

The Nippon Paper Group endorsed the Task Force on Climate-related Financial Disclosures (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 Board of Directors of the Company regards addressing climate change issues as an important issue in realizing the Group's Mission. 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 GHG emission reduction and environmental management has been reporting to the Board of Directors on issues once a quarter.

## Risk Management

The assessment of and response to climate change-related risks is integrated into the Group's risk management system and is managed by the Risk Management Committee (see P.9 of ESG Databook 2022). 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 (FY2030)

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

- GHG reduction plan: GHG emissions (Scope 1+2) 45% reduction (compared to FY2013)  
Non-fossil energy use ratio of 60% or more
- Amount of investment to address climate-related risk: ¥52.0 billion
- Internal carbon price: Introduced in FY2021, but temporarily ceased being used in FY2022 due to a surge in the price of fuels such as coal

## Strategy and Scenario Analysis

As a scenario analysis for the year 2021, the Company drew up a vision of society against the backdrop of growing awareness of ESG issues. Using two different scenarios (1.5°C scenario and 4.0°C scenario), the Company conducted qualitative and quantitative assessments of the impacts of climate change risks and opportunities as of 2030 and 2050 on its financial plans, and reported the results to the Board of Directors.

### — Scenario Analysis Methods

#### (1) Establishing an image of society

##### 1.5°C scenario (RCP 2.6)

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

##### 4°C scenario (RCP 8.5)

No policies will be introduced to control temperature rise. While some stakeholders will take actions to limit temperature rise from the perspective of promoting ESG management, regardless of whether policies are introduced or not and regardless of what society as a whole is doing, society generally will not take actions to limit temperature rise. As a result, temperatures will rise more rapidly than in the 1.5°C scenario, and the frequency of severe disasters will increase, temperatures will rise, and precipitation patterns will be more changeable in 2030 than in the current situation.

(2) Evaluation Items

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

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

— Summary of Analysis Results

Since the pulp and paper industry is an energy-intensive industry, transition factors such as 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 Company is focusing on 45% reduction of GHG emissions, shift to multiple production sites, and green strategy. In regard to GHG emission reduction in particular, the Company will work to ensure strategic resilience by taking additional measures and achieving GHG reduction targets at an early stage through accelerated realization of scenarios in the 2030 Vision.

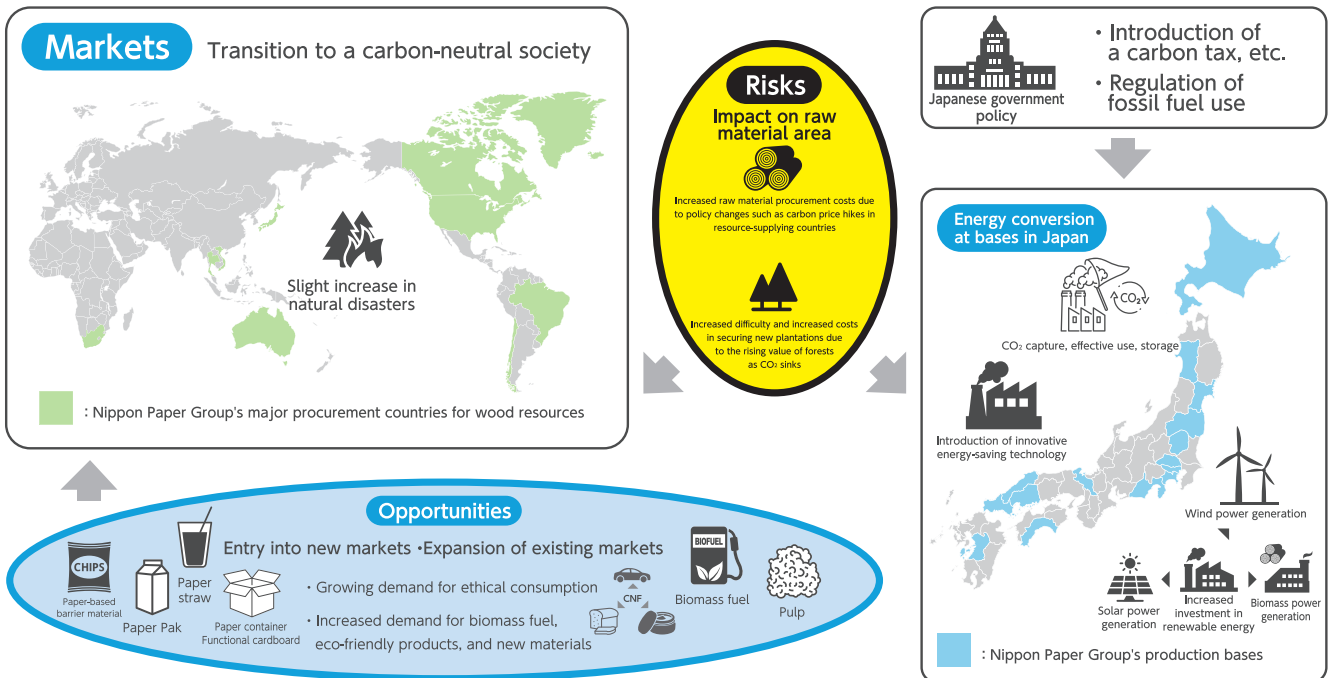
On the other hand, there are many opportunities for the Company to leverage its strengths to enter, and grow in, markets that are being created and expanded due to the introduction of policies and changes in market needs. As for adaptation to climate change, measures to shift to multiple production sites 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.

**[1.5°C scenario]**

2030

Costs such as a carbon tax will increase.

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

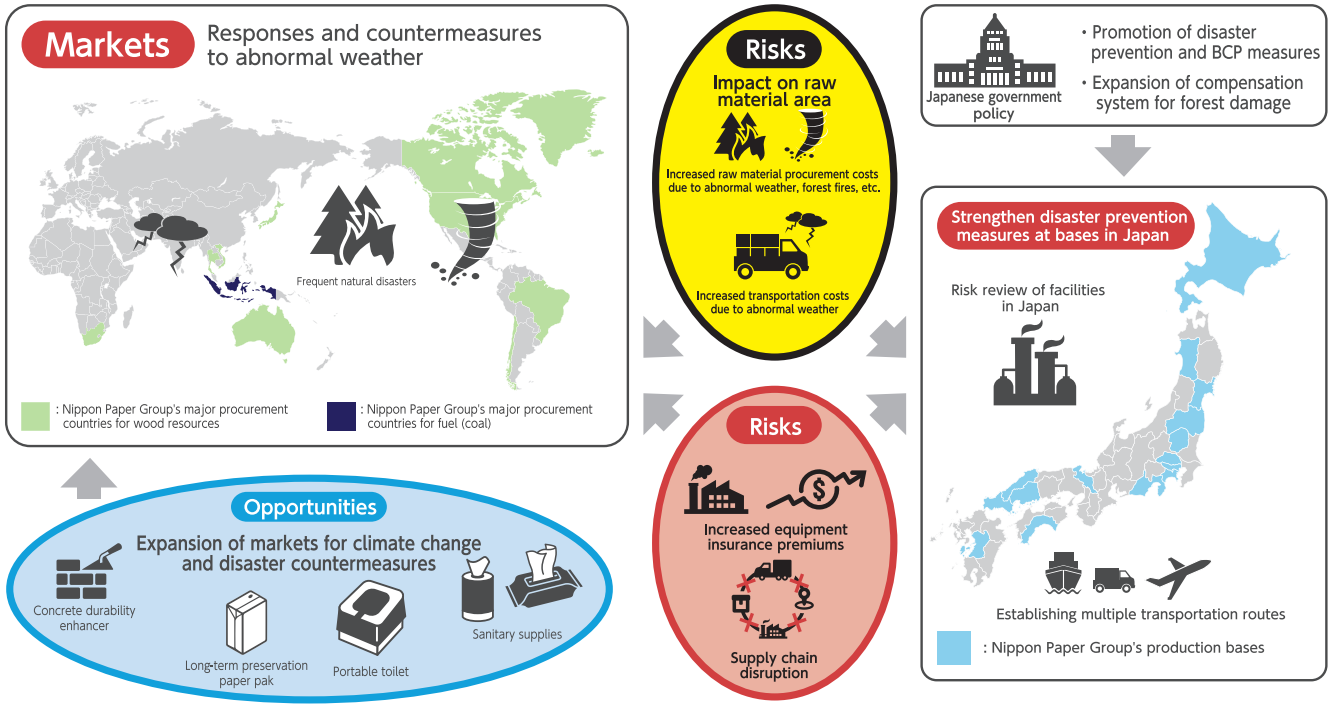


**[4°C scenario]**

2030

**Increased physical risk.**

On the other hand, business opportunities for climate change and disasterresponse products will expand.



**Climate Change-Related Risks**

**Risks as of 2030**

Factors		Impact on the Company	Risk assessment	
			1.5°C scenario	4°C scenario
Transition factors	Policy introduction (e.g., carbon tax, changes in energy mix)	• Energy procurement costs will increase.	High	Low
		• Capital investment costs for fuel conversion and energy conservation will increase.		
		• Raw material procurement costs will increase.		
		• Increased acquisition cost of plantation project sites		
Transition factors	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 factors	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 of products	Medium to high	High
		• Procurement, manufacturing, and logistics costs will increase.		
	Increase in temperature and change in precipitation patterns	• Increase in turbidity of rivers, etc., from which water is taken, resulting in production stoppage and delay or stoppage of deliveries of products	Medium	High
		• Losses in the company's plantation assets		
Physical factors	Increase in temperature and change in precipitation patterns	• Raw materials will become difficult to procure and procurement costs will increase.	Medium	High
		• Costs for search for alternative materials and technology development will increase.		
		• Sales volume decreases or sales price declines due to difficulty in maintaining quality.		

## 1. Transition Factors

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

#### <Hikes in carbon and fuel prices due to introduction of carbon tax, etc.>

Under the 1.5°C scenario, carbon prices 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. At the same time, it is expected that fossil fuel prices will rise, and fuel procurement costs will increase. Since the pulp and paper industry is energy-intensive, financial plans are at risk of being significantly affected by the introduction of these policies.

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

Meanwhile, in response to risk of rising fossil fuel prices expected in the 1.5°C scenario in which all kinds of policies will be introduced, the Group will make maximum use of its Nippon Paper Lumber biomass procurement network, which is one of the largest timber procurement companies in Japan, reducing this risk by accelerating the shift to non-fossil fuels.

In addition, in regard to carbon price hikes due to the introduction of emissions trading schemes and carbon tax, the Group will mitigate risk of an impact on financial plans related to carbon price hikes at an early stage by taking speedier actions to reduce GHG emissions. As part of its measures to reduce GHG emissions, the Group employs energy-saving measures to reduce the use of coal on an ongoing basis. As an indicator, the Group is improving energy consumption per unit of paper and paperboard at its mills by at least 1% per annum. At the same time, the Group is also working on initiatives such as a shift to recycled fuels such as biomass and waste fuels, and to maximize the use of black liquor\* which is a carbon-neutral fuel.

While the Group has set a target of achieving "45% reduction of GHG emissions (compared to FY2013)" in its 2030 Vision, the path to be followed for achieving the target has become much clearer through the execution of various measures. In addition, social demand for reduction of GHG emissions and the possibility of carbon price hikes are growing. Accordingly, the Group has judged that actions are needed to be taken in a manner speedier than ever, and has begun looking at reducing GHG emissions targets even further.

The Group will mitigate risk of an impact on financial plans related to carbon price hikes at an early stage by considering reorganization of the production system, reducing GHG emissions in an integrated manner, and achieving low-carbon consumption early through steps such as controlling output from, or even ceasing the operation of, coal boilers.

The Group believes that there is a high possibility of carbon price hikes triggered by future introduction of emissions trading schemes and other such systems. Therefore, the Group will also work to mitigate risks by participating actively in creating systems, rules, etc., for example through the GX League Basic Concept advocated by the Ministry of Economy, Trade and Industry, so that these systems will contribute to growth of companies.

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

#### <Changes in energy composition>

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

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

In response to procurement risk associated with increased demand for biomass fuel due to the introduction of policies, 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 risks by securing raw materials and stabilizing purchase prices by strengthening relationships of trust based on our long track record with existing suppliers and developing and adopting inexpensive local resources.

#### <Impact on raw material procurement>

Since the Company imports most of the raw materials necessary for its manufacturing from overseas, it may be affected by the policy trends of resource-supplying countries. Under the 1.5°C scenario, carbon prices are expected to be raised due to stricter policies in resource-supplying countries, 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 1.5°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 plantation projects, for the purpose of creating credits, will lead to an increase in the price of land suitable for plantation and an increase in the cost of land acquisition for the Company's plantation business. Such trends have already been seen in some regions.

On the other hand, under the 4°C scenario, some stakeholders may secure plantation 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 plantation business is considered to be small.

Expansion of 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.

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

### <Rapid increase in demand for environmentally friendly products>

Under the 1.5°C scenario, demand for environmentally friendly products is expected to increase, and there is a risk that technology development costs, capital investment costs, etc. will increase in response to this demand while products and services with high environmental burden will no longer be selected in the market.

In the future, the market is expected to favor products and services derived from renewable raw materials, due to expectations of being environment friendly. Therefore, the Company believes that by accurately identifying and forecasting customer needs and further promoting the "paperization" that it is already working on, the Company will be able to promote the replacement of materials with renewable biomass materials, reduce risks associated with changes in market needs, and at the same time seize this as an opportunity to expand its business. The Company will further accelerate reduction of GHG emitted over the course of product manufacturing. At the same time, by taking advantage of the fact that its production bases are dispersed throughout Japan, the Company will offer products that contribute to the reduction of GHG emissions throughout the supply chain by shortening the transportation distance to delivery destinations and reducing GHG emissions during transportation through the use of multiple production bases.

In addition, as part of changes in market needs, under the 1.5°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 more than ever 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 that are a limited resource. 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. Physical Factors

### 2-1. 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 essential services, there is a risk that production sites that do not have their own power generation facilities will be forced to temporarily suspend production.

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

#### <Deterioration of water intake quality>

The Company's main business, pulp and paper, uses water in its manufacturing process. If the water quality (turbidity) of the rivers, etc. from which water is taken deteriorates due to typhoons or heavy rains, product quality cannot be maintained, and there is a risk that production will be suspended until the water quality improves. This event is already occurring, but is expected to become more frequent under the 4°C scenario. Natural disasters are unavoidable, but the Company is taking measures to ensure that operations can continue as long as possible by strengthening its water intake purification facilities and methods, and at the same time, working to reduce risks by developing a detailed system for business continuity in case production is suspended.

## 2-2. Risk Due to Rising Temperatures and Changing Precipitation Patterns

### <Forest fire occurrence>

As temperature rises, 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 revenue from the Company's plantation business will decrease. In order to reduce these risks, the Company is strengthening its fire prevention and extinguishing systems in its own forests, and at the same time, it is trying to reduce these risks by dispersing its own forests and suppliers in multiple countries and regions.

### <Deterioration in plant growth>

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 the 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 has difficulty in procuring raw materials, it would be hard to maintain the quality and function of its products, which may be a risk that its sales volume and price decrease. However, the Company is working to reduce these risks by diversifying its raw material supply sources and continuing to search for alternative materials.

— Opportunities for Business Expansion

Opportunities as of 2030

Factors		The Company's opportunities	The Company's strength	Market growth		
				1.5°C scenario	4°C scenario	
Transition factors	Policy introduction (e.g., carbon tax, changes in energy mix)	• Renewable energy will be introduced.	• Demand for power generation facility locations will increase.	• Company-owned forests and land in Japan, etc. • Biomass fuel production technology • Fuel procurement network • Existing boiler facilities and operation technologies	Expansion	Stable
			• Demand for biomass fuels will increase.			
			• Waste-derived fuels such as refuse derived paper and plastics densified fuel (RPF) and waste tire-derived fuel will be utilized more often.			
		• Next-generation vehicles are becoming increasingly popular.	• Storage batteries will spread and demand for raw materials for storage batteries will increase.	• CMC Technology and Production Facilities • CNF Technology and Production Facilities	Significant expansion	Expansion
			• Demand for CNF will increase due to the need to reduce the weight of automobiles.			
		• Carbon credit market will be activated.	• Demand for forest absorption credits will increase.	• Company-owned forests in Japan • 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 domestic lumber will increase.	• Company-owned forests and in japan seedling businesses • Recycled paper procurement network • Collaboration with Stakeholders • Unused recovered paper recycling technology	Expansion	Stable	
		• Demand for recycled paper will increase.				
	• 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 scale 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 for paperizing increases due to decarbonization.	• Woody biomass materials development technologies (CNFs, paper-based packaging materials, liquid containers, functional corrugated cardboards, biocomposites, etc.) • Technologies to extract and utilize lignin • Technology for recycling unused waste paper	Significant expansion	Expansion	
		• Demand for lignin products will increase.				
	• Demand for environmentally friendly products will increase.	• Demand for paper made from sustainably sourced forest materials will increase.	• Track record of procuring certified forest materials • Relationship of trust with excellent suppliers • Sustainable forest management	Expansion	Expansion	
		• Demand for products that reduce GHG emissions from livestock farming will increase.	• Cellulose material utilization technology	Expansion	Stable	
		• Demand for halogen-free resins with low environmental burden will increase.	• Functional resin technology	Expansion	Expansion	
Physical factors	Increase in the number of catastrophic disasters	• Increasing demand for stable supply of products	• Increased need to purchase from suppliers with established elaborate systems for business continuity	• Multiple production sites	Expansion	Significant expansion
		• Overseas raw material suppliers and distribution networks are damaged.	• Demand for domestic lumber will increase.	• Domestic Company-owned forests and seedling Businesses • Recycled paper procurement network • Fuel procurement network • Collaboration with stakeholders • Unused recovered paper recycling technology	Expansion	Significant expansion
			• Demand for recycled paper will increase.			
			• Domestic demand for waste-derived fuels and biomass fuels will increase.			
	• 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 in the amount of plant growth	• Demand for environmental stress tolerant trees will increase.	• Breeding and propagation technology	Expansion	Expansion	

## 1. Transition Factors

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

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

In the 1.5°C scenario, policies are expected to promote the introduction of renewable energy, which will increase the demand for locations to install solar, wind, and small hydroelectric power generation facilities, as well as the demand for biomass fuels.

The Company owns its forests and land in Japan, and it has an opportunity to expand its business of supplying renewable energy in cooperation with power generation companies. Increasing demand for biomass fuels will provide an opportunity to expand the biomass fuel sales business by making maximum use of the procurement network of Nippon Paper Lumber, one of the largest wood collection and sales companies in Japan.

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

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

Since the transportation sector accounts for about 20% of Japan's 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. 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 5.02 billion in 2021, and is expected to grow at a rate of 23.9% per annum from 2022 to 2030, reaching USD 22.5 billion in 2030.<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 USD228.4 billion in 2019 and is expected to reach USD295.6 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 expected to be about USD70 million in 2022, but it is expected to expand to about USD250 million 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 1.5°C scenario, the diffusion will be rapid due to policy support. The Company believes that it has the technological superiority and technological development capability to respond to this rapid spread, and that it can promptly respond to the rapid market expansion and grow the Company's business.

\*1 Cellulose Nano Fiber

\*2 Report by Report Ocean (U.S.) dated December 17, 2020

\*3 Source: Yano Research Institute, [https://www.yanoresearch.com/en/press-release/show/press\\_id/2959](https://www.yanoresearch.com/en/press-release/show/press_id/2959)

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

In the 1.5°C scenario where the world is aiming for carbon neutrality (net zero CO<sub>2</sub>), the carbon credit market is expected to expand due to increased demand, and the demand for forest absorption credits is expected to increase accordingly.

The Company owns approximately 90,000 hectares of its forests in Japan and operates tree plantation projects in various overseas countries. In addition to forest management technology cultivated through the management of Company-owned forests in Japan and overseas plantation projects, the creation of carbon credits by utilizing the Company's unique breeding and propagation technology that enables highly efficient CO<sub>2</sub> fixation is expected to enable the Company to enter the expanding market and capture business opportunities. The Company is committed to making contribution to formulation of rules regarding how forest absorption credits should be shaped and utilized from a forest owner's perspective, through such initiatives as the GX League Basic Concept advocated by the Ministry of Economy, Trade and Industry.



### <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 1.5°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 utilizes such resources, and at the same time, it operates a seedling business that contributes to creation of new resources. The Company has also established diversified procurement networks in Japan for resources such as fuels and recovered paper. Accordingly, the Company is able to make a shift to utilization of domestic resources. In addition, the Company has already become one of the top-ranked companies in Japan in terms of the domestic timber utilization rate.

The Company is working with stakeholders to create a closed-loop recycling system for 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.

With the aim of establishing a used paper container recycling business, the Company is working to install facilities for recycling paper containers for foods and beverages in Fuji Mill, which is slated to start operation in the fall of 2022. In addition, the Company recycles used paper containers in cooperation with Hamamatsu City, and has established a scheme for separation and collection of paper cups and paper pak products. The Company aims to collect and use unused recovered paper, such as used paper containers, stably (12,000 tons per year) in 2030.

Under the 1.5°C scenario, the Company expects the impact of the policies of resource-providing countries to occur within five years, but the Company believes it can maintain and expand its business by taking advantage of its access to domestic resources.

### <Promotion of carbon recycling>

In the 1.5°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 GHG emissions through the reduction of fossil fuel use.

In the Company's overseas tree plantation business, by continuing the cycle of planting, 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 plantation 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 contribute to the recycling of carbon resources, not just in the Company's own forests.

The Company aims to improve the CO<sub>2</sub> fixation efficiency in overseas tree plantation projects by 30% by FY2030, as compared with FY2013. The Company intends to secure future resources for the Company by contributing to improvement of productivity of forests across the globe and an increase in CO<sub>2</sub> fixation through provision of our breeding and propagation technologies and plantation technologies to other companies. The Company entered into a strategic partnership agreement concerning a plantation project in Indonesia with Marubeni Corporation in 2022, and commenced provision of technological support. In addition, the Company aims to secure about 0.1 million hectares of new plantation resources mainly in Asia. 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.

## 1-2. Opportunities Associated with Transition to a Decentralized Society

Under the 1.5°C scenario, the transition from a metropolitan-intensive society to a decentralized society is expected to proceed. As a result, local production and local consumption of energy will increase, and small-scale demand for fuel will likely increase. This trend has already begun, but it is expected to accelerate under the 1.5°C scenario.

In response, the Company will have the opportunity to expand its biomass fuel sales business by making full use of the biomass procurement network of Nippon Paper Lumber, which is one of the largest wood collection and sales networks in Japan. In addition, with the shift to a decentralized society, the places of consumption of products are also expected to become more dispersed.

In the 4°C scenario, regardless of the temperature rise, there will be a shift to decentralization, but at a slower rate than in the 1.5°C scenario, in part due to the impact of increased risk of infectious diseases.

In both scenarios, the Company believes that it can maintain and expand its business by taking advantage of the fact that its mills are dispersed throughout Japan and by responding to the decentralization.

### 1-3. Opportunities Arising from Changes in Market Needs

#### <Increase in demand for biomass materials>

The Company has built a business model based on carbon-neutral forest resources, which enables it to provide products that meet the needs of customers who prefer environmentally friendly products. There is an ongoing movement to switch from plastic to paper packaging as a means of solving the problem of ocean plastic. In the 1.5°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 is considered to 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 products such as "waterproof liner", a multifunctional base paper for corrugated board that is a sustainable alternative to Styrofoam boxes, "SPOPS®", a replaceable paper container, and "School POP®", which enables drinking without using straws.

Moreover, biomass composites, which are made of "KC FLOCK®", powdered cellulose created by finely grinding pulp, and plastic, are under consideration for various applications as a material with low environmental burden, as the Company can reduce the use of plastic while improving the strength by using biomass composites. It believes that, by providing powdered cellulose suitable for composite material, it can respond to changing market needs and capture and expand business opportunities.

#### <Increased demand for products derived from sustainable forests>

The Company confirms the legality and sustainability of all 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 the Company ensures certainty through its due diligence system and forest resource creation in procurement activities. Moreover, the Group's "Philosophy and Basic Policy Concerning Raw Materials Procurement" was revised in 2022 to strengthen the contents, and the "Principles and Basic Policies Concerning Raw Materials Procurement" was newly established under said policy with the aim of, among others, responding to demand of customers by improving the reliability of wood raw materials that the Group uses.

The Company has been producing various products ranging from pulp to dispersants for industrial use and additives for use in lead-acid batteries which use lignin as a raw material, aiming for full use of wood resources. The Company is committed to continuing to provide environmentally friendly products using sustainable wood resources as raw materials.

#### <Increase in products that reduce greenhouse gas emissions>

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

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 1.5°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.

## 2. Physical Factors

### 2-1. Opportunities Due to the Increase in the Number of Severe Disasters

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

Severe weather disasters, such as typhoons and torrential rains, are expected to cause damage to production 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, recovered paper and domestic non-fossil fuel use expand significantly, the Company can take advantage of its strong timber, recovered paper and fuel 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®”, an admixture for concrete made from coal ash, a byproduct of in-house power generation, by modifying it with its unique technology. “CfFA®” 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 1.5°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 1.5°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®, 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.

### 2-2. Rising Temperatures and Changing Precipitation Patterns

#### <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.