of Biodiversity

<https://www.nipponpapergroup.com/english/csr/policies/>

### The Group’s Biodiversity Conservation Initiatives (Summary)



## Biodiversity Conservation Initiatives

- The Nippon Paper Group works to reduce its impact on biodiversity in its manufacturing processes of paper and other products, such as by processing wastewater and reducing greenhouse gas emissions.
- The Group sustainably procures wood resources, which are the raw materials for our Group’s products, from properly managed forests.
- The Group manages sustainable forests in its own forests in Japan and overseas.
- The Group properly manage forests for economic use and forests for environmental conservation forests by setting of Conservation area / Protected forests that are not logged to conserve biodiversity through confirmation of topographical information to be considered such as riparian forests and implementation of fixed-point surveys of forest ecosystems, etc.

**CASE STUDY**

### Preserving Blakiston’s fish\* owl habitat while Pursuing Business Activities – Collaborating with the Wild Bird Society of Japan (Nippon Paper Industries)

In 2010, Nippon Paper Industries entered into an agreement with the Wild Bird Society of Japan where forestland owned by the company in Hokkaido was identified as a sanctuary for Blakiston’s fish owl. In 2015, the Company set a new standard for the compatibility of business activities with the preservation of Blakiston’s fish owl habitat in company-owned forests in the Kushiro area. In that standard the Company considers the scale and timing of forest operations. Also, the Company continued to conduct joint surveys accumulated data, on biodiversity in company-owned forests. In November 2020, the Company set up nest boxes and is not only conserving habitats, but also supporting the breeding of Blakiston’s owls. In February 2021, evaluation of more than 10 years of working with the Wild Bird Society of Japan led to being awarded Hokkaido Biodiversity Conservation Awards (*Mirai e Tsunagu! Kitaguni no Ikimono Mamoritai Sho* prize) organized by the Hokkaido government.



(Photo courtesy of the Wild Bird Society of Japan)

\* 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

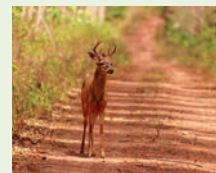
**CASE STUDY**

### Conducting Biodiversity Research Overseas (AMCEL S.A, Brazil)

AMCEL S.A. (Brazil) owns approximately 300 thousand hectares of land and has set aside 170 thousand hectares as a conservation area. This conservation area includes forests of high conservation value and is home to large numbers of plant and animal species, some of which are rare or endangered.

#### Biodiversity Conservation Initiatives

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



Monitoring wild animal life



Monitoring Vegetation

## CASE STUDY

**Supporting the Activities of the Shirane-aoi wo Mamoru Kai (Nippon Paper Group)**

Shirane-aoi (*Glaucidium palmatum*: Japanese wood poppy) is designated as a “Threatened II” species for Gunma Prefecture. To protect this plant species, the Shirane-aoi Preservation Group was set up in December 2000, mainly at the initiative of Gunma Prefectural Oze High School and the residents of Katashina in Tone-gun, Gunma. As recognition of its achievements to date, it received the Greenery Day Minister of the Environment’s Prize for Meritorious Service Related to the Natural Environment in April 2014.

On the part of the Nippon Paper Group, Nippon Paper Development—which manages Nippon Paper Industries’ Sugenuma Forest—has supported the operation of the Shiraneaoi Preservation Group since its initial establishment, and has made a portion of the Sugenuma Forest available to the group as a restorative plantation site for Shiraneaoi. Since 2002, Group employees have participated as volunteers in planting, seed collection, and other activities.



Care of the planting site with high school students in Oze

## CASE STUDY

**Eradicating Invasive Plant Species from Iriomote Island**

~Cooperation with the Iriomote Island Ecotourism Association (Nippon Paper Industries)

In August 2017, Nippon Paper Industries entered into an agreement with the Forestry Agency Kyushu Regional Forest Office Okinawa District Forest Office to carry out forest conservation activities such as the eradication of non-native plants on approximately nine hectares of national forest of Iriomote Island. It has since been engaged in such efforts through cooperation with the Iriomote Island Ecotourism Association, which conducts activities for conserving and ensuring the continuity of the nature and traditional culture of the island. Iriomote Island is covered with highly diverse forests, including Japan’s largest mangrove forest and subtropical broad-leaved trees, providing a habitat for precious animal and plant species such as the Iriomote wild cat, which has been designated a special national treasure (a Critically Endangered IA species). However, large numbers of invasive non-native plants have been found over an extensive area. The Company is therefore cooperating with the local people of Iriomote Island to eradicate non-native plant species such as the Bay Biscayne\* creeping-oxeye, and conducting continuous surveys to detect their reappearance

\*A plant in the Asteraceae (sunflower) 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.



A removed Bay Biscayne creeping-oxeye

## CASE STUDY

**Mutual cooperation in forest management with Coca-Cola Bottlers Japan (Nippon Paper Group)**

The Company, Nippon Paper Group company Marunuma Kogen Resort and Coca-Cola Bottlers Japan Inc. agree on mutual cooperation for the conservation and protection of forest and water resources. They are collaborating on initiatives to keep “Healthy forest” that nurtures “rich water” utilizing the knowledge and experience of The Group’s “Forest / Tree” and Coca-Cola Bottlers Japan’s “Water”. Because the water source area of Coca-Cola Bottlers Japan’s Saitama Mill and Iwatsuki Mill are located in part of Sugenuma company-owned forest in Katashina Village, Gunma Prefecture (1,746ha) where Marunuma Kogen Resort has developed a leisure business. The Group promotes the activities of forest conservation and maintenance.

## Other environment-related data

### Environmental Accounting

#### Environmental Conservation Costs (FY2020) (Millions of Yen)

	Investment	Cost
(1) Business area costs		
①Pollution prevention costs	4,091	11,484
②Global environmental conservation costs	2,333	339
③Resources circulation costs	41	8,738
(2) Upstream/downstream cost	—	3,202
(3) Administration cost	—	274
(4) R&D cost	—	3,099
(5) Social activity costs	—	42
(6) Environmental remediation costs	—	522
Total	6,465	27,760

#### Environmental conservation impacts (FY2020)

Categories	Environmental Impact Indicators		Results	YoY Change
Effects related to resources introduced to business activities	Afforestation projects overseas	Overseas afforestation areas	83kha	No change
	Energy-saving measures	Fuel reduction(Heavy oil equivalent)	54,638kl	Up 783kl
Effects related to environmental impact and waste from business activities	Greenhouse gas emissions		5.75Mt	Down 0.51Mt
	Air pollutant emissions	NOx emissions (NO equivalent)	7,268t	Down 1,210t
		SOx emissions (SO <sub>2</sub> equivalent)	2,012t	Down 1,436t
		Soot and dust emissions	868t	Down 492t
	Effluent		798Mt	Down 65Mt
	Water contaminant emissions	COD/BOD emissions	43,195t	Down 5,420t
		SS emissions	18,558t	Down 2,647t
Final waste disposal		14.2kt	Down 6kt	
Effects related to goods and services produced from business activities	Product recycling	Recycled paper utilization rate(paper)	34%	Up 0.7%
		Recycled paper utilization rate (paperboard)	89%	Up 0.7%
	Shipping material recycling	Pallet recovery rate	46%	Down 0.7%

#### Environmental Benefits of Environmental Conservation (FY2020) (Millions of Yen)

Effect	Amount
Income from company-owned forests in Japan	549
Reduced expenses from energy saved	1,006
Reduced disposal expenses through the effective use of waste	3,702
Gain on sales from the recycled waste	386
Reduced expenses through the recycling of shipping material	1,526
Total	7,170

※Accounting standards are based on Environmental Accounting Guidelines 2005

## Environment related

## Balance of Materials for All Businesses (Principal Materials) (FY2020)

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

		Unit	FY2018 <sup>*1</sup>	FY2019 <sup>*1</sup>	FY2020 <sup>*1</sup>
<b>Input</b>					
Energy input	Purchased electricity	GWh	2,134	2,100	1,934
	Oil	Thousand kl	462	447	578
	Coal	Thousand t	2,841	2,637	2,039
	Gas		261	272	299
	Other fossil fuels		23	27.5	23
	Non-fossil fuels <sup>*2</sup>		6,622	5,997	5,347
	(Of which Black liquor)		4,906	4,643	3,985
Chemical substances subject to the PRTR Law <sup>*3</sup>	Amount handled	t	9,257	9,270	11,568
Water consumption	Total	Million t	901	930	880
	River water		750	757	710
	Industrial water		123	143	140
	Well water		27	29	29
	Public water supply		1	1	1
Raw Material	Woodchips	Thousand BDt	5,443	5,228	5,446
	Logs	BDt	808	805	702
	Pulp	Thousand ADt	511	512	446
	Recycled paper(Pulp)		2,899	2,705	3,202
	Base Paper		100	102	123
<b>Output</b>					
Gas Emissions	GHG emissions	Million t-CO <sub>2</sub>	7.90	7.40	6.90
	(Scope 1)		7.06	6.62	6.26
	(Scope 2)		0.83	0.78	0.64
	SOx emissions	Thousand t	3.95	3.97	2.83
	NOx emissions		11.2	10.82	9.39
	Soot and dust		1.4	1.61	1.10
Chemical substances subject to the PRTR Law <sup>*3</sup>	Amount released	t	201	141	150
	Amount transferred		82	80	94
Waste Water	Wastewater Total	Million t	875	905	843
	Public water		866	896	835
	Sewerage		9	9	8
	COD/BOD	Thousand t	62	59	53
	SS		24	26	24
	Nitrogen		1.5	1.5	1.3
	Phosphorous		0.2	0.2	0.2
Waste	Total Waste Generated	Thousand BDt	982	989	760
	Final disposal subtotal		124	141	72
	Recycled subtotal		858	848	688
	Hazardous waste generation <sup>*4</sup>	BDt	—	—	1,541
Products manufactured	Paper, household Paper	Million t	4.3	4.02	3.29
	Paperboard		2.16	2.04	1.88
	Pulp	Thousand t	268	239	221
	Paper container		83	88	92
	Chemical products		101	100	93
	Building materials		85	126	80
Electricity	Electricity	GWh	2,523	2,199	2,384

<sup>\*1</sup> Coverage: FY2018 [https://www.nipponpapergroup.com/english/csr/npg\\_csrr2019\\_e\\_all.pdf#page=2](https://www.nipponpapergroup.com/english/csr/npg_csrr2019_e_all.pdf#page=2)  
FY2019 [https://www.nipponpapergroup.com/english/csr/npg\\_csrr2020\\_e\\_all.pdf#page=2](https://www.nipponpapergroup.com/english/csr/npg_csrr2020_e_all.pdf#page=2)  
FY2020 [https://www.nipponpapergroup.com/english/csr/npg\\_esgdb2021\\_contents.pdf](https://www.nipponpapergroup.com/english/csr/npg_esgdb2021_contents.pdf)

<sup>\*2</sup> Biomass fuels ( including black liquor ) and waste fuels

<sup>\*3</sup> Japan only. Dioxins are not included in total data.

<sup>\*4</sup> Only in Japan, Aggregated by specially controlled industrial waste

## Balance of Materials in the Pulp and Paper Businesses in Japan(Principal Materials) (FY2020)

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

		Unit	FY2018 <sup>※1</sup>	FY2019 <sup>※1</sup>	FY2020 <sup>※1</sup>
<b>Input</b>					
Energy input	Purchased electricity	GWh	929	895	804
	Oil	Thousand kl	170	159	147
	Coal	Thousand t	1,942	1,773	1,619
	Gas		101	97	101
	Other fossil fuels		23	27	23
	Non-fossil fuels <sup>※2</sup>		4,608	4,281	3,582
	(Of which Black liquor)		3,315	3,130	2,561
Chemical substances subject to the PRTR Law <sup>※3</sup>	Amount handled	t	328	402	341
Water consumption	Amount of water intake	Million t	815	805	757
	water intake intensity	t/product-t	146	155	171
Raw Material	Woodchips	Thousand BDt	4,239	4,102	3,344
	Logs	BDt	25	28	23
	Pulp	Thousand ADt	430	424	350
	Recycled paper (Pulp)	ADt	2,823	2,619	2,658
<b>Output</b>					
Gas Emissions	GHG emissions (Scope 1 + 2)	Million t-CO <sub>2</sub>	6.56	6.00	5.49
	Scope 1		6.08	5.56	5.17
	Scope 2		0.49	0.44	0.31
	GHG emissions intensity during production	t-CO <sub>2</sub> /product-t	1.18	1.16	1.24
	SOx emissions	Thousand t	3.3	3.2	1.7
	NOx emissions		8.4	8.2	7.0
	Soot and dust		1.1	1.3	0.8
Chemical substances subject to the PRTR Law <sup>※3</sup>	Amount released	t	147	97	104
	Amount transferred		0.23	0.22	6
VOC (Volatile Organic Compounds)	Amount released	t	48	41	49
Wastewater	Wastewater Total	Million t	763	789	731
	COD/BOD	Thousand t	44	40	35.6
	SS		18	18	16.2
	Nitrogen		1.5	1.4	1.2
	Phosphorous		0.2	0.1	0.1
Waste	Total Waste Generated	Thousand BDt	714	700	553
	Final disposal subtotal		12	19	13
	Recycled subtotal		702	681	541
Products manufactured	Paper, household Paper	Million t	3.86	3.57	2.86
	Paperboard		1.7	1.6	1.6
	Pulp	Thousand t	13	14	11

※1 Coverage: Pulp and Paper Businesses in Japan extracted from P.0 (the first page of this databook) coverage

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

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

**GHG emissions Scope3 (FY2020)**

Coverage : Nippon Paper Industries, Paper and Paperboard Business

Category		Emissions (thousand t-CO <sub>2</sub> )
1	Purchased goods and services	3,867
2	Capital goods	130
3	Fuel- and energy-related activities (not included in scope 1 or scope 2)	1,556
4	Upstream transportation and distribution	987
5	Waste generated in operations	1.26
6	Business travel	0.72
7	Employee commuting	3.98
8	Upstream leased assets	0
9	Downstream transportation and distribution	139
10	Processing of sold products	0
11	Use of sold products	0
12	End-of-life treatment of sold products	0
13	Downstream leased assets	0
14	Franchises	Not applicable
15	Investments	Not applicable
Total		6,685

Category 2,6 : Including other than Paper and Paperboard Business

Category 10-12 : Not subject to calculation because it is an intermediate good

However, categories 11 and 12 are considered as follows:

Paper and paperboard products do not use energy when used

CO<sub>2</sub> emissions at the time of disposal of paper and paperboard products are set to zero by offsetting from the concept of carbon neutrality.**External Awards for Environmental Conservation Activities (FY2020)**

Award	Recipient
Yamaguchi Prefecture Seto Inland Sea Environmental Conservation Association Slogan about environmental conservation in the first year of Reiwa	Nippon Paper Industries, Iwakuni Mill
Yamaguchi Prefecture Seto Inland Sea Environmental Conservation Association Senryu about environmental conservation in the first year of Reiwa	Nippon Paper Industries, Iwakuni Mill

**Environmentally-participating initiatives and external collaboration, etc.**

Name	Organizer	Year of participation
TCFD Consortium		2021
Initiative on Declaration of Biodiversity by Keidanren	KEIDANREN(Japan Business Federation)	2021
Task Force on Climate-related Financial Disclosures (TCFD)		2021
Japan Partnership for Circular Economy(J4CE)	Ministry of the Environment, KEIDANREN(Japan Business Federation)	2021
GREEN SEA SETOUCHI HIROSIMA PLATFORM	Hiroshima Prefecture	2021
Opinion exchange meeting for zero carbon	Kumamoto Prefecture	2021