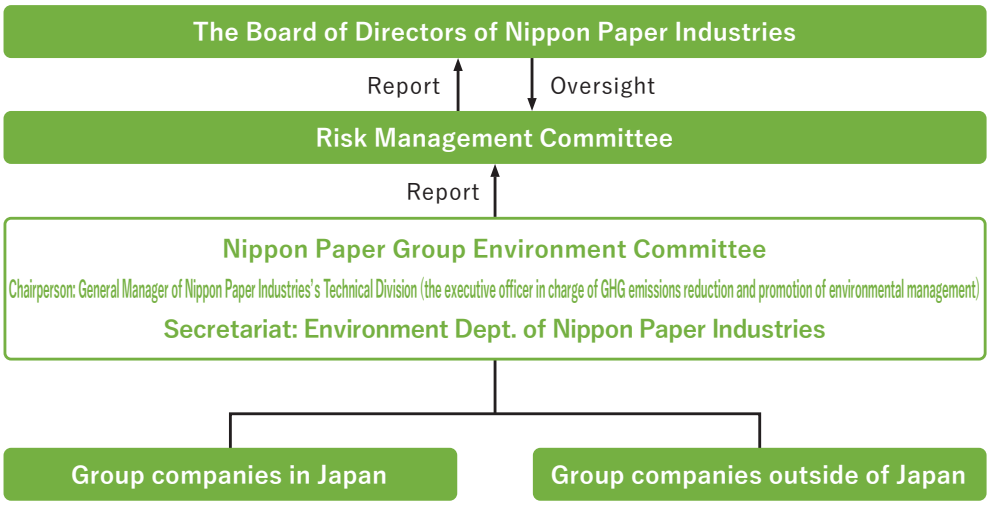
Policy and Management

》 The Nippon Paper Group Environmental Charter (see P.86)

Environmental Management Promotion Structure



Environmental management systems

Acquisition of ISO 14001 Certification (as of March 31, 2022)

Company Name	Mills/Operating Division/Production Subsidiaries
Nippon Paper Industries	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	Kauttua

* Manufacturing of non-carbon paper, heat-sensitive paper, inkjet paper and other information paper and wholesaling of electric power

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

・Nippon Paper Industries has obtained ISO 14001 certification for 50% of its environment-related matters to be reported.

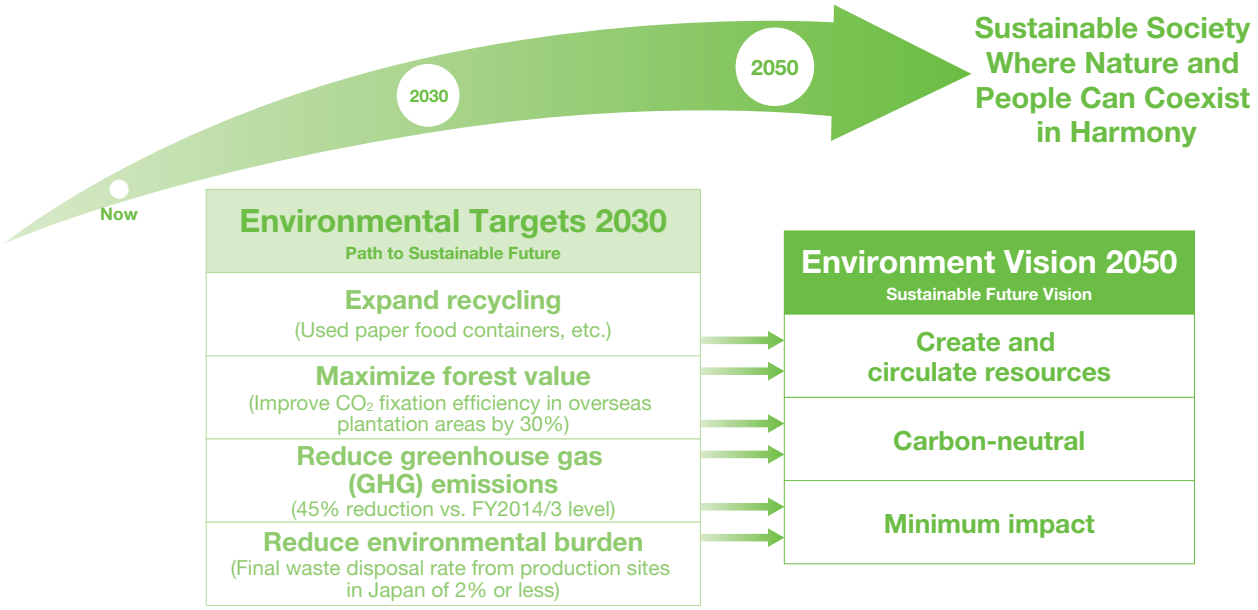
The status of Eco-Action 21 acquisition (as of March 31, 2022)

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

Nippon Paper Group Environmental Vision 2050 (Sustainable Future Vision), Nippon Paper Group Environmental Targets 2030: Path to Sustainable Future

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 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)

1. 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_2 absorption and fixation in forests and CO_2 removal technologies.

2. 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.

3. 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

1. 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 FY2020 levels through modal shift and other measures*.
- ▶ Collaborate with stakeholders to reduce indirect greenhouse gas emissions.

* Applied to Nippon Paper Industries.

2. Promote the creation and circulating of resources

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

- ▶ Improve CO_2 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 forest resources in Japan.

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.

3. 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 production sites in Japan to 2% or less.
- ▶ Provide society with products and services that have minimal environmental impact throughout their entire life cycle.

Nippon Paper Group Environmental Targets 2030: Path to Sustainable Future

1. Reduce greenhouse gas emissions

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

Target	Progress and Status of Initiatives
▶ Reduce direct greenhouse gas emissions by 45% from FY2013 levels.	The Group reduced GHG emissions (Scope 1 and 2) by 20% compared with FY2013.
▶ Accelerate fuel conversion and increase the ratio of non-fossil energy use to at least 60%.	The non-fossil energy ratio to energy used was 46%.
▶ Improve total energy consumption per unit of production and distribution by 1% from the previous year.	Total energy consumption per unit of Nippon Paper Industries decreased by 6% in the paper business and 1.3% in the paperboard business in production processes, and increased by 2.6% in logistics processes, compared with 2020.
▶ 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*.	GHG emissions increased by 3% compared with FY2020, due to an increase in the transportation volume associated with recovery in production due to the impact of the COVID-19 pandemic.
▶ Collaborate with stakeholders to reduce indirect greenhouse gas emissions.	The Group calculated Scope 3 emissions from major pulp and paper companies in Japan and is considering measures to reduce indirect GHG emissions.

* Applied to Nippon Paper Industries.

2. Promote the creation and circulating of resources

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

Target	Progress and Status of Initiatives
▶ Improve CO_2 fixation efficiency in overseas forest plantations by 30% compared to 2013 levels.	The Company conducts research and development such as elite tree selection on an ongoing basis with the aim of improving CO_2 fixation efficiency.
▶ Obtain and maintain forest certification for all company forests in Japan and overseas.	The Group has obtained and maintained forest certification (FSC®*1, PEFC, and SGEC) for all of the company-owned forests in Japan and overseas.
▶ Ensure the traceability and sustainability of all woody biomass resources used.	The Group has worked to confirm sustainability and enhance traceability by making use of forest certification systems, and through other efforts. The wood chips and pulp used for papermaking in FY2021 were all made from wood approved by FSC®*2 or PEFC (including controlled wood and controlled sources).
▶ Promote the use of domestic forest resources.	The use of domestic wood at all Nippon Paper mills reached 37.6% in FY2021 (based on actual purchases).

Promote the circulation of resources.

▶ Work to build a recycling system that promotes resource circulation	The Company has been conducting a test and verification project for collection of paper used for food containers since April 2021, with the support of Hamamatsu City. In addition, the Company started to build a recycling system by installing recycling facilities in Fuji Mill of Nippon Paper Industries which is slated to start operation in October 2022.
▶ Utilize 12,000 t/year of unused recovered paper, which has been difficult to recycle, through the development of recovered paper utilization technology.	The amount of previously unused and hard-to-process wastepaper used in FY2021 was 22.5 tonnes (22.14 tonnes of plastic compound paper and 0.34 tonnes of used paper cups) (consumed at Kanto Mill (Soka) of Nippon Paper Industries).

3. Reduce environmental impact

Reduce the environmental impact of manufacturing processes.

Target	Progress and Status of Initiatives
▶ Reduce air pollutants by 15% and water pollutants by 15% compared to FY2018.	The Group reduced air pollutants and water contaminants through initiatives related to facility improvement and energy saving. SOx 34%, NOx 22%, soot and dust 21%, COD/BOD 23%, and SS 9% (reduction rate at production sites in Japan compared with FY2018)
▶ Reduce the final disposal of industrial waste at domestic production sites to 2% or less.	The final disposal of industrial waste at production sites in Japan was 2.1%.
▶ Provide society with products and services that have minimal environmental impact throughout their entire life cycle.	The Group sells products such as heat-sealing plastic-free paper “Lamina®” and multi-functional corrugated paper “Waterproof Liner” as products that contribute to reduction of the use of plastics, and to resource recycling.

*1 FSC® Logo License No. FSC® C023383 (AMCEL:Brazil)
*2 FSC® Logo License No. FSC® C001751 (Nippon Paper Industries)

Strengthening Environmental Compliance

Two-Pronged Approach to Environmental compliance

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

Two-Pronged Approach

1. Building Systems to Prevent Problems
   - Building a workplace that emphasizes the importance of the environment (environmental compliance training)
   - Strengthening the system for identifying applicable laws and regulations
   - Implementing measures from both the facility and technology perspectives
2. Establishing a Framework that Ensures All Problems are Covered
   - Enhancement of environmental audits
   - Enhancement of environmental management system
   - Engaging in environmental communication and active information disclosure

Environment-related* fines and penalties

Environment-related fines and penalties (FY2021)	0 Yen

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

Systems to Ensure that the Laws and Regulations in Japan and Overseas 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, etc. to search for and share information on revised laws and relevant trends, and which ensures 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 regular environmental audits by double-checking through internal audits by each business site and audits by the head office’s environmental department.

<Examples of Environmental Audits>

- ▶ 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 initiatives based on the guidelines.

<Examples of Environmental Communication>

- ▶ Environmental risk communication for local residents and local governments (at least once a year in principle).
- ▶ Preliminary briefing session on the environmental impact of construction and operation when introducing large equipment, etc.

Responses to Opinions and Complaints

- ● The Group has a system to accept opinions.
  - ▶ Acceptance of opinions and inquiries on the Company website
  - ▶ Establishment of a contact point for complaints and inquiries at mills
  - ▶ Utilization of an environmental monitoring system to request local residents to provide information
- ● When a complaint is received, the Group moves swiftly to determine possible causes, and implement emergency and permanent solutions. The Group also explains to the person who lodged the complaint what happened and what was done to resolve the situation, so that they can be satisfied that the Group has responded appropriately.

Environment-Related Complaints in Japan (FY2021)

Complaints	Noise/Vibration	Odor	Dust and mist dispersal	Smoke	Other	Total
Number	4	6	1	0	0	11

Environmental Education and Training for Employees

The Group conducts environmental education for employees.

<Examples of Environmental Education>

- ▶ Encourage participation in pollution control-related qualifications and external training to gain specialized knowledge
- ▶ 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 (FY2021)

Program Name	Number of participants
Let's reduce plastic waste! ~ New law is made ~	Over 7,400

Addressing Climate Change

- The Nippon Paper Group sees addressing climate change as one of its material issues for realizing the Group Mission.
- Under the 2030VISION, in its mid- and long-term basic policy, the Company states “reduce GHG 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.
- Japan Paper Association, of which the Company is a member, listed five targets including “Achieving a Low Carbon Society” as environmental policy in 2012, and is working to achieve a course of action to materialize them.

The Nippon Paper Group’s FY2030 Targets

Reduce GHG emissions (Scope 1 and 2) by 45% compared with FY2013

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

Green strategy

・Improve CO_2 fixation efficiency in overseas plantation areas by 30% compared to 2013

・Respond to demands to eliminate and reduce plastic (increase products that replace plastic with paper)

▼

Carbon neutrality in 2050

Initiatives to Achieve Carbon Neutrality

- The Group is working to achieve carbon neutrality at each stage of its 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_2 through the appropriate management of company-owned forests (carbon sequestration).
- The Company has reviewed the Group energy mix and introduced internal carbon pricing (2,000 Yen/t-CO_2) from 2021 in order to accelerate the reduction of GHG emissions.

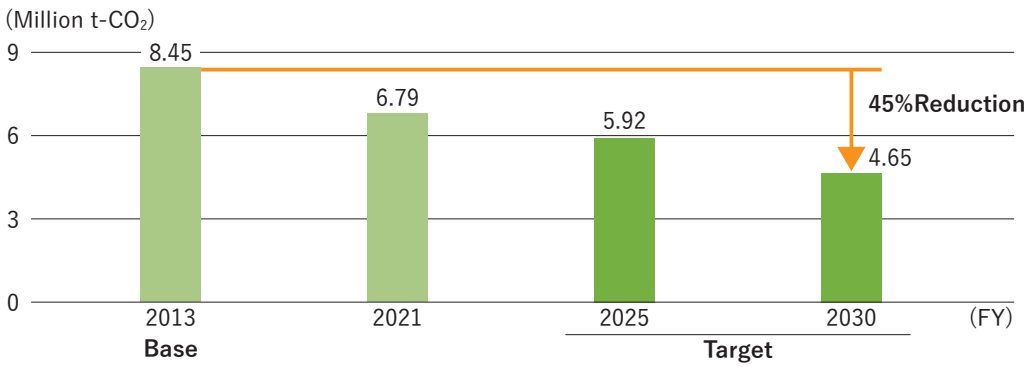
Realize carbon neutrality

▲

The Nippon Paper Group’s initiatives

Reduction of GHG emissions from business activities		Absorption and fixation of CO_2 in Company-owned forests
▲		▲
Fuel conversion	Energy conservation in manufacturing and logistics processes	Absorption and fixation of CO_2 through appropriate management of company-owned forests

GHG Emissions (Scope 1 and 2)



GHG emissions (Scope 3, FY2021)

Scope of organizations covered : Nippon Paper Industries, Nippon Paper Crecia, Nippon Paper Papylia

Scope of businesses covered : paper and paperboard business, daily-life products business

Category		Emissions (thousand t-CO_2)
1	Purchased goods and services	1,806
2	Capital goods	97
3	Fuel- and energy-related activities (not included in scope 1 or scope 2)	1,149
4	Upstream transportation and distribution	683
5	Waste generated in operations	57
6	Business travel	1.8
7	Employee commuting	6.0
8	Upstream leased assets	Not applicable
9	Downstream transportation and distribution	237
10	Processing of sold products	67
11	Use of sold products	0
12	End-of-life treatment of sold products	173
13	Downstream leased assets	Not applicable
14	Franchises	Not applicable
15	Investments	Not applicable
Total		4,276

Category 2,6,7 : Applies to all businesses, including other than scope of businesses covered

Category 11 : Paper and paperboard products, which are our main products, are assumed not to use energy when using the products

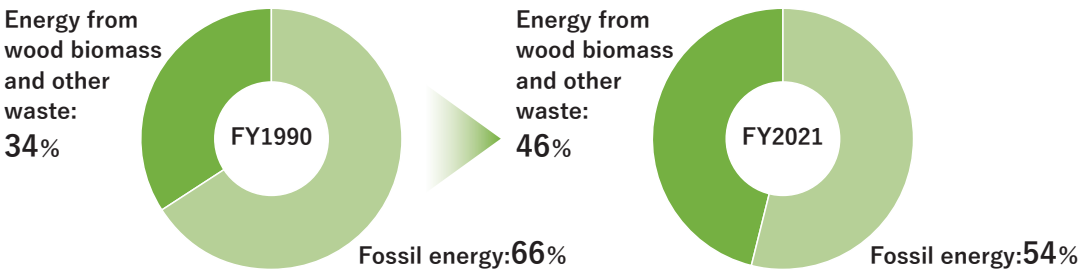
Fuel Conversion

- 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.
- The amount of woody biomass energy used by the Group in FY2021 was equivalent to around 3.4%[*1] of all non-fossil energy supplied in Japan (excluding nuclear and hydroelectric power).
- The Group has also installed two types of boilers—high efficiency boilers, and boilers capable of burning construction waste and other biomass fuels, used tires, RPF[*2] and other waste fuels.

*1 Estimated by Nippon Paper Industries based on domestic primary energy supply data (finalized data for FY2020) published by the Agency for Natural Resources and Energy

*2 RPF: Refuse derived paper and plastics densified fuel. This is a high-grade solid fuel made mainly from those paper and plastic industrial waste materials which are difficult to recycle. (From the website of Japan RPF Industry Association)

Fossil energy usage ratio (calorie conversion) of all fuels used



CASE STUDY Use of Torrefaction Technology and Wood Biomass Fuels

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

CASE STUDY In-house Production of Solid Fuel from Waste

The Company's Otake Mill converts the paper sludge[*1] and wastepaper residues[*2] 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 FY2021, the mill produced 6,940 BD t[*3] 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.

Energy Conservation in Manufacturing and Logistics Processes

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. It endeavors to increase the effectiveness of these efforts by seeking to share examples of effective initiatives with other mills.
- 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.
- The Group is striving to save energy in and outside Japan by introducing more efficient facilities and reviewing manufacturing processes.

<Examples of Energy-saving in Manufacturing Processes>

▶ Reduction of heating steam in the system by efficiently collecting hot water (Asahikawa mill, Nippon Paper Industries)
▶ Use of a highly efficient beating machine at the beating process in manufacturing (Akita mill, Nippon Paper Industries)
▶ Utilization of a co-generation system (Use of steam with high temperature and pressure obtained in combustion at a boiler in power generation and production processes)

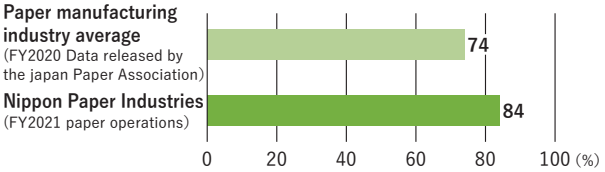
Promoting energy-saving in logistics processes

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.

<Examples of Energy-saving in Logistics Processes>

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

Comparison of modal shift rates



Green Management Certifications* (Consolidated and non-consolidated subsidiaries in Japan as of April 15, 2022)

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

Of those locations that have obtained certification, 16 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).

* 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.

Eco Rail Mark Certifications* (as of July 31, 2021)

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

* The certification, established by the Ministry of Land, Infrastructure, Transport and Tourism, applies to companies (and the products of companies) which use more than given percentage of rail freight transportation, which generates lower unit CO_2 emissions.

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).

* Each of them has the transportation capability equivalent to roughly two heavy-duty trucks, and CO_2 emissions per weight of the trucks (vehicles over 21m) are reduced by about 30% compared to ordinary heavy-duty trucks (12 m vehicles) (according to NLJ actual values).

Absorption and Fixation of CO_2 through Appropriate Management of Company-owned Forests

- The Group is in compliance with the Clean Development Mechanism (CDM) of the Kyoto Protocol and considers that the forests absorb CO_2 while growing and the CO_2 is deemed emitted to the atmosphere when trees are harvested.
- The forests owned by the Group in Japan and overseas are harvested and replanted based on the business plan for the purpose of using resources.
- Part of the amount of CO_2 absorbed through proper forest management and continuous thinning has been certified as "J-credits*" after inspection.
  * A system in which the government certifies as "credits", the amount of CO_2 emissions reduced through the introduction of energy-saving equipment, the use of renewable energy, and the absorption of CO_2 through appropriate forest management.
- The amount of net absorption of CO_2 in company-owned forests in Japan and overseas (amount of absorption minus amount of harvesting) was approximately 250 thousand tonnes, and the total amount of sequestered CO_2 was approximately 31 million tonnes.
- The Group estimates that the amount of sequestered CO_2 in forests in environmental protection area established in afforestation projects overseas is approximately 10 million tonnes.

J-クレジット販売実績

Company	Credit name	FY2017	FY2018	FY2019	FY2020	FY2021
Nippon Paper Industries	Fuji/Kitayama company-owned forest thinning promotion project	2cases	—	1case	—	2cases
Nippon Paper Lumber	Gunma/Sudagai company-owned forest thinning promotion project	3cases	—	2cases	1case	2cases

CASE STUDY

Utilization of J-Credits

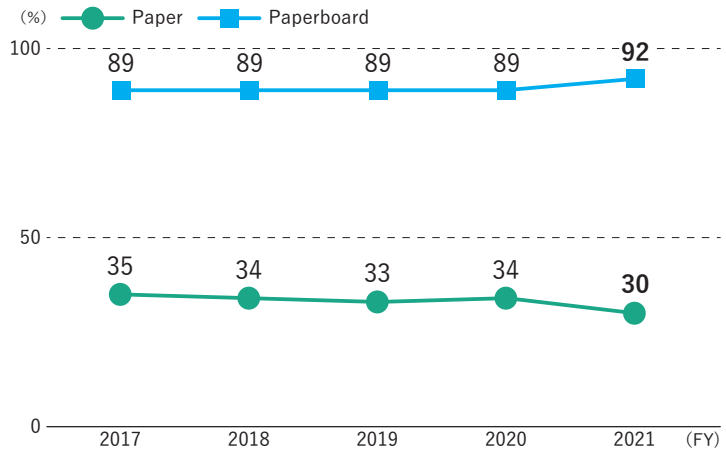
In FY2021, the Group's J-Credit was used in International Coastal Cleanup conducted by the employees of Coca-Cola System as a carbon offset (offset of 1-tonne of CO_2 per participant to promote reduction of CO_2 emissions).

Promotion of Resource Circulation

Initiatives for Using Wastepaper

The Nippon Paper Group considers wastepaper as important raw material and is working on the recycling of unused wastepaper.

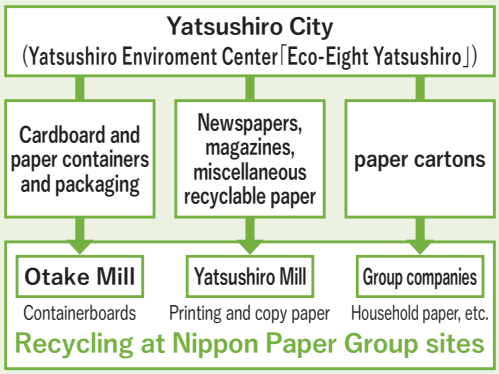
Trend of used paper utilization rate (in Japan*)



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

CASE STUDY Circular Use of Wastepaper in Collaboration with Local Governments

The Company's 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.



CASE STUDY Collaborative business for recycling used food paper containers (Nippon Paper Industries)

The Company has been conducting tests of self-collection of paper containers for ice cream and other foods with the support of Hamamatsu City since April 2021. This project, being carried out together with Hamamatsu Green Wave Co., Ltd. and NPO Ecolife Hamamatsu, uses collection boxes installed at Ecohama, a facility in Hamamatsu City to raise environmental awareness, and other locations where used paper containers are collected and brought to one of the Company's mills to be utilized as raw material for paper. This will contribute to raising general consumers' awareness of recycling, reducing the volume of incinerated rubbish and fixing carbon by prolonging use of woody resources.

CASE STUDY Closed Loop Initiatives (Nippon Paper Industries)

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

CASE STUDY Collection and Recycling of Paper Cups (Nippon Paper Industries)

The Company collects paper cups used at its head office and recycles them into material for containerboard at its Ashikaga Mill. Since this initiative was launched in September 2019, the Company has collected a total of around 363,000 cups (as of July 31, 2022).

CASE STUDY Paper Carton Recycling “PakUpcycle®”

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

<Paper-Pak Carton Collection and Recycling>

The Company has installed Paper-Pak collection boxes at Group company sites and is working to increase employee awareness of Paper-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 2017, the Company commenced collection activities using a proprietary method, primarily in Nerima City, Tokyo (four tonnes were collected in FY2021). The collected Paper Paks are used as raw material for household paper products.

<Recycling of Beverage Paper Packs with Aluminum>

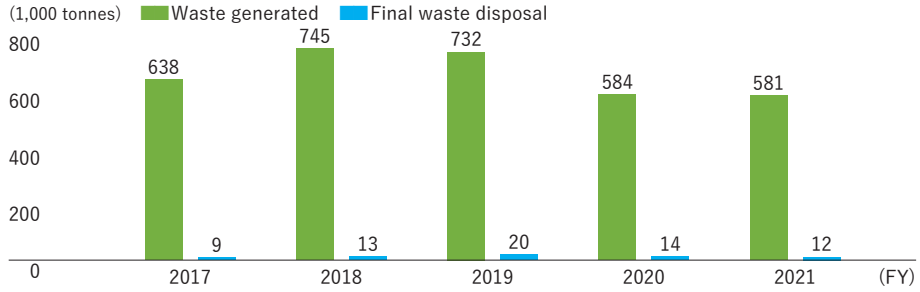
The Company is working on the development of mixture of polyethylene and aluminum jointly with RIPRO Corporation, Japan and HAGIHARA INDUSTRIES INC. to material-recycle* the mixture processed as waste in the recycling process of the beverage paper packs with aluminum. In 2021, a boundary stake made of the mixture was introduced in several forestry unions.

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

Waste Recycling

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

Waste generated and final waste disposal (in Japan*)



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

CASE STUDY Circular Use of Quicklime (Nippon Paper Industries)

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

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

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

CASE STUDY **Local Production and Consumption of Energy (Nippon Paper Industries)**

At the Company's Nakoso Mill, waste generated in neighboring areas is actively used as fuel. This waste includes shiitake mushroom beds and rubber chips from artificial turf. The use of waste as fuel allows the Nakoso Mill to reduce its use of fossil fuels. The local production and consumption of fuel has not only contributed to reducing GHG emissions from the Nakoso Mill, but it has also helped to reduce waste generated in local areas.

Response to the Plastic Resource Circulation Act

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

Control of Generation and Discharging

- The Group is striving to control the generation and discharging of plastic waste by encouraging simple packaging and the use of returnable containers for products in which plastic is used in its business activities.
- As for waste plastic derived from waste paper used as raw material, the Group is encouraging waste paper suppliers to prevent mixture of plastic through Japan Paper Association.

Recycling

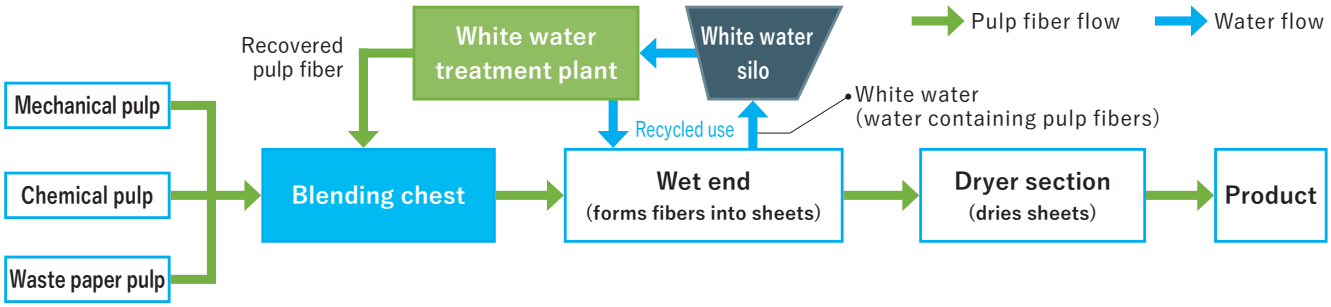
- As it is difficult to material-recycle waste plastic derived from waste paper, the Group burns and collects it as heat to use it as energy to operate mills as thermal recycling.
- The Company's Otake Mill conducts thermal recycling by transforming waste plastic and other wastes generated in Otake City as well as in the mill into solid fuel (see P. 34).

Alleviation of Environmental Burden

Effective Use of Water Resources

- The Group's main mills are working on saving of water by recovering "white water," which contains very fine pulp fibers from the wet end of the papermaking process, and recycling it.
- In FY2021, the Group has received no information from local government authorities or residents to indicate that the mills operated by the Group companies are having an environmental impact as a result of their water intake, and water risks in Japan and overseas are persistently low.

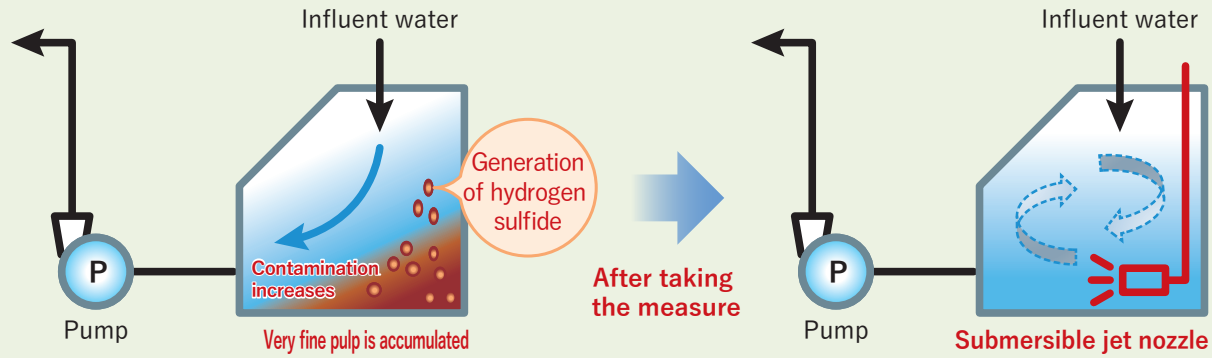
Water Recycling System



CASE STUDY Initiative for Water Saving in Manufacturing Processes (Nippon Paper Industries)

There is a concern that water saving in manufacturing process may result in an increase in recycled water, contamination of the system caused by closing the processes and the generation of hydrogen sulfide derived from corruption generated by accumulated very fine pulp. In order to save water use and mitigate the concern, the Company installed a submersible jet nozzle with an eductor effect* in Ashikaga and Yatsushiro mills. This makes it possible to purify inside the system by eliminating the contamination at the bottom of the pit due to strong currents in the liquid. The Company will introduce the nozzle in other mills in Japan.

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



Inside the pit in the manufacturing process before installing a submersible jet nozzle

Inside the pit in the manufacturing process after installing a submersible jet nozzle

Controlling Chemical Substances

- The Group examines the chemical substances it uses in its production processes in accordance with its Chemical Substance Management Guidelines. The Group exerces risk management by monitoring how much of these substances is used and how much is released into the environment. The Group also takes corrective actions as necessary.
- The Group discloses information on its management, release, and transfer of PRTR*-controlled substances to local stakeholders through environmental risk communications at each of its mills and other production sites.

Amounts of Substances Subject to the PRTR Law Released and Transferred[*1] (FY2021)

Cabinet Order No.	Chemical Substance	Amount Released	Amount Transferred	Total released and transferred
1	Water-soluble zinc compounds	300	0	300
2	Acrylamide	11	0	11
4	Acrylic acid and water-soluble salt	14	0	14
9	Acrylonitrile	1.4	0	1.4
53	Ethylbenzene	1.4	0	1.4
57	Ethylene glycol monoethyl ether	250	5,100	5,350
80	Xylene	555	0	555
85	Glutaraldehyde	17	1.7	19
127	Chloroform	39,252	40,000	79,252
149	Tetrachloromethane	0	35,000	35,000
154	Cyclohexylamine	730	0	730
186	Dichloromethane; Methylene dichloride	10,000	80	10,080
213	N,N-dimethylacetamide	130	190	320
232	N,N-dimethylmethanamide	38	190	228
243	Dioxins[*2]	764	4,122	4,886
245	Thiourea	2,300	0	2,300
251	O,O-dimethyl O-3-methyl-4-nitrophenyl phosphorothioate;fenitrothion; MEP	0.3	0	0.3
272	Water-soluble copper salts (except complex salts)	7.9	0	7.9
296	1,2,4-trimethylbenzene	491	0	491
297	1,3,5-trimethylbenzene	5.9	0	5.9
300	Toluene	27,652	18,200	45,852
302	Naphthalene	0.4	0	0.4
304	Lead	0	0	0.0
305	Lead compounds	0.4	0	0.4
318	Carbon disulfide	6,547	0	6,547
332	Arsenic and its inorganic compounds	0.4	0	0.4
333	Hydrazine	370	0	370
374	Hydrogen fluoride and its water-soluble salts	26,130	0	26,130
392	N-hexane	1.4	0	1.4
395	Water-soluble salt of peroxodisulfate	1,300	0	1,300
400	Benzene	0.2	0	0.2
405	Boron compounds	20,806	0	20,806
406	Polychlorinated biphenyls; PCBs	0	7,187	7,187
407	Poly(oxyethylene)alkyl ether(alkyl C=12-15)	6.3	0	6.3
411	Formaldehyde	939	85	1,024
412	Manganese and its compounds	4.6	0	4.6
415	Methacrylic acid	2.0	0	2.0
420	Methyl methacrylate	23	0	23
438	Methylnaphthalene	722	85	807
1-044	Alkyl(C=12-16) (benzyl) (dimethyl) ammonium chloride	866	0	866
1-380	1-hydroxyethane-1,1-diyldiphosphonic acid	2,880	0	2,880
2-060	Geraniol	268	0	268
Total[*3] Unit : kg		142,625	106,119	248,743

*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 the Group's mills contain almost no heavy metals, trichloroethylene or other soil contaminants.
- FY2021 was another year in which there were no instances of contaminated soil generated at the Group companies.

Preventing Air and Water Pollution

- The Group has introduced equipment and technology to reduce air pollutants such as sulfur oxides (SOx) and nitrogen oxides (NOx) and organic substances contained in wastewater to the standard levels designated by laws and regulations, or the levels agreed upon with local governments, or lower, before discharge.
- The Group carries out activated sludge treatment to reduce contaminants in wastewater.
- Contaminants in the air are reduced with NOx removal equipment, desulfurization equipment, a dust collector, etc.

Preventing Noise and Vibration

The 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 (Nippon Paper Industries, NIPPON PAPER UNITEC)

Nippon Paper Industries and NIPPON PAPER UNITEC have developed the "e-musen junkai®" (e-wireless patrol) system, which uses wireless sensors to constantly monitor equipment for signs of abnormalities. The system enables early detection of abnormalities by accumulating and monitoring the data of technology and technique of human experiences and feeling that cannot be quantified using IoT. This will contribute to the prevention of equipment problems and the solution to issues related to the difficulty in inheritance of technique due to labor shortage. The Company introduces the system in its mills and sells it in Thailand and other countries (see P. 52).

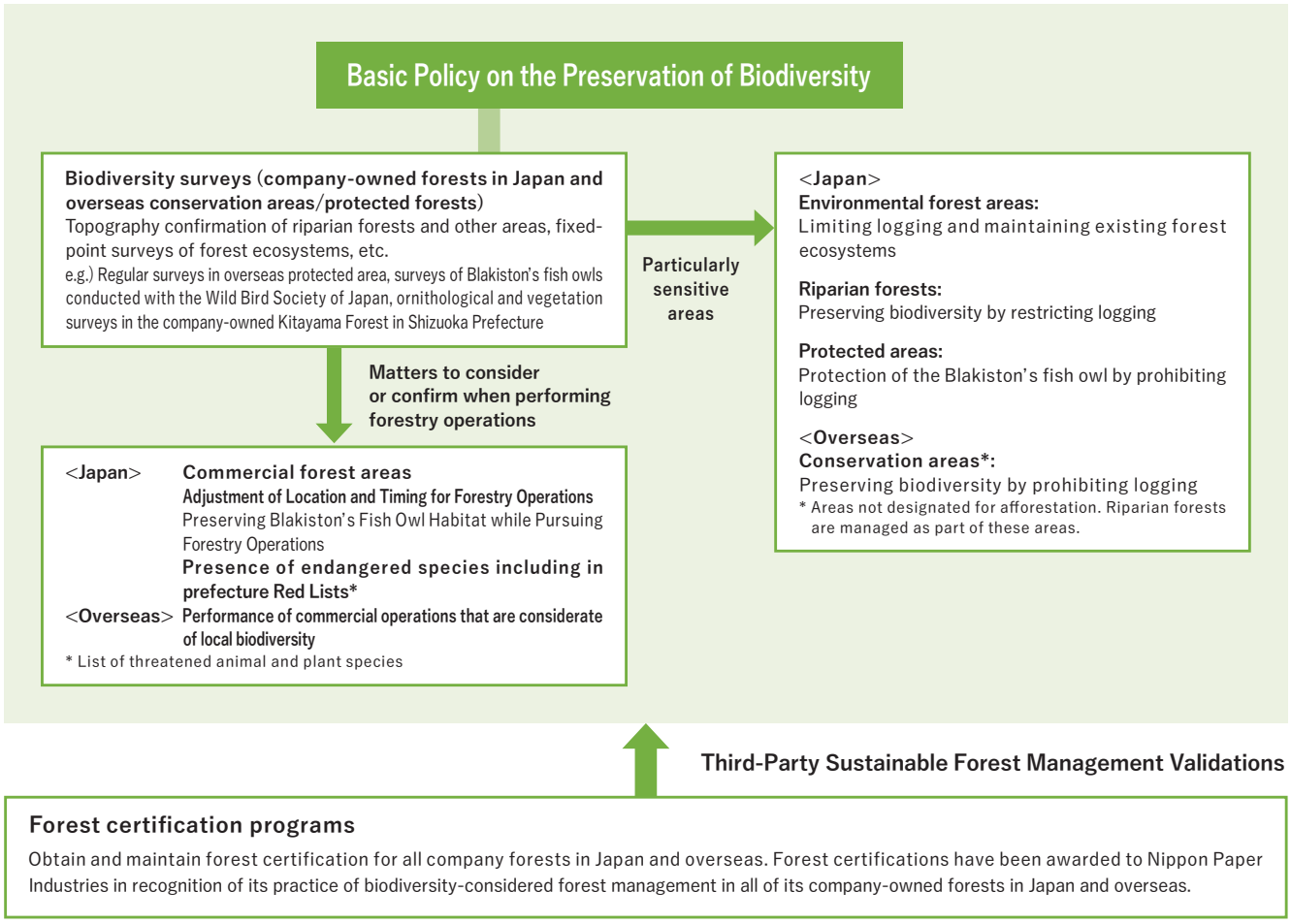
Preserving Biodiversity

》Basic Policy on the Preservation of Biodiversity (see P. 87)

Biodiversity Conservation Initiatives

- Nippon Paper Industries' business foundation is forest resources. In Nippon Paper Group Environmental Targets 2030, the Group has set targets for sustainable forest management that consider biodiversity.
- The Group sustainably procures wood resources, which are the raw materials for the Group's products, from properly managed forests.
- The Group manages sustainable forests in its own forests in Japan and overseas.
- In its existing businesses, topographical information on riparian forests and other landforms that need to be taken into account is confirmed and fixed-point surveys of forest ecosystems are carried out, while forests for economic use and those for environmental conservation are managed appropriately, for example by establishing protected areas and protected forests that are not logged to conserve biodiversity.
- The 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.

Nippon Paper Group's Biodiversity Conservation Initiatives (Summary)



CASE STUDY Preserving Blakiston's fish owl* habitat while Pursuing Business Activities-
Collaborating with the Wild Bird Society of Japan (Nippon Paper Industries)

The Company carries out initiatives to conduct business activities while protecting Blakiston's fish owl habitat with the Wild Bird Society of Japan.

Collaborating with the Wild Bird Society of Japan

Year	Activities
2010	Entered into an agreement on the protection of wild birds with which forestland owned by the Company in Doto, Hokkaido was identified as a sanctuary.
2015	Set a new standard for the compatibility of business activities with the preservation of Blakiston's fish owl habitat in company-owned forests in Doto, Hokkaido. Won Biodiversity Action Award of the Ministry of the Environment.
2020	Installation of artificial nest boxes to support Blakiston's fish owl breeding
2021	Won Hokkaido Biodiversity Conservation Awards of the Hokkaido Government.

* 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

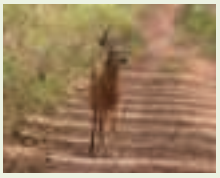
(Photo courtesy of the Wild Bird Society of Japan)

CASE STUDY Conducting Biodiversity Research Overseas (AMCEL Brazil)

AMCEL 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 of AMCEL

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

To protect Shirane-aoi (Glaucidium palmatum: Japanese wood poppy), 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. On the part of the Nippon Paper Group, Nippon Paper Development —which manages Nippon Paper Industries' Sugenuma Forest—has supported the operation of the Shirane-aoi Preservation Group since its initial establishment, and has made a portion of the Sugenuma Forest available to the Group. Since 2002, Group employees have participated as volunteers in activities.

* Designated as a "Threatened II" species for Gunma Prefecture

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

Based on the agreement concluded in 2017 with the Forest Agency Kyusyu Regional Forest Office Okinawa District Forest Office, the Company is conducting emergency countermeasures to exterminate the alien species Amerindia leopardus*, which has invaded Iriomote Island, as well as conducting surveys on the state of invasion of alien plants, together with the NPO Iriomote Island Ecotourism Association, in about 9 hectares of national forests on the island.

* 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.

CASE STUDY

Mutual cooperation in forest management with Coca-Cola Bottlers Japan

The Company, Nippon Paper Group company Marunuma Kogen Resort and Coca-Cola Bottlers Japan Inc. (hereinafter CCBJ) cooperate for the conservation and protection of forest and water resources. They are collaborating on initiatives to keep “Healthy forest” that nurtures “rich water.” The water source area of CCBJ’s Saitama Mill and Iwatsuki Mill are located in part of Suganuma company-owned forest in Katashina Village, Gunma Prefecture (1,746 ha), and the Group promotes the activities of forest conservation and maintenance.

Other environment-related data

Environmental Accounting* (Domestic)

* Calculation standards are based on the Environmental Accounting Guidelines 2005

Environmental Conservation Costs (FY2021)

(Millions of Yen)

Categories	Main contents	Investment	Cost
(1)Business area costs			
①Pollution prevention costs	Measures against air pollution, water pollution, noise and vibration	1,643	11,677
②Global environmental conservation costs	Company-owned forest in Japan nursery care, overseas plantation business, energy-saving investment	2,293	687
③Resources circulation costs	Efficient use of resources, cost of waste management	2,415	8,136
(2)Upstream/downstream cost	Expenses related to collection, recycling, and disposal of pallets and packing materials	—	3,596
(3)Administration cost	Costs for employee training, maintaining ISO 14001, analysis of air and water quality, and management of various conferences	—	286
(4)R&D cost	Product development that contributes to environmental conservation, such as promoting the use of recovered paper, and reduction of environmental impact at the manufacturing stage	—	2,876
(5)Social activity costs	Social contribution activities, group support, corporate action report, Eco-Products	—	62
(6)Environmental remediation costs	Pollution Health Compensation Levy	—	443
Total		6,351	27,763

Environmental conservation impacts (FY2021)

Categories	Environmental Impact Indicators		Results	YoY Change
Effects related to resources introduced to business activities	Plantation projects overseas	Overseas plantation areas	72kha	Down 11kha
	Energy-saving measures	Fuel reduction (Heavy oil equivalent)	35,576kl	Down 1,9062kl
Effects related to environmental impact and waste from business activities	Greenhouse gas emissions		5.58Mt	Down 0.17Mt
	Air pollutant emissions	NOx emissions (NO equivalent)	6,807t	Down 461t
		SOx emissions (SO2 equivalent)	2,362t	Up 350t
		Soot and dust emissions	900t	Up 32t
	Effluent		799Mt	Up 1Mt
	Water contaminant emissions	COD/BOD emissions	37,633t	Down 5,562t
		SS emissions	18,042t	Down 516t
	Final waste disposal		12.1kt	Down 2.1kt
Effects related to goods and services produced from business activities	Product recycling	Recycled paper utilization rate (paper)	30%	Down 4%
		Recycled paper utilization rate (paperboard)	92%	Up 3%
	Shipping material recycling	Pallet recovery rate	42%	Down 4%

Environmental Benefits of Environmental Conservation (FY2021)

(Millions of Yen)

Effect	Amount
Income from company-owned forests in Japan	690
Reduced expenses from energy saved	1,935
Reduced disposal expenses through the effective use of waste	3,494
Gain on sales from the recycled waste	464
Reduced expenses through the recycling of shipping material	1,566
Total	8,149

Balance of Materials

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

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

		Unit	FY2019*1	FY2020*1	FY2021*1
Input					
Energy Input	Purchased electricity	GWh	2,100	1,934	2,425
	Oil	Thousand kl	447	578	434
	Coal	Thousand t	2,637	2,039	2,287
	Gas		272	299	302
	Other fossil fuels		28	23	27
	Non-fossil fules*2		5,997	5,347	5,919
	(Of which Black liquor)		4,643	3,985	4,307
Chemical substances subject to the PRTR Law*3	Amount handled	t	9,270	11,568	11,094
Water Intake	Amount of total water intake	Million t	930	880	953
	River water		757	710	615
	Industrial water		143	140	291
	Well water		29	29	46
	Public water supply		1	1	1
	Rainwater		0	0	0
	Seawater, sea, ocean		0	0	0
	External waste water		0	0	0
Raw Material	Woodchips	Thousand BDt	5,228	5,446	4,699
	Logs		805	702	857
	Pulp	Thousand ADt	512	446	492
	Recycled paper(Pulp)		2,705	3,202	2,802
	Base Paper		102	123	122
	Others		—	—	384
Output					
Gas Emissions	GHG emissions	Million t-CO_2	7.40	6.90	6.79
	(Scope 1)		6.62	6.26	5.83
	(Scope 2)		0.78	0.64	0.96
	Emissions by type of greenhouse gas (Scope 1)				
	CO_2	Million t-CO_2	6.09	5.79	5.38
	CH_4		0.02	0.03	0.03
	NO_2		0.50	0.44	0.43
	SOx emissions	Thousand t	3.97	2.83	3.02
	NOx emissions		10.82	9.39	8.99
	Soot and dust		1.61	1.10	1.23
Chemical substances subject to the PRTR Law*3	Amount released	t	141	150	143
	Amount transferred		80	94	106
VOCs (volatile organic compounds)*4	Emissions	t	41	49	51
Waste Water	Waste water total	Million t	905	843	890
	Public water		896	835	877
	Sewerage		9	8	13
	COD/BOD	Thousand t	59	53	50
	BOD		—	—	43
	COD		—	—	7
	SS		26	24	25
	Nitrogen		1.5	1.3	1.3
	Phosphorous		0.2	0.2	0.2
Waste	Total Waste Generated	Thousand BDt	989	760	848
	Final disposal subtotal		141	72	102
	Recycled subtotal		848	688	746
	Hazardous waste generation*5	BDt	—	1,541	1,610
Products manufactured	Paper, Household Paper	Million t	4.02	3.29	3.64
	Paperboard		2.04	1.88	1.90
	Pulp	Thousand t	239	221	156
	Paper container		88	92	95
	Chemical products		100	93	62
	Building materials		126	80	197
Electricity	Electricity	GWh	2,199	2,384	2,199

*1 Coverage : FY2019 https://www.nipponpapergroup.com/english/csr/npg_csrr2020_e_all.pdf#page=2
FY2020 https://www.nipponpapergroup.com/english/csr/npg_esgdb2021_e_contents.pdf
FY2021 https://www.nipponpapergroup.com/english/csr/npg_esgdb2022_e_contents.pdf

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

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

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

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

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

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

		Unit	FY2019*1	FY2020*1	FY2021*1
Input					
Energy Input	Purchased electricity	GWh	895	804	985
	Oil	Thousand kl	159	147	137
	Coal	Thousand t	1,773	1,619	1,521
	Gas		97	101	140
	Other fossil fuels		27	23	27
	Non-fossil fules*2		4,281	3,582	3,823
	(Of which Black liquor)		3,130	2,561	2,803
Chemical substances subject to the PRTR Law*3	Amount handled	t	402	341	482
Water Intake	Amount of water intake	Million t	805	757	756
	Water intensity	t /product-t	155	168	158
Raw Material	Woodchips	Thousand BDt	4,102	3,344	3,453
	Logs		28	23	20
	Pulp	Thousand ADt	424	350	393
	Recycled paper(Pulp)		2,619	2,658	2,693
	Base Paper		—	—	0.4
	others		—	—	0.3
Output					
Gas Emissions	GHG emissions	Million t-CO_2	6.00	5.49	5.51
	(Scope 1)		5.56	5.17	5.04
	(Scope 2)		0.44	0.31	0.47
	GHG emissions intensity during production	t-CO_2/ product-t	1.16	1.24	1.15
	SOx emissions	Thousand t	3.2	1.7	2.1
	NOx emissions		8.2	7.0	6.5
	Soot and dust		1.3	0.8	0.9
Chemical substances subject to the PRTR Law*3	Amount released	t	97	104	97
	Amount transferred		0.22	6	15
VOCs (Volatile Organic Compounds)	Amount released	t	41	49	51
Waste Water	Waste water total	Million t	789	731	729
	COD/BOD	Thousand t	40	36	38
	SS		18	16	18
	Nitrogen		1.4	1.2	1.3
	Phosphorous		0.1	0.1	0.2
Waste	Total Waste Generated	Thousand BDt	700	553	582
	Final disposal subtotal		19	13	12
	Recycled subtotal		681	541	570
Products manufactured	Paper, Household Paper	Million t	3.6	2.9	3.1
	Paperboard		1.6	1.6	1.6
	Pulp	Thousand t	14	11	17

*1 Coverage : FY2019/Nippon Paper Industries, Nippon Paper Crecia,Nippon Paper Papylia
FY2020/Nippon Paper Industries, Nippon Paper Crecia,Nippon Paper Papylia
FY2021/Nippon Paper Industries, Nippon Paper Crecia,Nippon Paper Papylia,Crecia-Kasuga,Fukuda Paper MFG
*2 Biomass fuels (including black liquor) and waste fuels
*3 Japan only. Dioxins are not included in total data.

Other environment-related

External Awards for Environmental Conservation Activities (FY2021)

Award	Recipient
Sainokuni Saitama Small and Medium Enterprise CO_2 Reduction Grand Prize "Outstanding performance award"	GAC
Fukushima Minpo Fukushima industry award "Special Prize"	Nippon Paper Industries Nakoso Mill

Environmentally-participating initiatives and external collaboration, etc.

Name	Organizer	Year of participation
GX League Basic Concept	Ministry of Economy, Trade and Industry of Japan	2022
Task Force on Climate-related Financial Disclosures (TCFD)		2021
Committee on Nature Conservation	KEIDANREN (Japan Business Federation)	1992
Japan Partnership for Circular Economy	KEIDANREN (Japan Business Federation)	2021
Initiative for Biodiversity Conservation	KEIDANREN (Japan Business Federation)	2021